EPA Region 5 Records Ctr.
209958

Investigation Plan to Define the Extent of Free Phase and Dissolved Phase Hydrocarbons in the Village of Hartford, Illinois

Volume II of III: Appendix C

Clayton Project No. 15-03095.12.003
January 7, 2004

Prepared for:
THE HARTFORD WORKING GROUP
Hartford, Illinois

Prepared by:
CLAYTON GROUP SERVICES, INC.
3140 Finley Road
Downers Grove, Illinois 60515
630.795.3200

Clayton
GROUP SERVICES

APPENDIX C

SOIL BORING LOGS/WELL COMPLETION REPORTS

APPENDIX C-1 SOIL BORING LOGS/WELL COMPLETION REPORTS – WITHIN VILLAGE OF HARTFORD

APPENDIX C-2 SOIL BORING LOGS/WELL COMPLETION REPORTS – OUTSIDE VILLAGE OF HARTFORD

Clayton GROUP SERVICES

APPENDIX C-1

SOIL BORING LOGS/WELL COMPLETION REPORTS – WITHIN VILLAGE OF HARTFORD

- HB WELLS
- HMW / VW-1 WELLS
- IEPA WELLS
- PWS (WSW) WELLS
- VCB / BHPE WELLS
- MONITORING PROBES INSTALLED JULY 2003
- SENTINEL WELLS INSTALLED DECEMBER 2003

THE FOLLOWING BORING LOGS ARE UNAVAILABLE AND THEREFORE NOT INCLUDED:

- **HB – 1 & 2**
- **HB-6**
- **HB-12**
- **HB-18**
- **HB-21**
- **HB-22**
- **WSW – 60105 (#5)**
- **WSW – 60106 (#6)**

Clayton GROUP SERVICES

HB WELLS

EXHIBIT
412
1/17/94 BJW

Drilled for 1978 Phase II Study

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES

BORING 3 (HB-3) CONTRACT 465-78

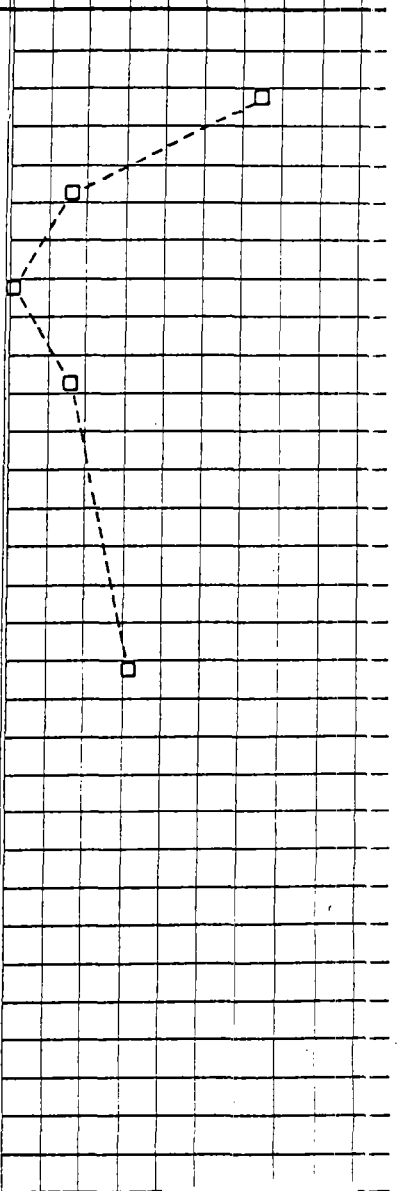
DRILLED BY Gotsch DATE DRILLED 6/1/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Grayish-Brown CLAY w/Silt	3-4	
5	2	SS		Grayish-Brown Silty CLAY -w/Fine Sandy Seams @4.0'	1-2	
	3	SS		-w/Traces Of Fine Sand @7.5'	1/18"	
10	4	SS		Interbedded Brown CLAY & Silty CLAY Seams w/Oxi. Spots ~~& Stains & Traces Of Sand~~	1-2	
	5	SS		Brownish-Gray Fine Sandy SILT	3-5	
15	6	SS			3-3	
	7	SS		Gray CLAY w/Oxi. Spots & Stains Gray Silty CLAY Interbedded w/Fine Sandy Seams	2-3	
20	8	SS		Gray Fine Sandy SILT	3-4	
	9	SS			7-8	
25	10	SS			4-5	
	11	SS		Grayish-Brown Silty Fine SAND	8-7	
30	12	SS	Encountered Water @ 29.5'		4-4	
	13	SS			8-8	
35	14	SS		-w/Dk.Gr. Fi. Sandy Silt Seam @34.0' Cont'd	7-11	

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0)

WATER CONTENT, % (0, 20, 40, 60, 80)



BEI 022559

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 3 Cont'd (HB-3) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/1/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Br. Silty Fine SAND		
				Gray Fine Sandy SILT		
	15	SS			10-13	
				Gray Silty Fine SAND		
40	16	SS		T. O. B.	12-12	
45						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2

PL + WATER ● CONTENT, % + LL — 0 20 40 60 80 100

BEI 022560

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

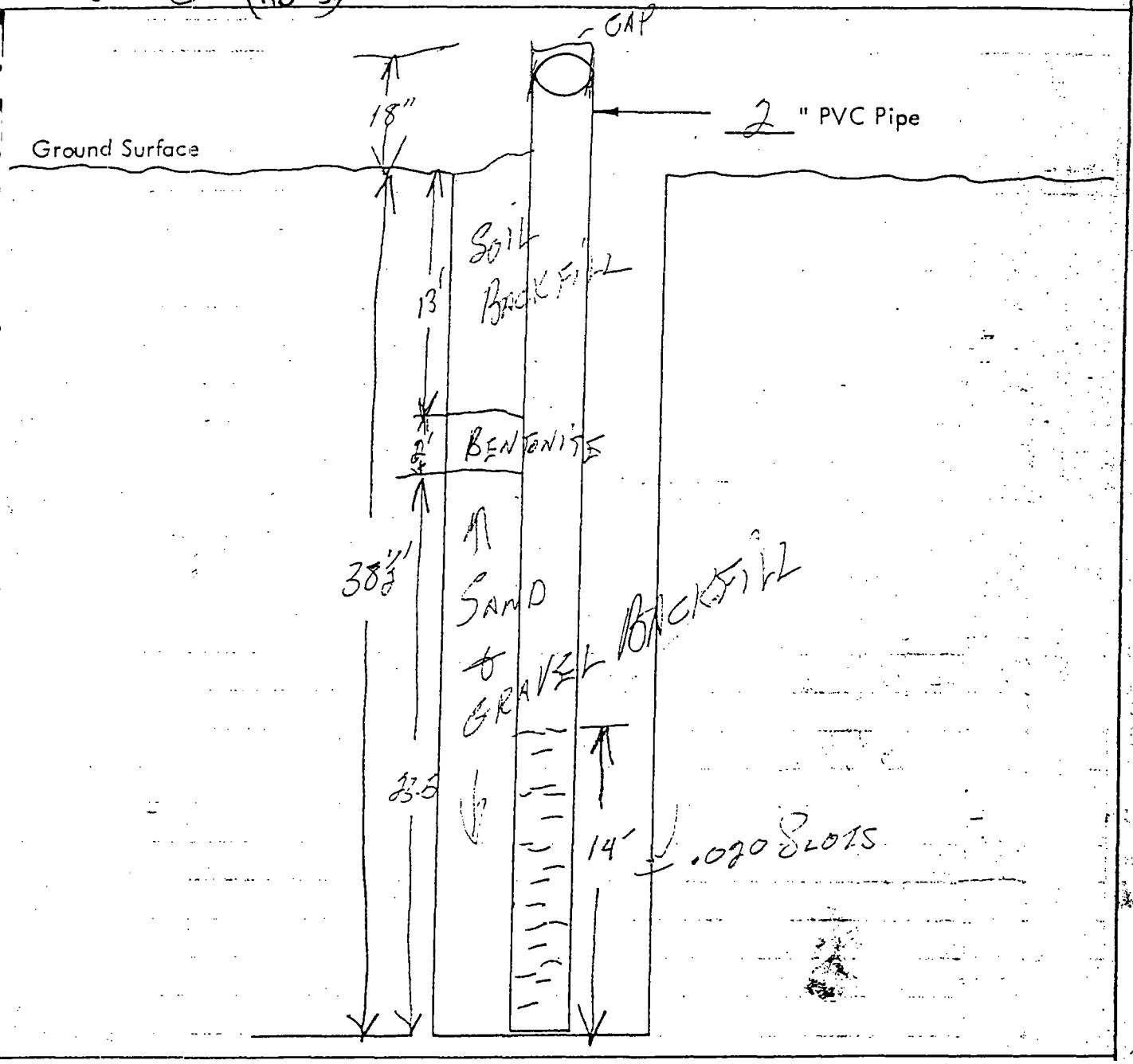
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 3 (HB-3) Contract No. Date Installed



NOTES:

BEI 023423

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 4 (HB-4) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch DATE DRILLED 6/2/78 LOGGED BY Black

PROJECT Phase II Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Dark Gray Fine Sandy CLAY		
	1	SS			3-3	
5	2	SS		Brownish-Gr. Si. CLAY w/Fine Sand, Oxidized Spots & Stains	2-2	
	3	SS		Brownish-Gray CLAY w/Silt Oxidized Spots & Stains	2-2	
10	4	SS		Gray CLAY w/Oxidized Spots & Stains	7-7	
	5	SS			2-3	
15	6	SS			3-3	
	7	SS		Gray Clayey SILT w/Oxidized Stains	1-1	
20	8	SS		Gray CLAY w/Si. Oxidized Spots & Stains	1-5	
	9	SS		Grayish-Brown Silty Fine SAND	7-11	
25	10	SS			6-10	
	11	SS		-Brownish-Gray From 26.5' To 30.5'	11-11	
30	12	SS	Encountered Water @ 29.0'		7-10	
	13	SS		-Gray Below 31.5' -Fine To Medium @31.5'	17-22	
35	14	SS		Cont'd	7-8	

SHEAR STRENGTH, TSF — SV △ — OP/2 □ — QU/2 ○ — 0 0.5 1.0 1.5 2.0 2

WATER CONTENT, % — PL + — ● — LL + — 0 20 40 60 80 100

BEI 022561

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 4 Cont'd (HB-4) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/2/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL ELEVATION	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ● ; 0, 20, 40, 60, 80, 1)
	14	SS		Gray Silty Fine SAND			
				-w/Traces Of Clay @ 36.5'			
	15	SS			7-9		
				-Fine To Medium w/Silt @ 39.0'			
40	16	SS		T. O. B.	8-10		
45							

BEI 022562

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

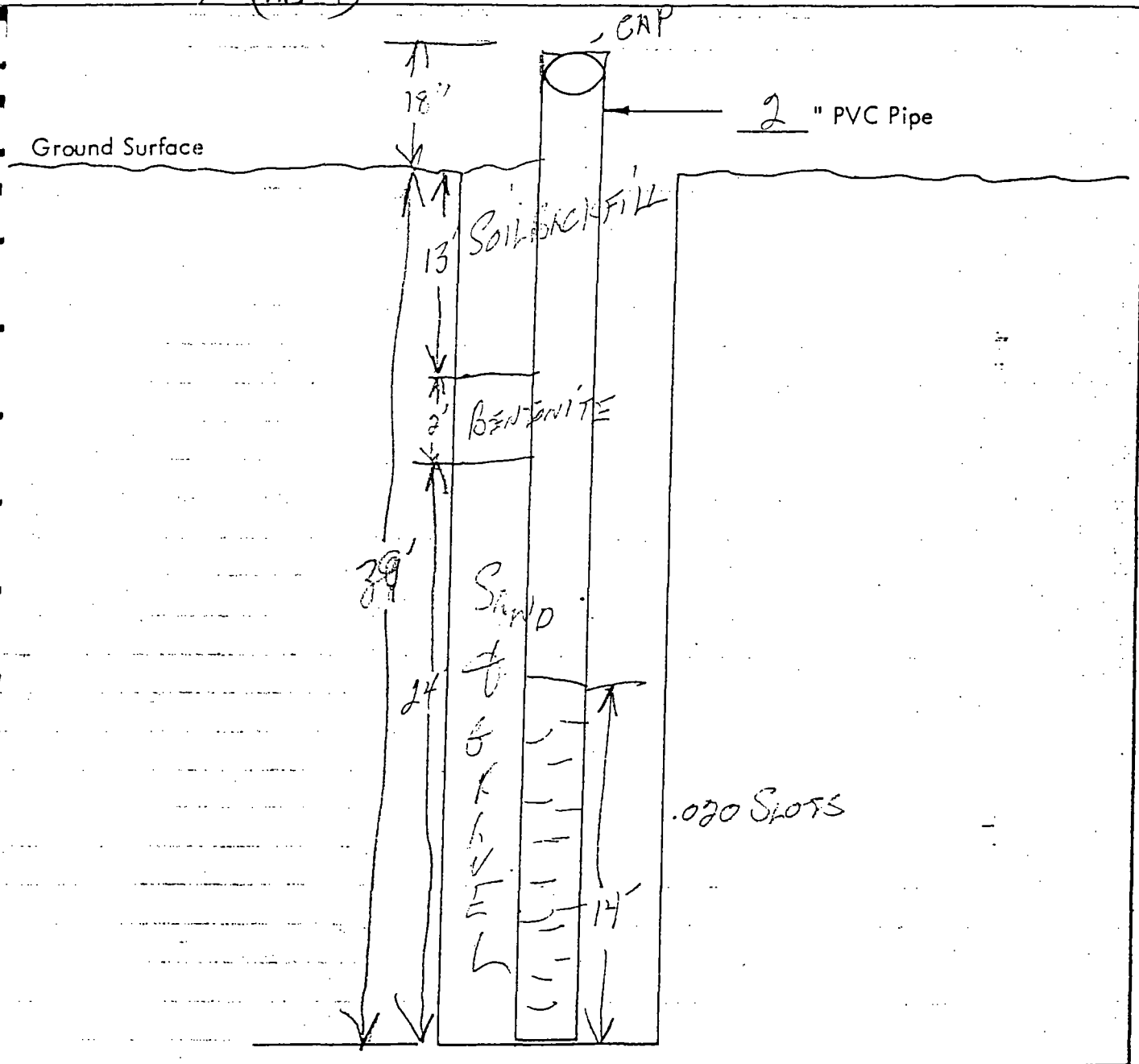
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 4 (HB-4) Contract No. Date Installed



NOTES:

BEI 023424

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

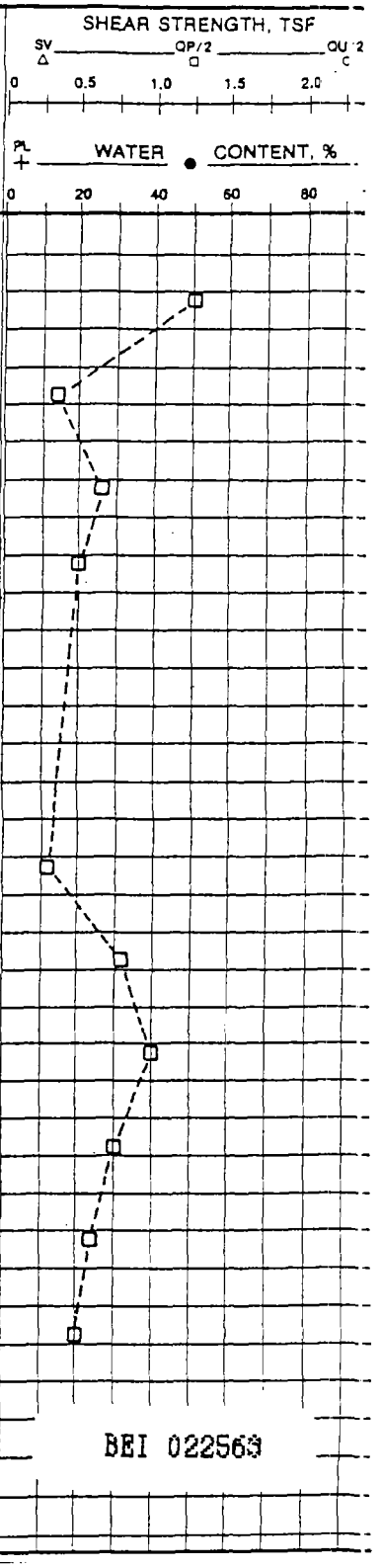
BORING 5 (HB-5) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/5/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dark Gray & Brown CLAY w/Fine Roots	5-5	
5	2	SS		Brown Silty CLAY w/Traces Of Fine Sand	1-2	
	3	SS		Gray CLAY w/Oxidized Spots & Stains	2-4	
10	4	SS		Gray Fine Sandy Silty CLAY Grayish-Brown Silty Fine SAND	4-5	
	5	SS		Brownish-Gray Fine Sandy SILT w/Oxi. Stains	3-6	
15	6	SS		Gray Fine Sandy Clayey SILT w/Oxidized Stains	4-4	
	7	SS		Gray Silty CLAY w/Oxidized Spots & Stains & Traces Of Sand	4-4	
20	8	SS		Interbedded Gray CLAY, Si. Clay & Clayey SILT Seams	3-4	
	9	SS		Dark Gray CLAY w/Oxidized Spots & Silty Pockets	4-5	
25	10	SS		Gray CLAY w/Silt, Fine Sand & Oxidized Spots	2-3	
	11	SS		Gray CLAY w/Oxidized Spots Silty Clay Lenses & Sand Partings	2-3	
30	12	SS		Dark Brownish-Gray CLAY w/Silt	3-3	
	13	SS		Brown Silty Fine To Medium SAND -w/Clay @ 29.0'	10-10	
35	14	SS		Cont'd	9-13	



BEI 022563

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 5 Cont'd (HB-5) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/5/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ●; 0, 20, 40, 60, 80)
	14	SS		Brown Silty Fine To Medium SAND			
	15	SS			6-10		
				-w/Silt & 2" Clay Seam @ 39.0'			
40	16	SS		T. O. B.	13-14		
45							

BEI 022564

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

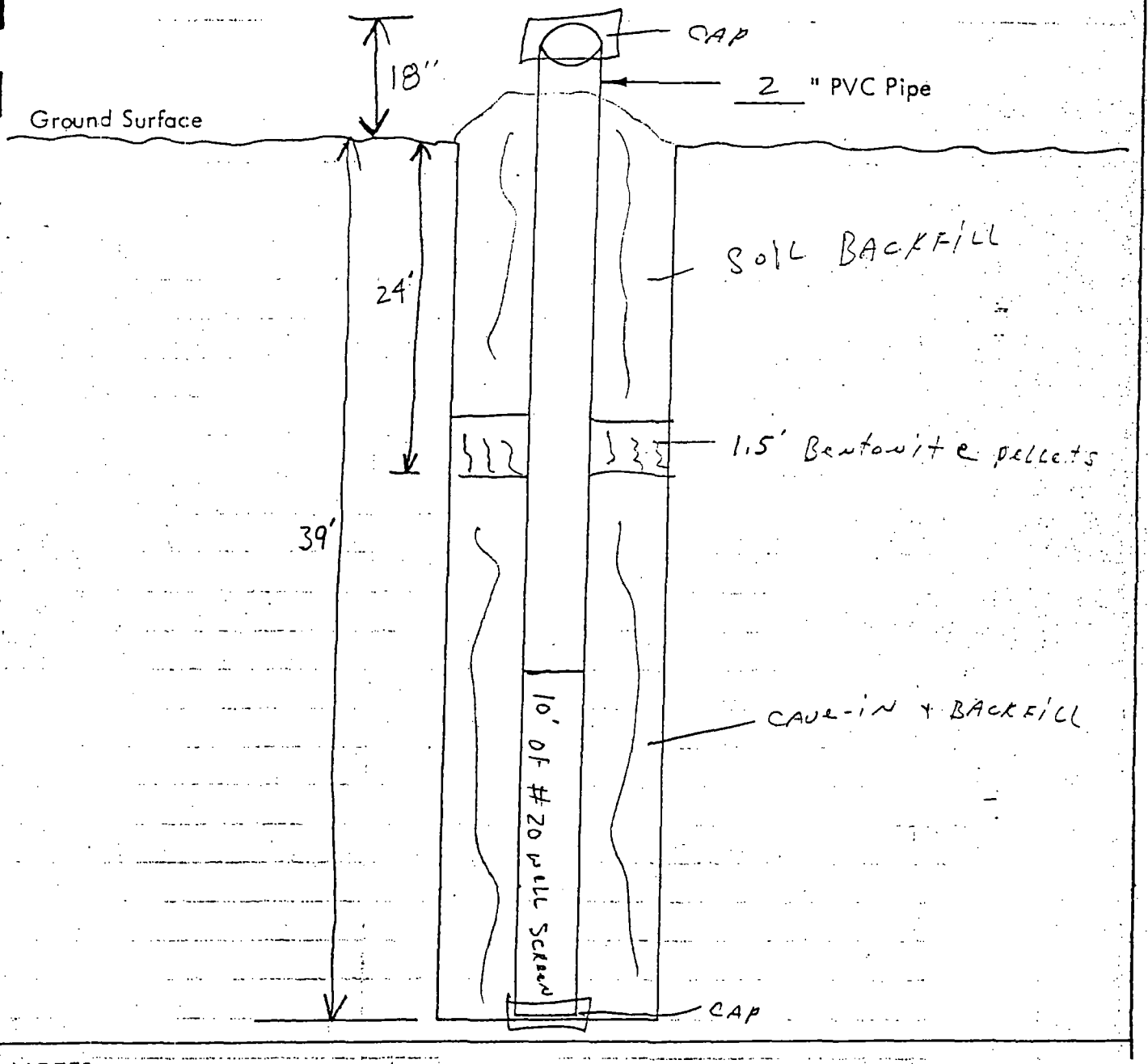
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-5 (HB-5) Contract No. 465 Date Installed 6-5-78



NOTES:

BEI 023425

Information Checklist: Type of Backfill Soil Strata

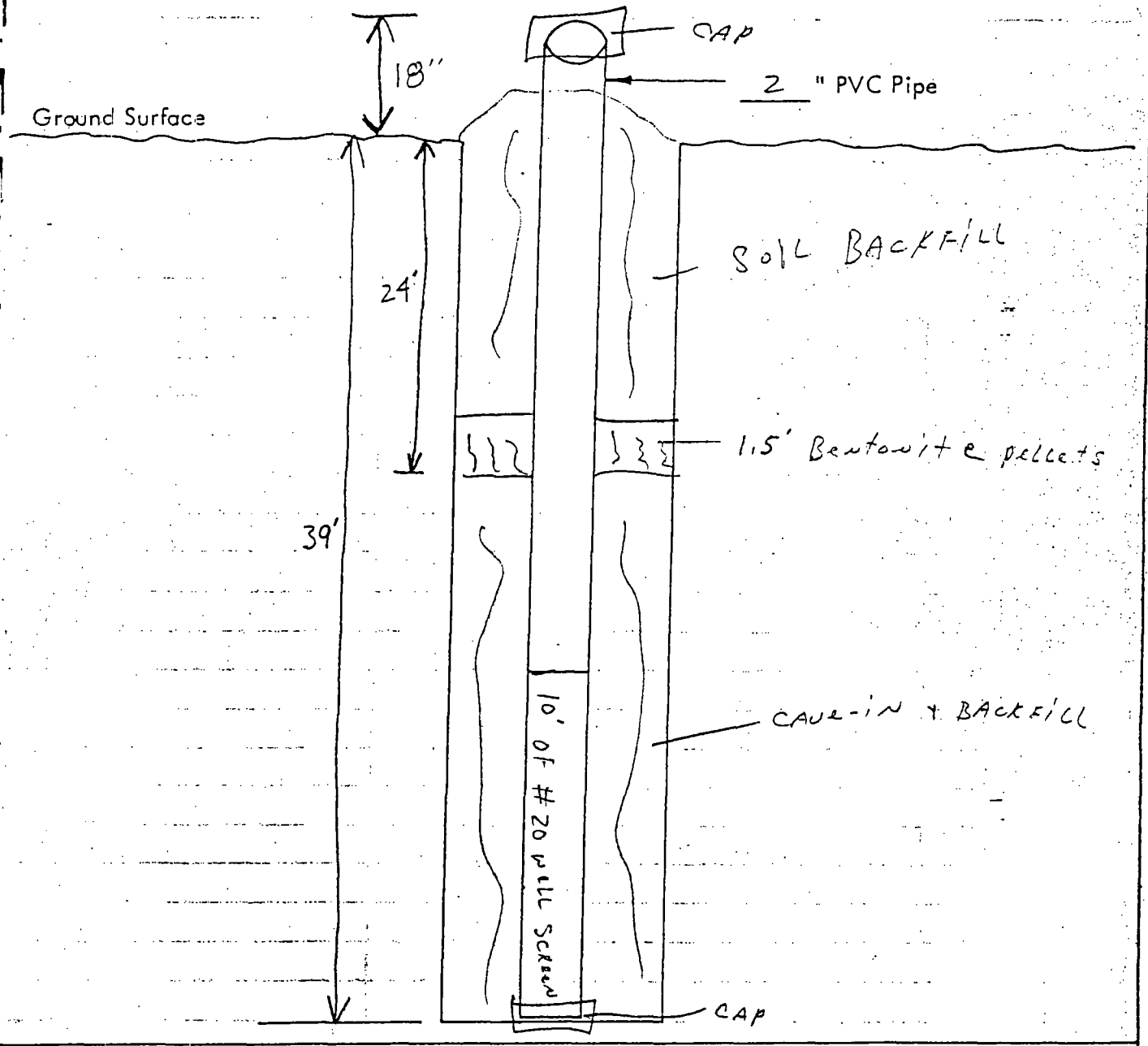
Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-5 (HB-5) Contract No. 465 Date Installed 6-5-78



NOTES:

BEI 023425

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

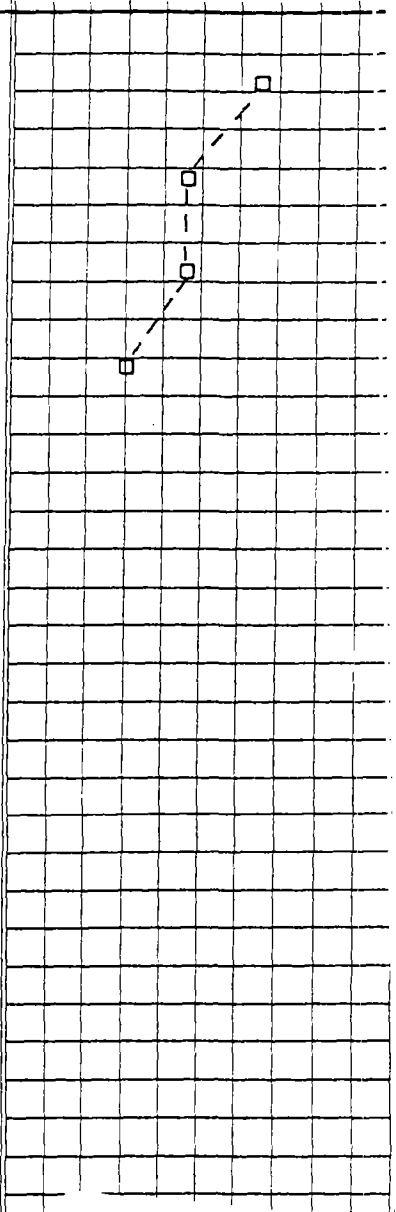
BORING 7 (HB-7) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert
PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/26/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. CLAY w/Roots		
	1	SS		Grayish-Brown CLAY w/Silt To Dark Brown Silty CLAY w/ Fine Sand, Fill	6-5	
5	2	SS			2-2	
	3	SS		-w/Rock & Brick Fragments @ 6'	4-4	
10	4	SS		Gray CLAY w/Silt, Oxidized Spots, Stains, & Fi. Sandy Pockets	2-4	
	5	SS		Gray Silty Fine SAND -w/CLAY from 11' To 15'	3-5	
15	6	SS			3-5	
	7	SS			4-5	
20	8	SS		~~Gray Fine Sandy SILT~~	4-5	
	9	SS		Gray Fine SAND -Silty From 21' To 27.5'	5-6	
25	10	SS		-w/A Faint Fuel Odor From 23' To 27.5'	6-6	
	11	SS			6-7	
30	12	SS		-w/A Fuel Odor From 28.5' To 40' -Medium To Fine w/Traces Of Silt @ 28.5'	14-17	
	13	SS		-Gray & Brown Fine To Medium w/Silt From 31' To 35'	14-21	
35	14	SS		Cont'd	14-19	

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0)

WATER CONTENT, % (0, 20, 40, 60, 80)



BEI 022565

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 7 Cont'd (HB-7) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/26/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	15	SS		-Fine To Medium w/Coarse Sand @ 36'	11-18	
40	16	SS		-Brown Fine To Medium w/ Silt@ 38.5' -Silty w/Clay @41'	13-13	
	17	SS		T. O. B.	13-15	
45						

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2)

WATER ● CONTENT, % (0, 20, 40, 60, 80, 10)

BEI 022566

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

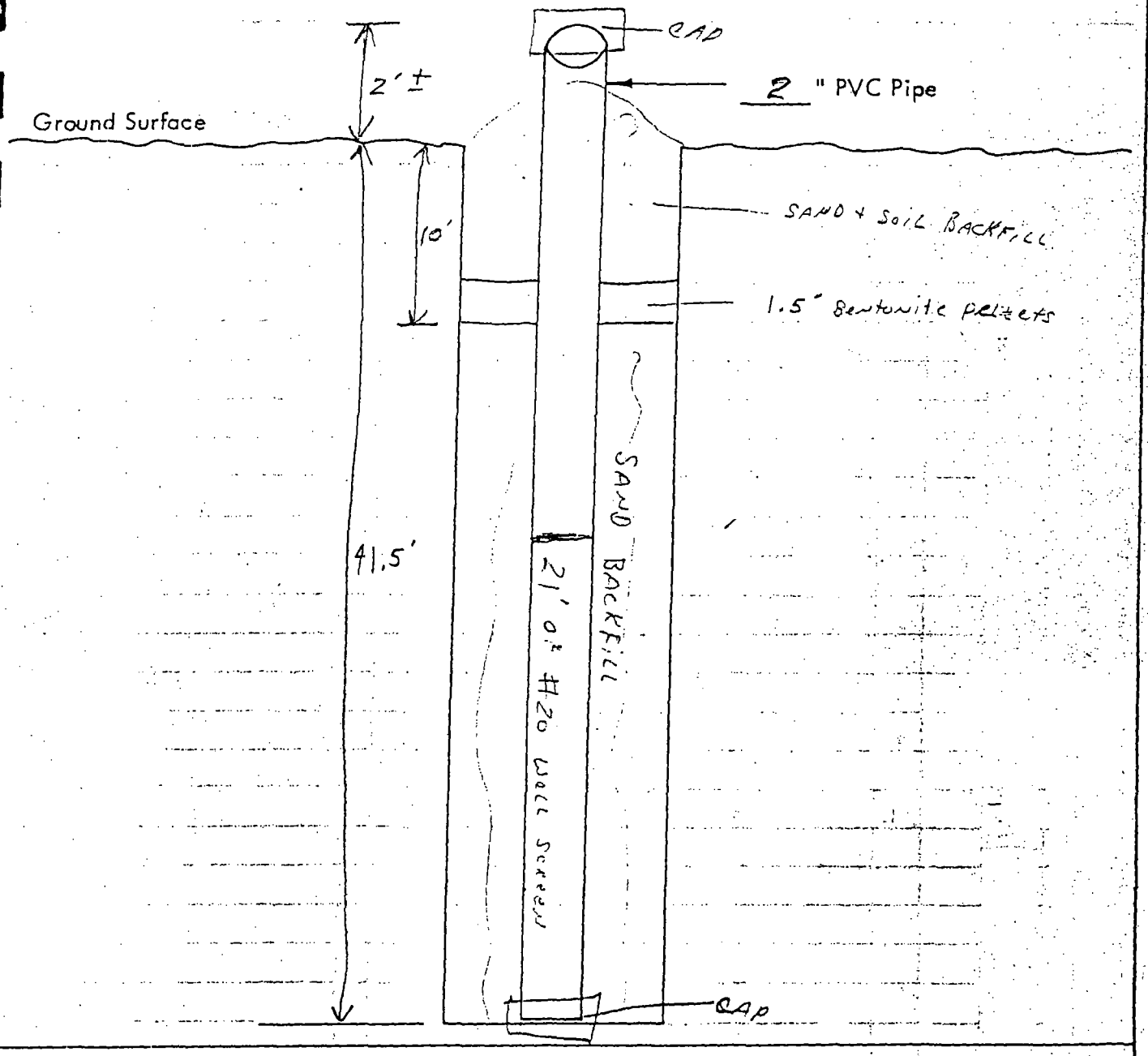
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-7 (HB-7) Contract No. 465 Date Installed 5-26-78



NOTES:

BEI 023426

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

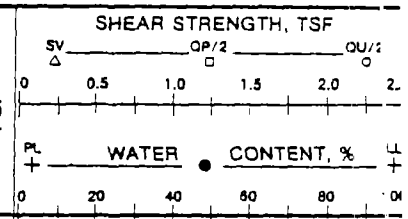
RECORD OF SUBSURFACE EXPLORATION

BORING 8 (HB-8) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/30/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Brown Silty CLAY w/Roots		
	1	SS		Brown CLAY w/Silt & Traces Of Fine Sand & Roots	2-3	
5	2	SS		Brown Silty CLAY w/Fine Sand	2-2	
	3	SS		Gr. CLAY w/Si. & Oxi. Stains	1-2	
10	4	SS		Gray & Dark Gray To Gray CLAY w/Oxidized Spots & Stains	3-4	
	5	SS		-w/Silty, Fine Sandy Pockets @ 11.5'	3-5	
15	6	SS		Grayish-Brown Fine SAND -Silty From 14' To 25.5'	4-3	
	7	SS		-Gray From 19' To 30.5'	4-4	
20	8	SS			6-6	
	9	SS		-w/Traces Of Clay @ 24'	4-6	
25	10	SS		-w/Silt & A Faint Fuel Odor @ 26.5'	5-7	
	11	SS		-w/A Fuel Odor Below 29'	11-12	
30	12	SS		-w/Medium Sand @ 29' -Dark Gray Fine To Medium w/Traces Of Silt From 31.5' To 35.5'	7-11	
	13	SS			9-11	
35				Cont'd		



BEI 022567

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 8 Cont'd (HB-8) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/30/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ●; 0, 20, 40, 60, 80, 1)
	14	SS			9-11		
				Brown w/Silt Below 36.5'			
	15	SS			9-11		
40	16	SS		T. O. B.	9-14		
45							

BEI 022568

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

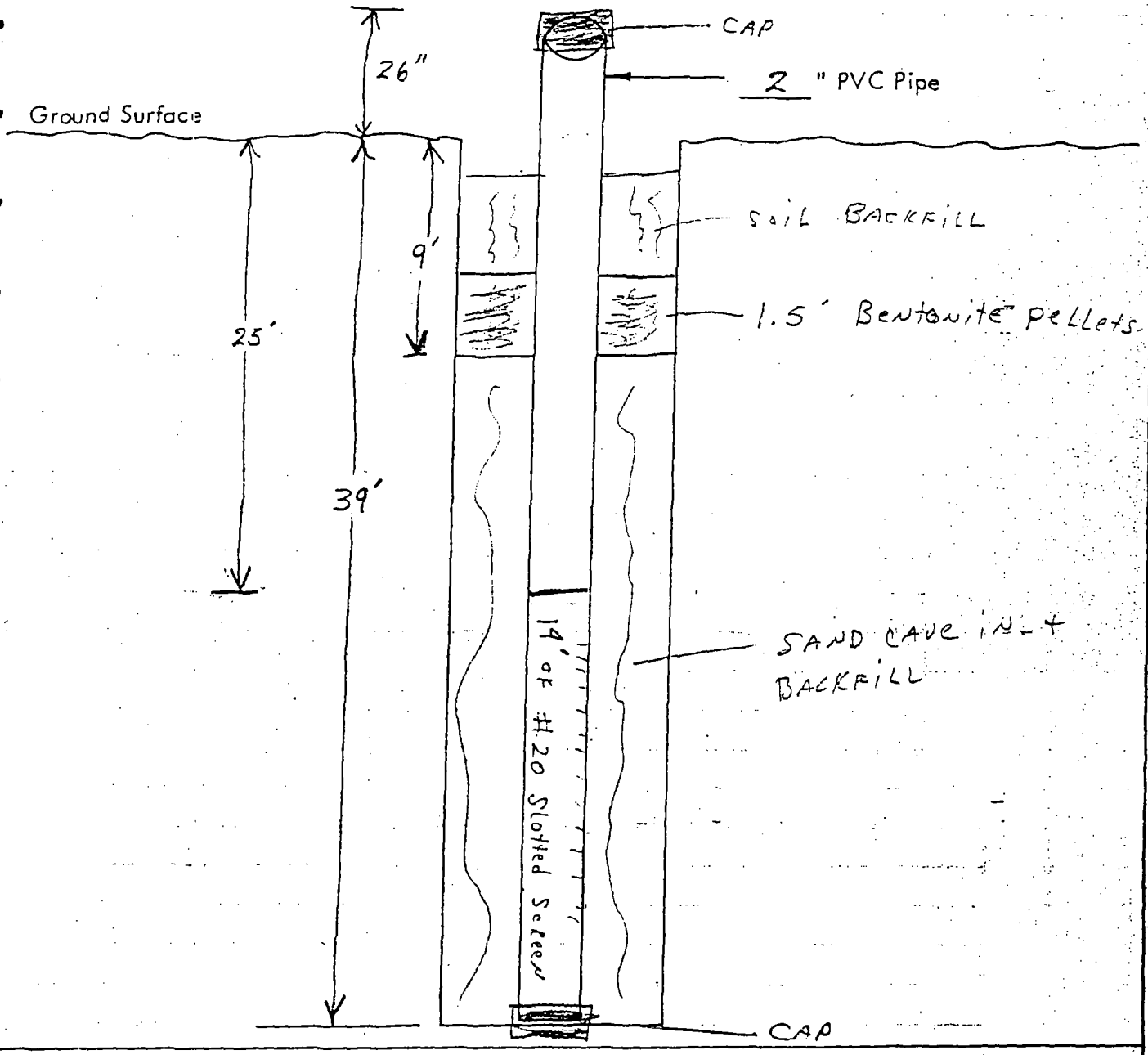
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-8 (HB-8) Contract No. 465-78 Date Installed 5-30-78



NOTES:

BEI 023427

nformation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 9 (HB-9) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

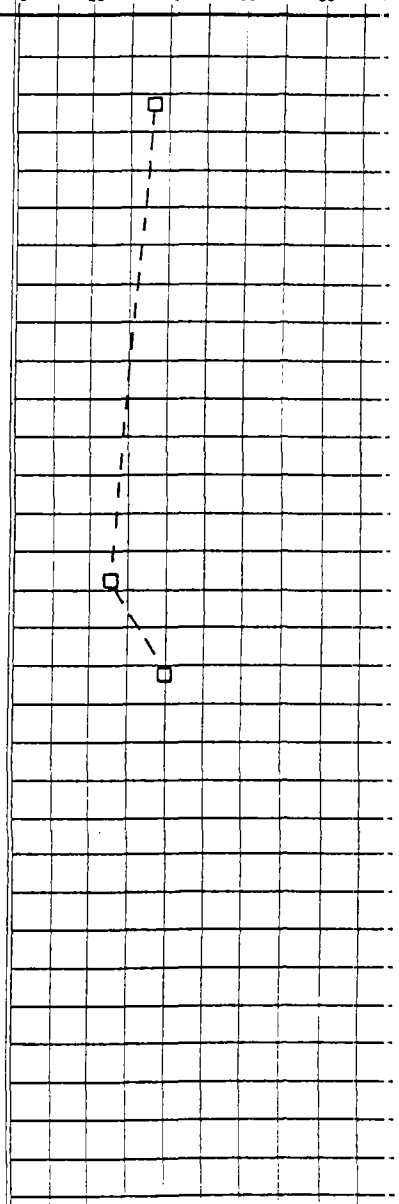
DRILLED BY Gotsch DATE DRILLED 5/30/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Brown Silty CLAY -w/Fine Roots @ 0' -w/Traces Of Fine Sand @1.5'	2-3	
5	2	SS		Brown To Gray Clayey Fine Sandy SILT	1-1	
	3	SS			2-1	
10	4	SS			3-4	
	5	SS		Grayish-Brown Clayey Silty Fine SAND	2-1	
15	6	SS		Brownish-Gray Silty CLAY w/ Oxidized Spots, Stains, & Traces Of Fine Sand	1-2	
	7	SS		Gr. CLAY w/Si. & Oxidized Stains	3-3	
20	8	SS		Brownish-Gray Silty Fine SAND	6-8	
	9	SS		Interbedded Brown & Gray Si. CLAY & CLAY w/Si. & Oxi. Stains	3-7	
25	10	SS		Grayish-Brown Fine SAND -w/Clayey Pockets @ 24' -Silty From 24' To 35.5' -Brown From 26.5' To 28'	5-5	
	11	SS			8-8	
30	12	SS		-Gray Below 31.5'	7-7	
	13	SS			13-13	
35				Cont'd		

SHEAR STRENGTH, TSF — SV △ — QP/2 □ — QU/2 ○ — 0 0.5 1.0 1.5 2.0

PL + — WATER ● CONTENT, % — 0 20 40 60 80



BEI 022569

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 9 Cont'd (HB-9) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/30/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ●; 0, 20, 40, 60, 80)
	14	SS			11-13		
				-w/Silt Below 36.5'			
	15	SS			11-7		
40	16	SS		T. O. B.	6-9		
45							

BEI 022570

GROUND WATER DEPTH AT COMPLETION 28.5' AFTER _____ HRS. _____ AFTER _____ HRS. _____

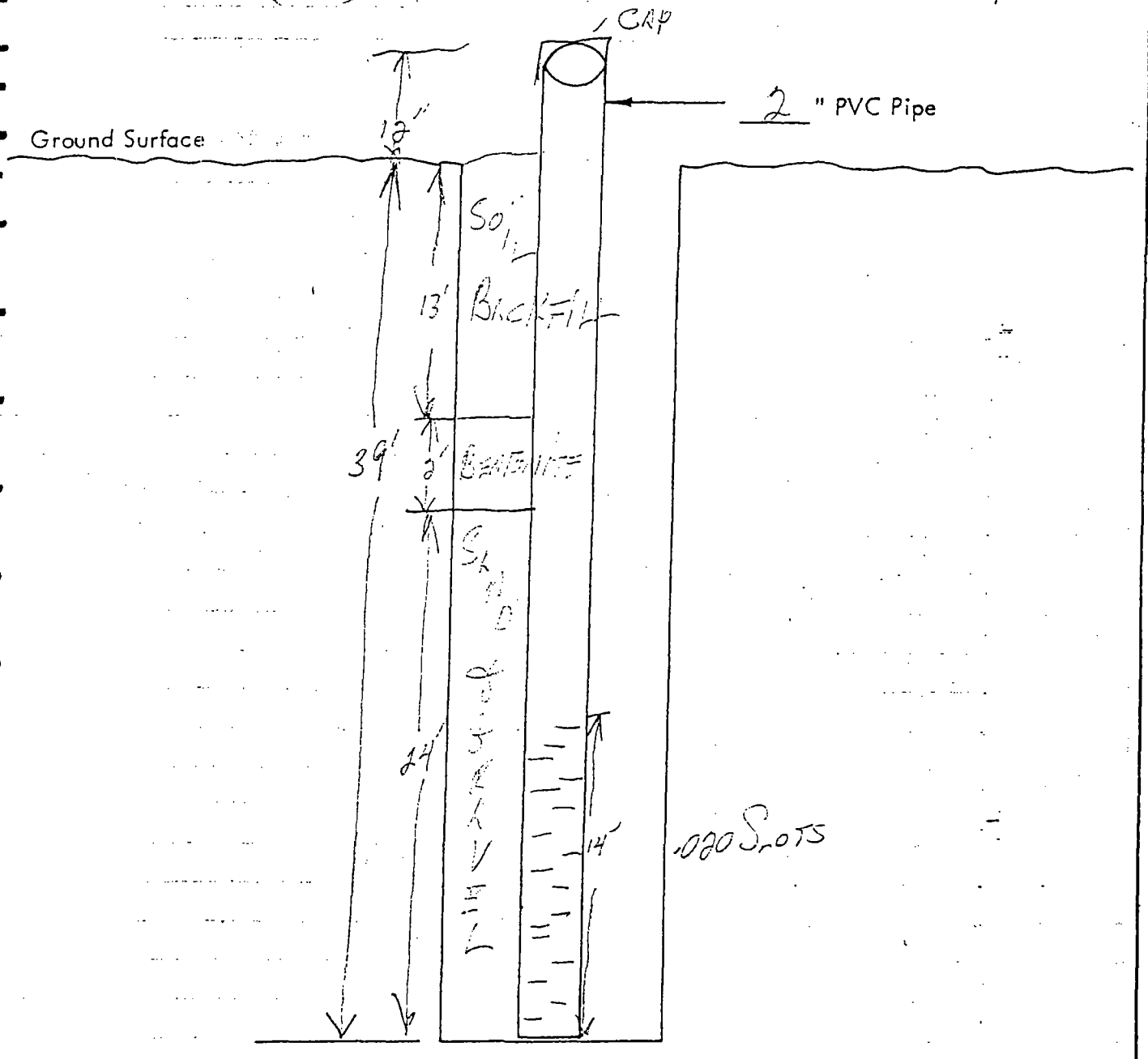
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 9 (HB-9) Contract No. 465 Date Installed 5/30/78



NOTES:

BEI 023428

nformation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

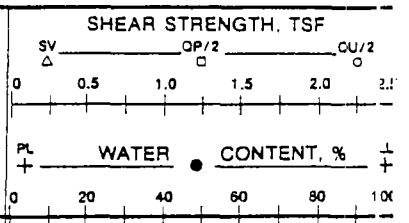
BORING 10 (HB-10) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch DATE DRILLED 5/26/78 LOGGED BY Schweigert

PROJECT Phase II - Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. Si. CLAY & Cinders, Fill		
	1	SS		Brown & Dk. Gr. CLAY w/ Oxidized Spots	3-6	
5	2	SS		Brownish-Gray CLAY w/Silt & Silty Fine Sandy Pockets	3-3	
	3	SS		Gray To Gray & Dk. Gray CLAY w/Oxidized Spots & Stains	3-4	
10	4	SS		-w/Slickensides @ 6.5'	3-3	
	5	SS		Brownish-Gray Silty CLAY w/Fine Sand	3-6	
15	6	SS		Brown Silty Fine SAND w/ Traces Of Clay	3-3	
	7	SS			3-3	
20	8	SS		Brown Fine Sandy SILT w/ Clay	3-6	
	9	SS		Brown Fine SAND -Silty w/A Faint Fuel Odor From 21.5' To 28'	4-5	
25	10	SS			2-3	
	11	SS		-Dk. Gr. w/Traces Of Clay @ 26.5'	2-4	
30	12	SS		-w/A Fuel Odor From 29' To 38' -Fine To Medium @ 29'	7-7	
	13	SS		-Fine To Medium w/Silt @ 31.5'	9-13	
35				Cont'd		



BEI 022571

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 10 Cont'd (HB-10) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch DATE DRILLED 5/26/78 LOGGED BY Schweigert

PROJECT Phase II - Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT % (PL +, ● ; 0, 20, 40, 60, 80)
	14	SS		-Gr. w/ Silt @ 34'	5-6		
	15	SS		-Dk. Gr. Si. From 36.5' To 43'	11-13		
40	16	SS		-w/ A Faint Fuel Odor & Traces Of Clay Below 29'	7-13		
	17	SS		T. O. B.	8-9		
45							

BEI 022572

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

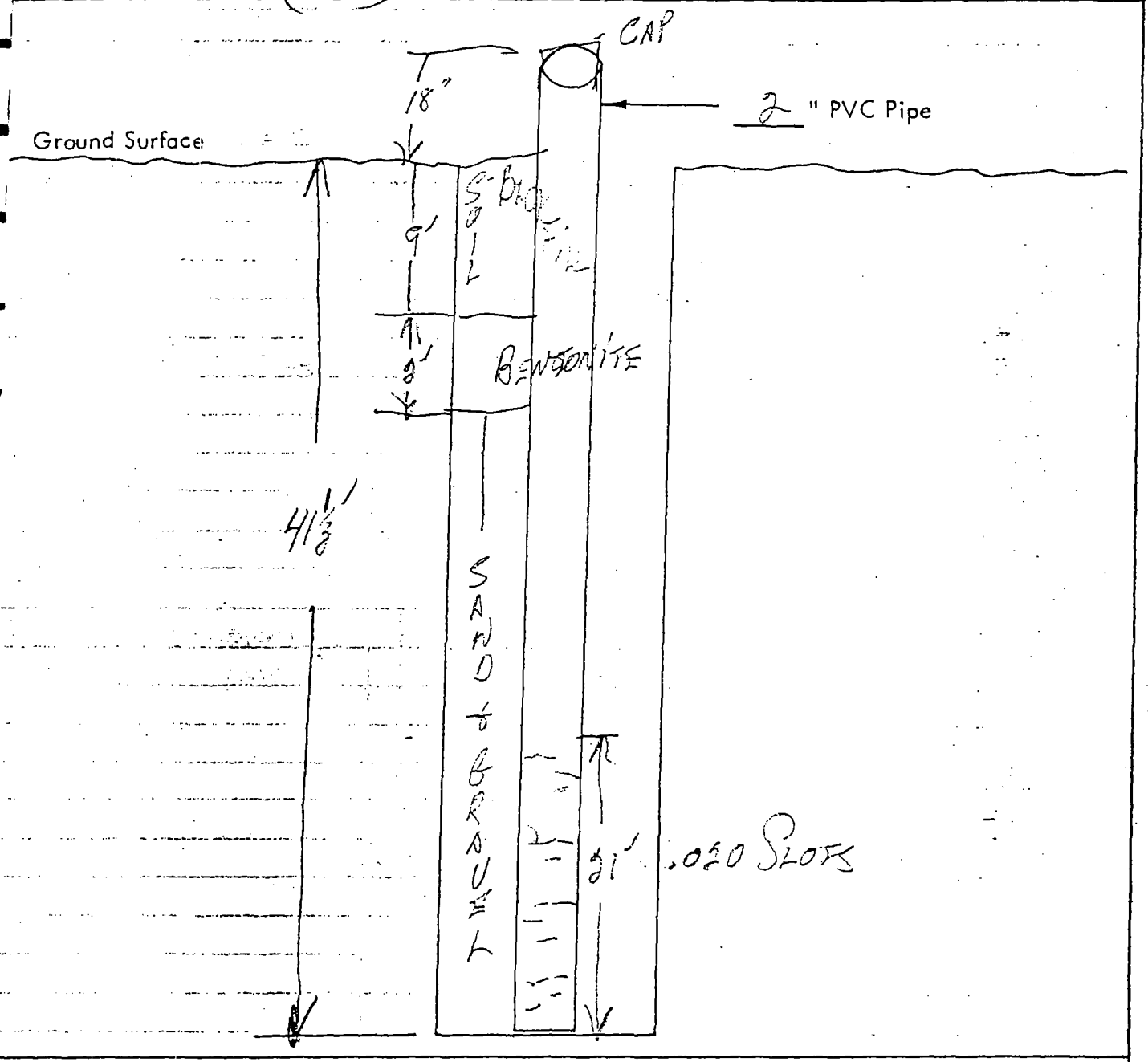
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 10 (HB-10) Contract No. Date Installed



NOTES:

BEI 023429

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

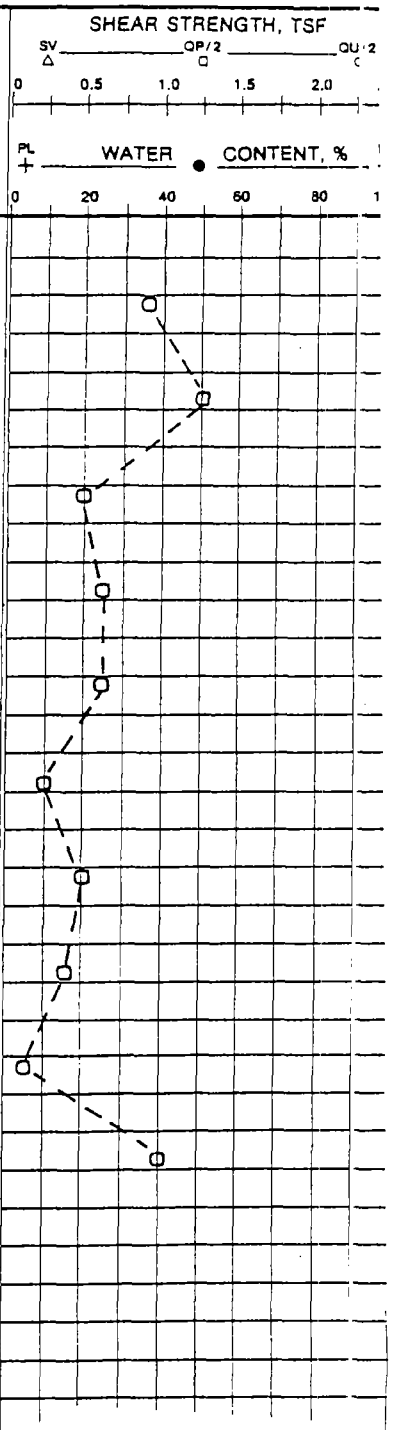
RECORD OF SUBSURFACE EXPLORATION

BORING 11 (HB-11) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/31/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. CLAY w/Roots		
	1	SS		Dk. Br. & Br. CLAY w/Traces Of Roots	2-3	
5	2	SS		-w/Oxidized Spots & Silty Pockets @ 4'	4-5	
	3	SS		Grayish-Brown CLAY w/Silt, Silty Pockets, & Oxidized Stains	2-2	
10	4	SS		Gray Silty CLAY w/Traces Of Fine Sand & A Faint Fuel Odor	2-2	
	5	SS			1-1	
15	6	SS		Brown CLAY w/Silt & A Faint Fuel Odor -w/Silty Pockets @ 14'	1-2	
	7	SS		-w/Oxidized Spots & Stains @ 16.5'	2-2	
20	8	SS		Gray Silty CLAY w/Traces Of Fine Sand & A Faint Fuel Odor	2-3	
	9	SS		Gray CLAY w/Oxidized Stains & A Faint Fuel Odor -w/Slickensides @ 21.5'	1-2	
25	10	SS		-w/Silty Pockets @ 24'	2-4	
	11	SS		Brown Fine SAND w/A Fuel Odor -w/Traces Of Clay @ 26.5'	6-8	
30	12	SS		-Silty From 26.5' To 35.5' -w/Clay Lenses @ 31.5'	10-10	
	13	SS		-w/Traces Of Medium Sand @ 34'	5-6	
35				Cont'd		



BEI 022573

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 11 Cont'd (HB-11) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/31/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
	14	SS			12-15	
				-Fine To Medium w/Traces Of Coarse Sand & Gravel @ 36.5'		
	15	SS			11-12	
				-Silty @ 39'		
40	16	SS		T. O. B.	10-15	
45						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2

WATER CONTENT, % — PL + ● L + — 0 20 40 60 80 10

BEI 022574

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

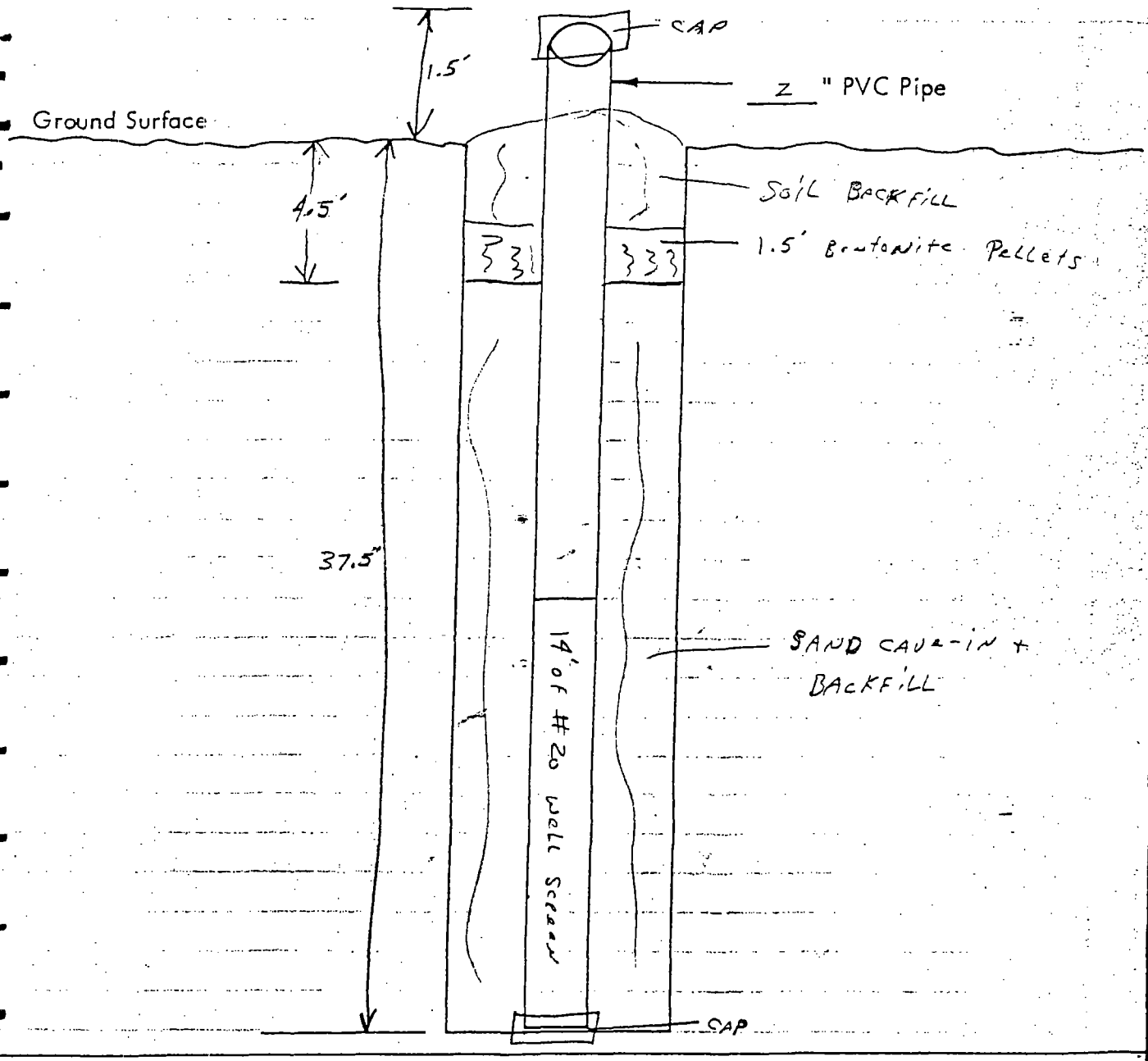
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-11 (HB-11) Contract No. 465 Date Installed 6-2-78



NOTES:

BEI 023430

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

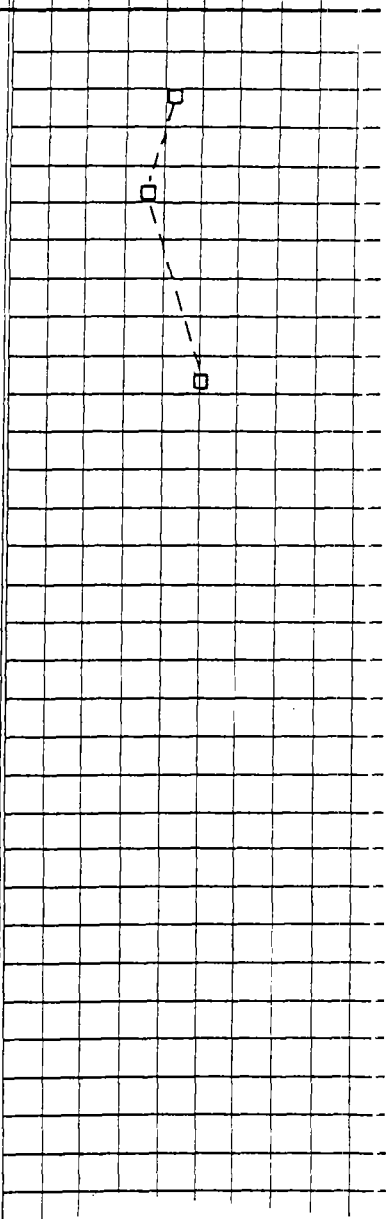
BORING 13 (HB-13) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert
PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/30/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Interbedded Dark Gray CLAY w/Silt & Brown Silty Fine SAND	3-3	
5	2	SS		Grayish-Brown & Dk.Gr.CLAY w/Fine Sandy Pockets & Oxi. Spots & Stains	2-3	
	3	SS		Brownish-Gray Clayey SILT w/Fine Sand & Oxidized Stains	3-3	
10	4	SS		Brownish-Gray Silty CLAY w/ Oxidized Spots & Stains	2-5	
	5	SS		Brown Fine SAND -Silty From 11.5' To 18'	5-5	
15	6	SS			6-8	
	7	SS			7-10	
20	8	SS		-Gray w/Silt @ 19'	4-2	
	9	SS		-Silty w/Clayey Pockets @ 21.5'	7-9	
25	10	SS		-Clayey, Silty @ 24'	2-2	
	11	SS		-Gray & Brown w/Silt @26.5'	8-7	
30	12	SS		-Gray Below 29' -w/Silt From 29' To 35.5'	4-5	
	13	SS			5-5	
35				Cont'd		

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QL/2 ○ (0, 0.5, 1.0, 1.5, 2.0)

WATER CONTENT, % (0, 20, 40, 60, 80, 1)



BEI 022575

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 13 Cont'd (HB-13) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 5/30/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
	14	SS			10-7	
	15	SS		-Fine To Medium w/Silt Below 36.5'	4-6	
40	16	SS		-w/Clayey Pockets @ 39'	4-7	
				T.O.B.		
45						

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2.5)

WATER CONTENT, % (PL + — ● — + LL): 0, 20, 40, 60, 80, 100

BEI 022576

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

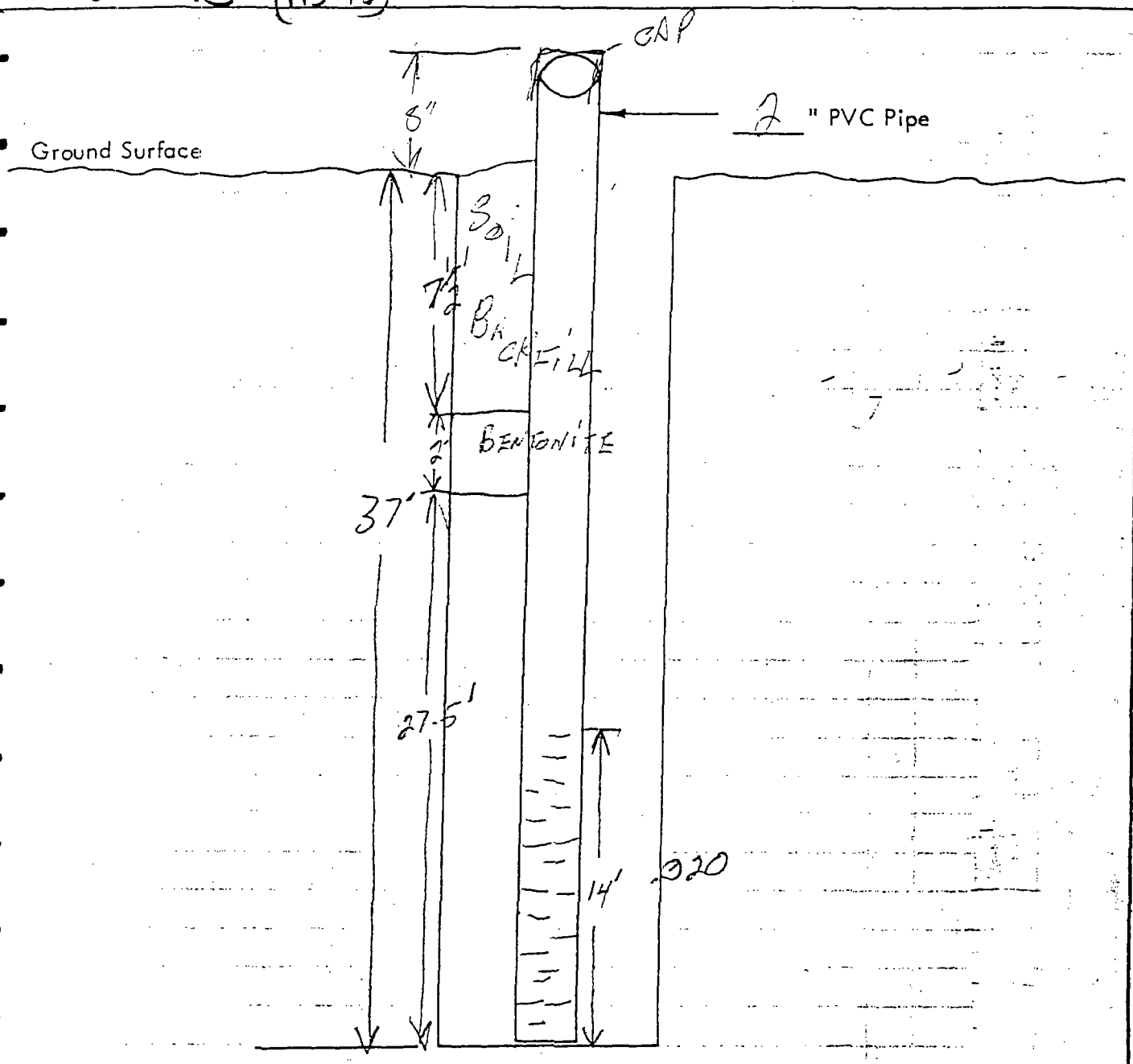
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 13 (HB-13) Contract No. Date Installed



NOTES:

BEI 023491

nformation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

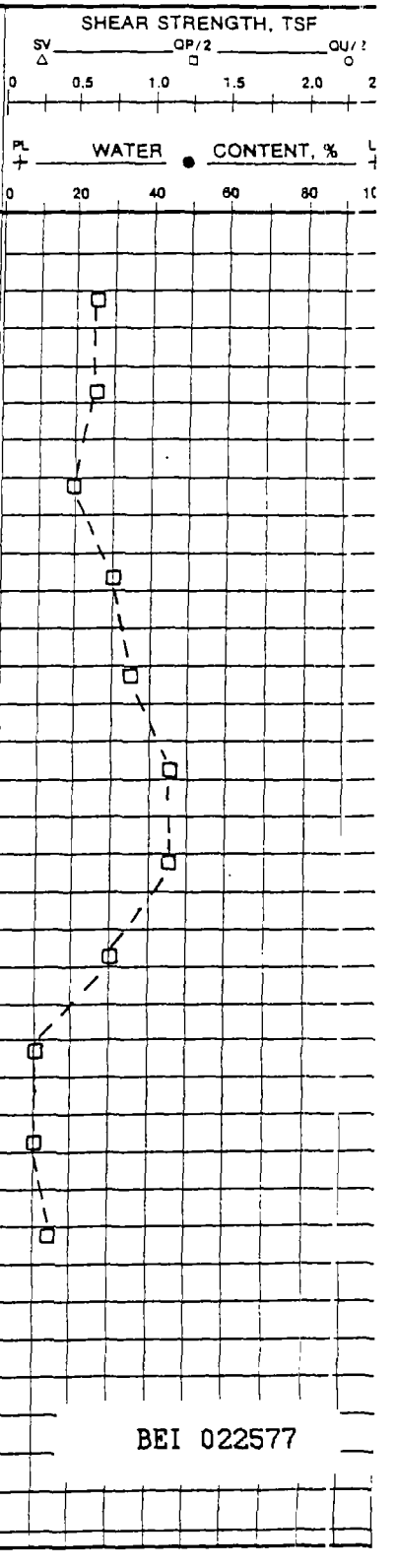
RECORD OF SUBSURFACE EXPLORATION

BORING 14 (HB-14) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/25/78 LOGGED BY Schweigert

PROJECT Phase II Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dk. Br. Si. CLAY w/Fine Roots	1-2	
5	2	SS		-Brown w/Fine Sand @ 4'	3-3	
	3	SS		Brownish-Gray CLAY w/Silt & Oxidized Spots & Stains -w/Silty Pockets @ 8.5'	2-2	
10	4	SS			2-2	
	5	SS		Mottled Gray & Dark Gray To Gray CLAY w/Oxidized Spots -w/Slickensides Below 13.5' -w/Silty Pockets @ 11' & 16'	3-4	
15	6	SS			3-5	
	7	SS			5-6	
20	8	SS		Gr. CLAY w/Si., Silty Pocks & Oxidized Spots & Stains	2-3	
	9	SS		Dark Gray Silty CLAY w/ A Fuel Odor	1-2	
25	10	SS		Gray CLAY w/Silt	0-1	
	11	SS			0-1	
30	12	SS		Gray Silty CLAY w/Traces Of Fine Sand	1-1	
	13	SS		Dk. Gr. Fi. SAND -w/A Fuel Odor To 43' -Clayey @ 31.5' -Brown From 34' To 38.5'	9-12	
35				Cont'd		



BEI 022577

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 14 Cont'd (HB-14) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II Hydrocarbon Recovery DATE DRILLED 5/25/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL, ●, LL; 0, 20, 40, 60, 80)
	14	SS			22-24		
	15	SS		-Brownish-Gr. Fine To Med. w/Silt From 38.5' To 43.5'	11-14		
40	16	SS			18-24		
	17	SS			17-22		
45	18	SS		-Brownish-Gray Fine To Coarse @ 44' T.O.B.	38-38		
50							

BEI 022578

GROUND WATER DEPTH AT COMPLETION ____ AFTER 24 HRS. 28'11" AFTER ____ HRS. ____

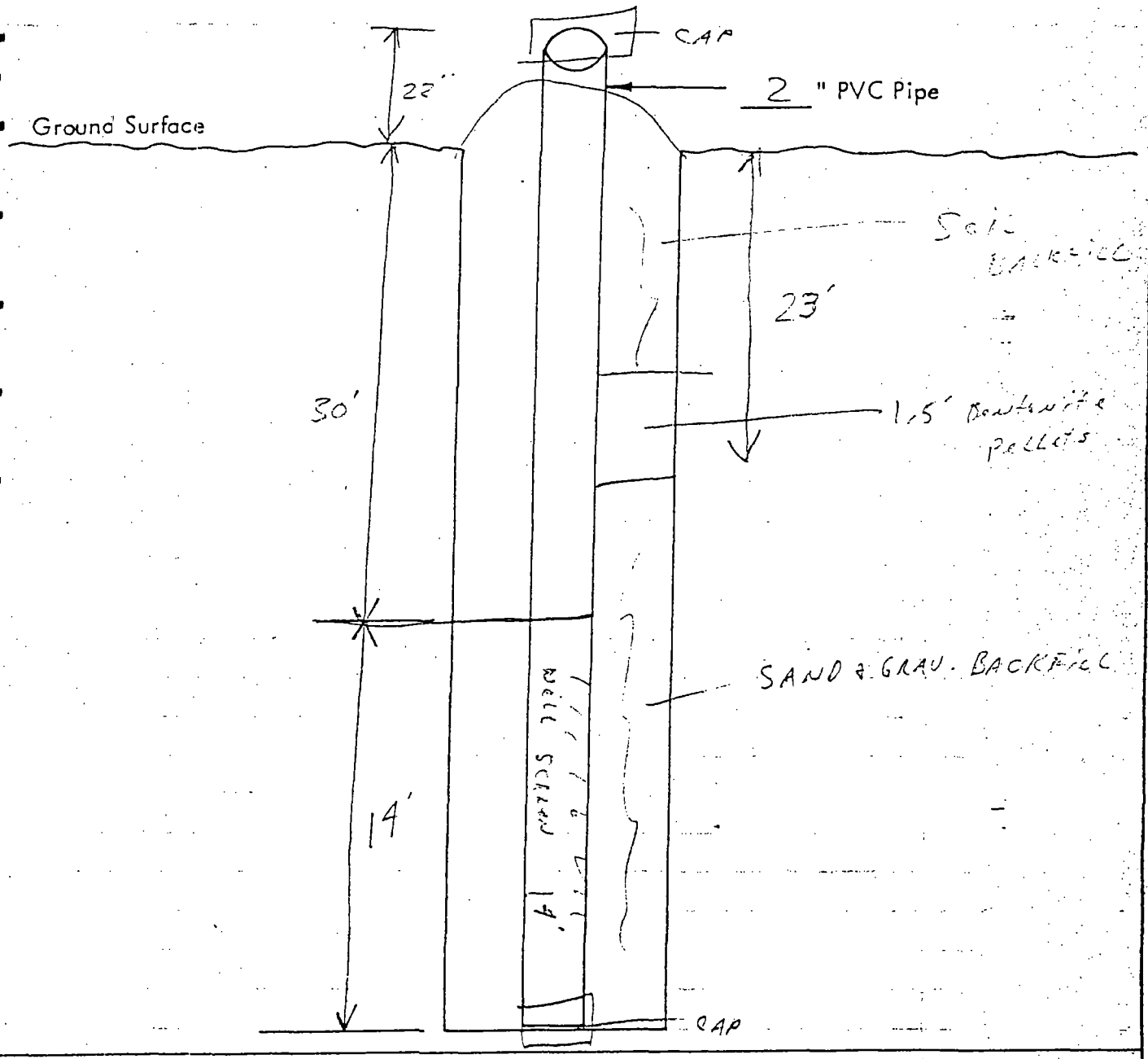
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-14 (HB-14) Contract No. 465 Date Installed 4-25-78



NOTES:

BEI 023432

nformation Checklist: — Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 15 (HB-15) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 6/1/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dark Gray Silty CLAY w/Br. Fine Sand Seams -w/Roots @ 0'	3-2	
5	2	SS		Gray CLAY w/Si., Oxidized Spots & Stains, & Traces Of Fine Sand	2-3	
	3	SS		Gray Silty CLAY w/Traces Of Fine Sand	2-2	
10	4	SS		-w/Oxidized Spots & Stains @ 9'	2-2	
	5	SS		Gray To Brown Silty Fine SAND	5-5	
15	6	SS		-w/Clay Pockets @ 14'	3-3	
	7	SS		Interbedded Brown Silty Fine SAND & Fine Sandy SILT w/Oxi. Stains	3-5	
20	8	SS		Br. Fine Sandy SILT w/Traces Of Clay	3-5	
	9	SS		Brown Silty Fine SAND	5-7	
25	10	SS		-w/Traces Of Clay From 25' To 31'	5-6	
	11	SS			12-12	
30	12	SS		-Gray @ 29'	5-5	
	13	SS		-Dark Gray Clayey w/Traces Of Cinders @ 31.5'	11-13	
35				Cont'd		

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2

WATER CONTENT, % — PL + ● LL — 0 20 40 60 80 10

BEI 022579

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 15 Cont'd (HB-15) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch DATE DRILLED 6/1/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 10)
	14	SS		-Gray Below 34'	12-17		
	15	SS			11-10		
40	16	SS		T. O. B.	11-15		
45							

BEI 022580

GROUND WATER DEPTH AT COMPLETION 23.5' AFTER ____ HRS. ____ AFTER ____ HRS. ____

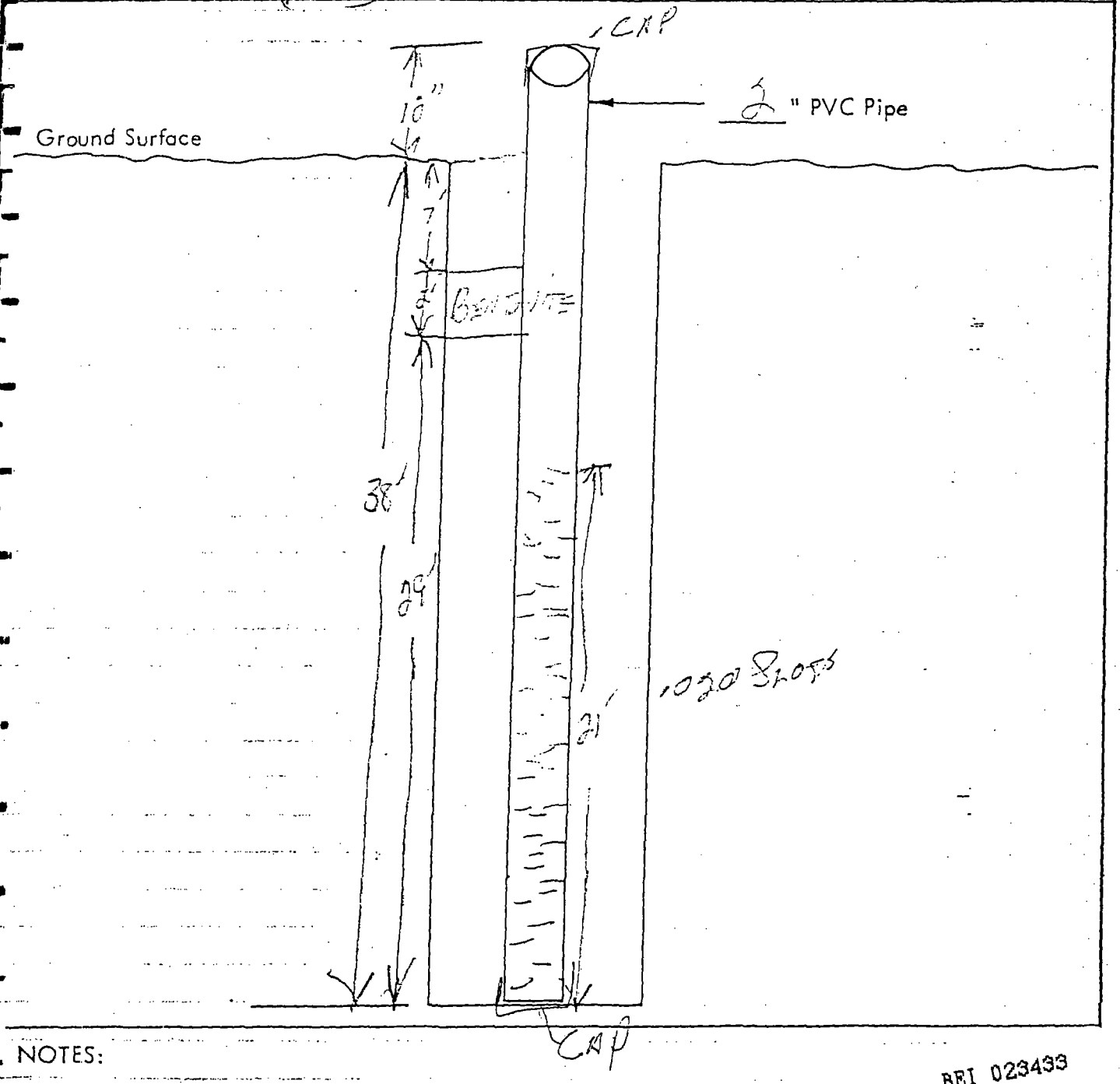
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 15 (HB-15) Contract No. Date Installed



NOTES:

BEI 023433

nformation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

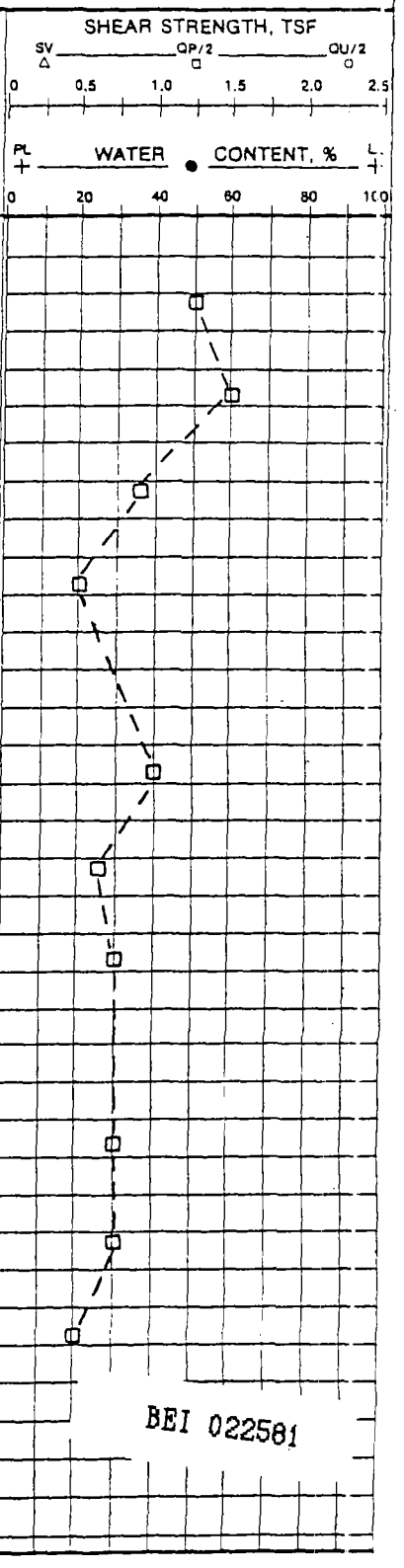
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 16 (HB-16) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert
PROJECT Phase II Hydrocarbon Recovery DATE DRILLED 5/25/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. & Gr. Si. CLAY w/Roots		
	1	SS		Brown CLAY w/Silt, Roots, Glass & Rock Fragments, Fill	2-3	
5	2	SS		Brown & Dk. Gray CLAY w/ Oxidized Spots	2-4	
	3	SS		Brownish-Gray To Gray CLAY w/Silt & Oxidized Spots & Stains	2-4	
10	4	SS		-w/Sandy Pockets @ 6.5' -w/Silty Pockets @ 9'	1-2	
	5	SS		Gray Clayey SILT w/Fine Sand	2-3	
15	6	SS		Brown & Gray Silty CLAY	1-1	
	7	SS		Gray CLAY w/Silt & A Faint Fuel Odor	1-2	
20	8	SS			1-2	
	9	SS		Brown Silty CLAY w/Fine Sand	2-2	
25	10	SS		Dark Gray Clayey SILT w/ Fine Sand	2-2	
	11	SS		Gray CLAY w/Silt & A Faint Fuel Odor -w/Sand Lenses @ 26.5'	2-2	
30	12	SS			2-2	
	13	SS		Brownish-Gray Fine Sand w/A Fuel Odor -Silty @ 31.5' -Fine To Med. w/Si. Below 34'	7-11	
35				Cont'd		



BEI 022581

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 16 (HB-16) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 5/25/78 LOGGED BY Schweigert

PROJECT Phase II Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV / QP/2 / QU/2; 0, 0.5, 1.0, 1.5, 2.0) / PL + WATER CONTENT, % • (0, 20, 40, 60, 80)
	14	SS			10-14		
				-w/Traces Of Coarse Sand @ 36.5'			
	15	SS			13-13		
				-w/Clay Pockets @ 39'			
40	16	SS			12-14		
				T. O. B.			

BEI 022582

GROUND WATER DEPTH AT COMPLETION ____ AFTER 24 HRS. 31.0' AFTER ____ HRS. ____

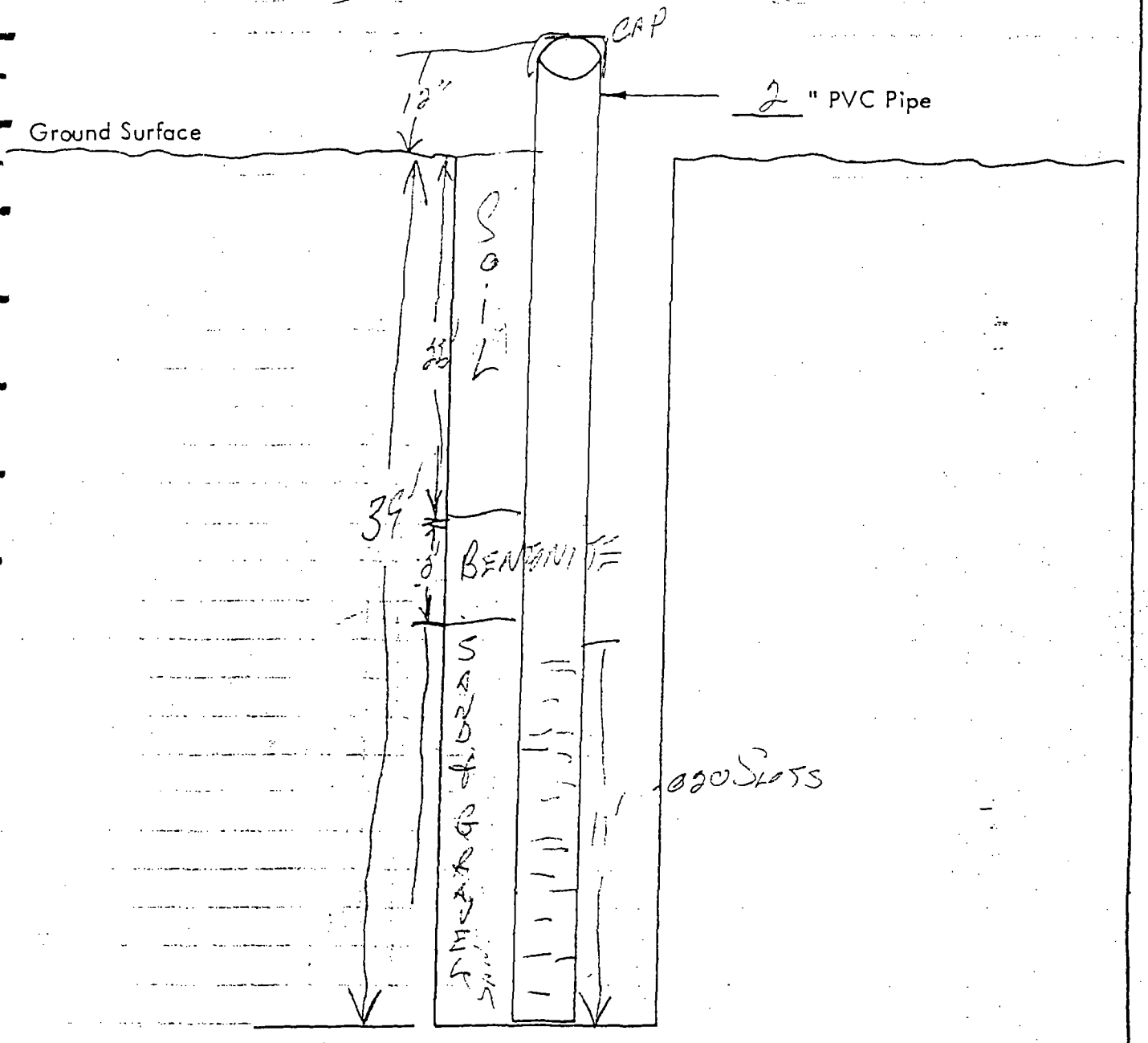
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 16 (HB-16) Contract No. Date Installed



NOTES:

BEI 023434

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 17 (HB-17) CONTRACT 465-78

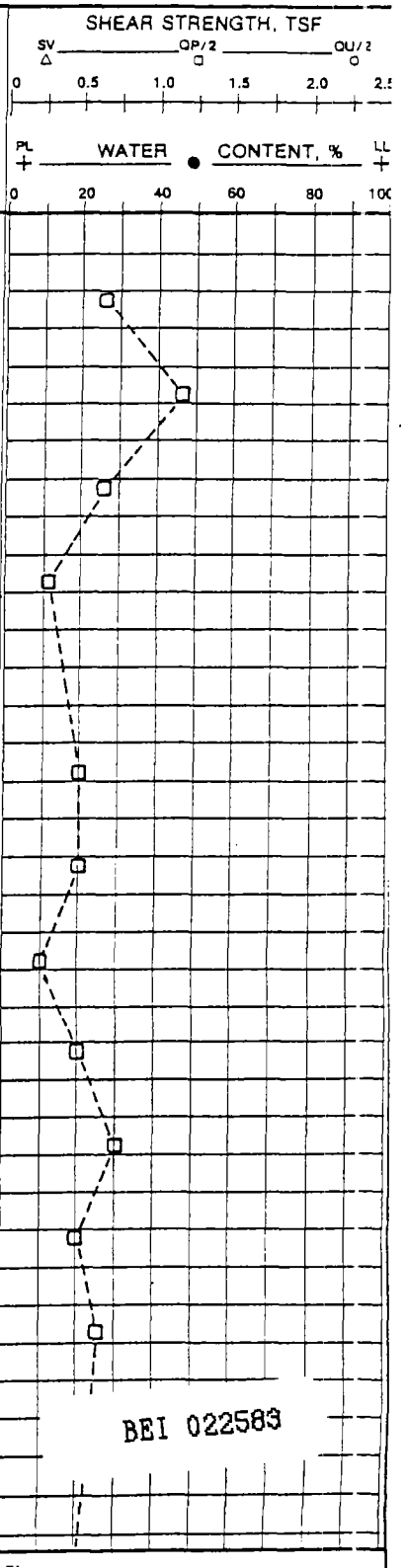
DRILLED BY Roberts LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/2/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Dk. Br. Silty CLAY w/Roots		
	1	SS		Brown & Gray CLAY w/Silt, Oxi. Spots & Traces Of Sand	2-3	
5	2	SS		Gray CLAY w/Oxidized Spots & Stains	4-7	
	3	SS		Gray CLAY w/Silt, Oxidized Spots & Stains -w/Sandy Lenses @ 6.5'	2-4	
10	4	SS		-Gray Clayey Sandy Silt Seams @ 9.6' To 10.0'	2-2	
	5	SS		Brownish-Gray Clayey Sandy SILT	1-1	
15	6	SS		Gray Silty CLAY w/Fine Sand & Oxi. Spots & Stains	2-3	
	7	SS		Gray CLAY w/Silt, Oxidized Spots & Fine Sandy Silt Lenses	1-2	
20	8	SS		Gray Silty CLAY w/Traces Of Fine Sand	1-2	
	9	SS			2-2	
25	10	SS		Gray CLAY w/Silt & Oxidized Spots & Stains	2-2	
	11	SS		Gray CLAY	2-2	
30	12	SS		Dark & Gray CLAY w/Silt	2-3	
				Dk. Gr. Sa. Si. CLAY w/Fuel Odor		
	13	SS		Gray Silty Fine To Medium SAND w/Fuel Odor	6-12	
35	14	SS		Cont'd	13-16	



BEI 022583

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 17 Cont'd (HB-17) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation PIEZOMETER Yes

DATE DRILLED 6/2/78 DRILLING METHOD Hollow Auger

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Gray Silty Fine To Medium SAND w/Fuel Odor		
	15	SS		-w/Silt @ 36.5'	12-12	
40	16	SS		Dark Gray CLAY w/Silt	2-2	
				Dk.Gr.Silty CLAY w/Fi.Sand		
	17	SS		Gray Fine To Coarse SAND w/Silt	7-13	
45	18	SS		-w/Gravelly @ 42.0' -Fine To Medium Below 44.0'	14-19	
	19	SS			11-15	
50	20	SS		T. O. B.	18-27	
55						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2.5

WATER CONTENT, % — PL + ● LL + — 0 20 40 60 80 00

BEI 022584

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

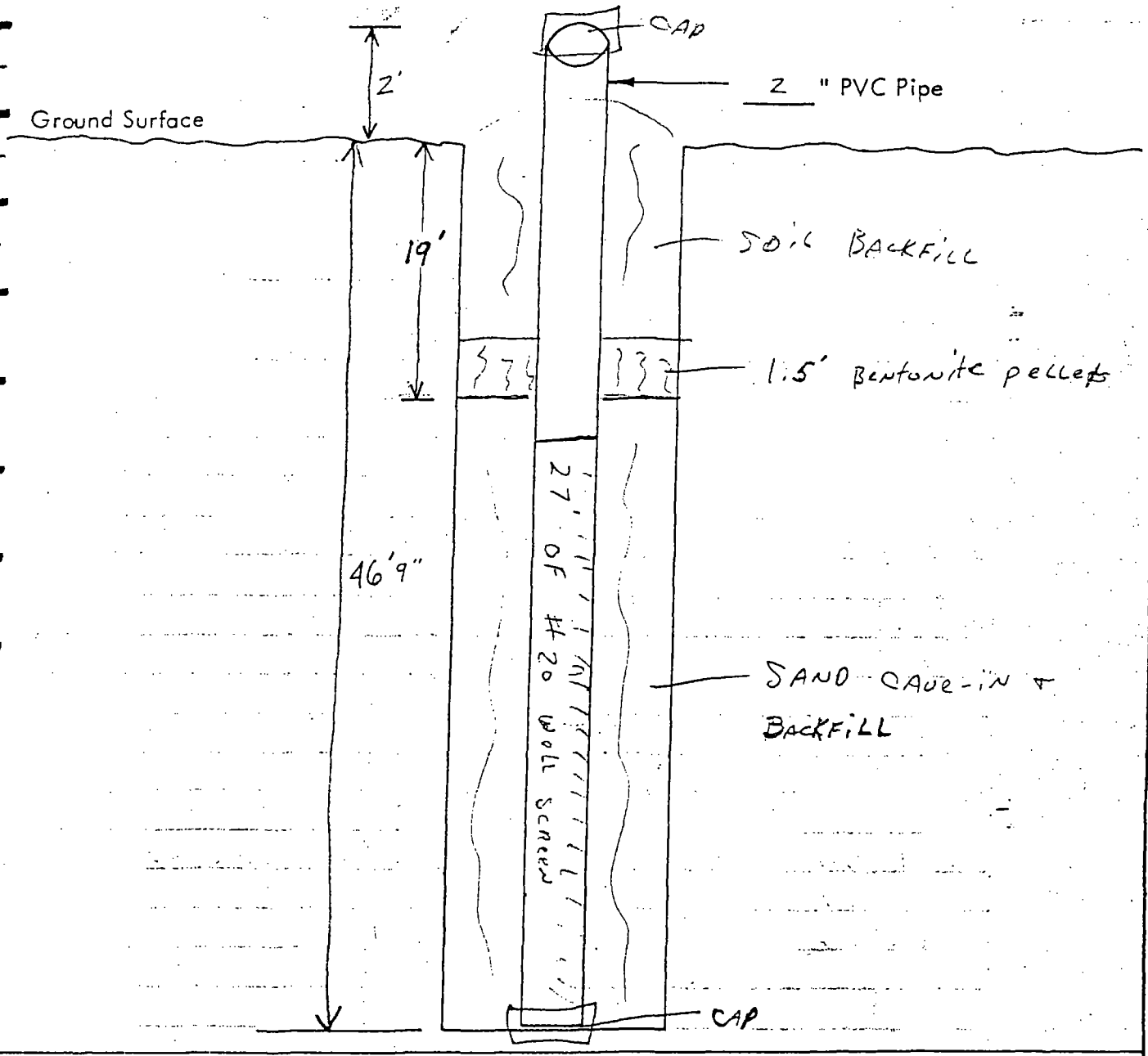
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-17 (HB-17) Contract No. 465 Date Installed 6-5-78



NOTES: Augers pulled P.V.C 2'3" off Bottom

BEI 023435

nformation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

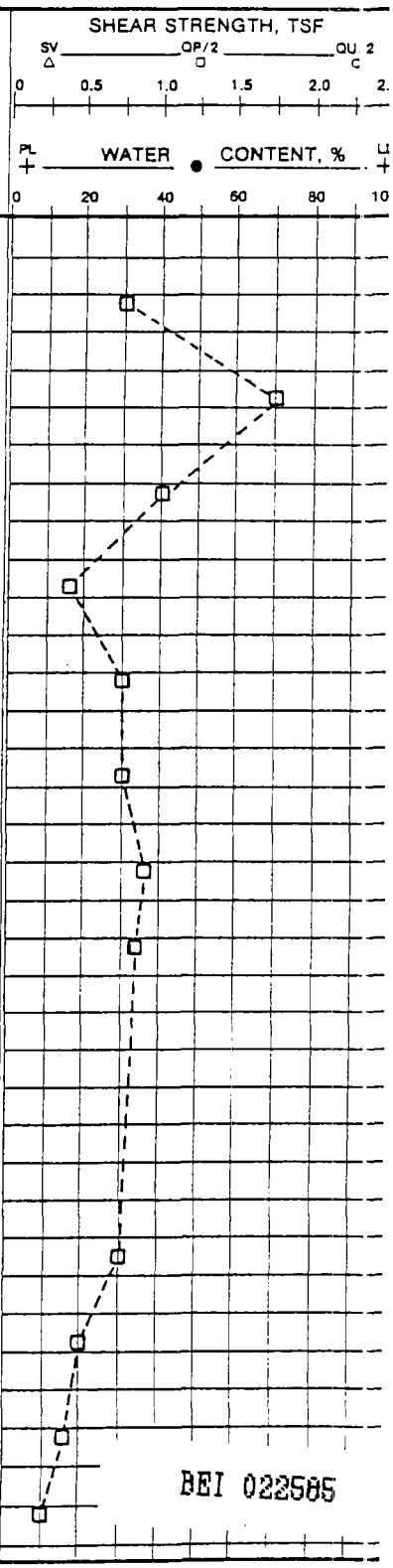
BORING 19 (HB-19) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/5/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Gr. & Br. Si. CLAY w/Rock		
	1	SS		Dk. Gr. CLAY w/Silt, Sand & Oxidized Spots	2-3	
5	2	SS		Dk. Gr. CLAY w/Oxidized Spots	3-4	
	3	SS		Gray CLAY w/Silt, Traces Of Sand & Dk. Gr. Pockets	3-4	
10	4	SS		Gr. Fi. Sandy Silty CLAY w/Fuel Odor	2-2	
	5	SS		Gr. Silty Fine SAND w/Fuel Odor	2-3	
15	6	SS		Gray CLAY w/Oxidized Spots, Silty Clay Seams & Fuel Odor	1-2	
	7	SS			1-1	
20	8	SS		Gray Silty CLAY w/Sandy Silt Lenses & Pockets & Fuel Odor	2-2	
	9	SS			1-1	
25	10	SS	Encountered Water @ 24.0	Brownish-Gray Fine To Medium SAND w/Fuel Odor & 1" Clay Seam	1/12"	
	11	SS		Dark Gray CLAY w/Silt & Fuel Odor	2-2	
30	12	SS		Dark Gray CLAY	2-3	
	13	SS			2-2	
35	14	SS		Dk. Gr. CLAY w/Si. & Fuel Odor; Dk. Gr. Si. Fi. SAND w/Fuel Odor Cont'd	6-14	



BEI 022585

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 19 Cont'd (HB-19) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/5/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Dk. Gr. Si. Fi. SAND w/Fuel Odor		
	15	SS		Dk. Gr. Fine Sandy SILT w/Fuel Odor	2-3	
40	16	SS		Dk. Gr. Fi. Sandy Silty CLAY w/Fuel Odor	1-2	
				Dk Gr. CLAY w/Silt & Fuel Odor		
	17	SS		Gray Fine To Coarse SAND	14-16	
45	18	SS		-w/Gravel To 45.5'	19-20	
				-w/Silt @ 46.5'		
	19	SS			12-16	
				-Fine To Medium @ 49.0'		
50	20	SS		T. O. B.	13-17	
55						

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2)

WATER CONTENT, %: PL + — ● — LL (0, 20, 40, 60, 80, 10)

BEI 022586

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

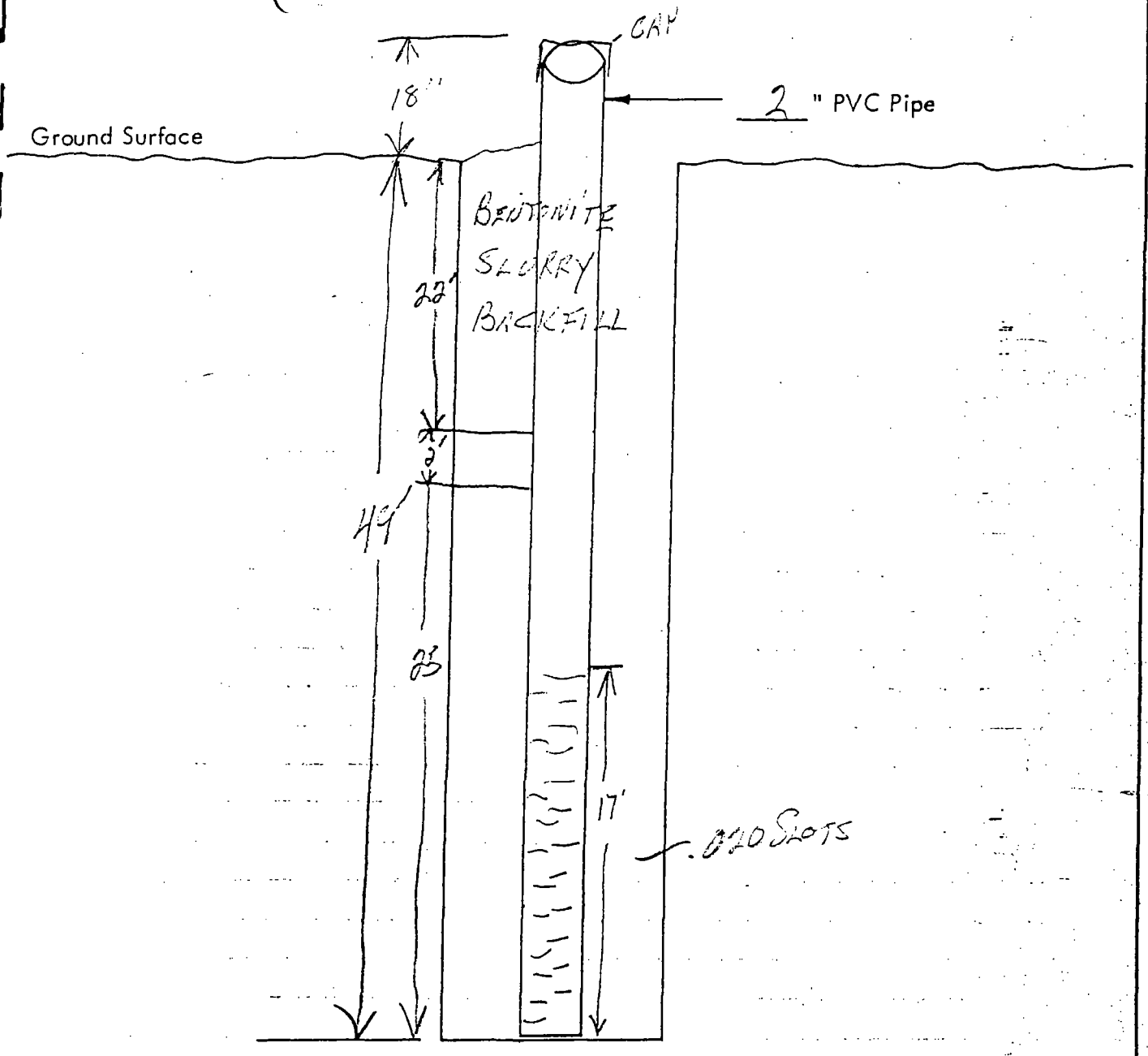
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 19 (HB-19) Contract No. Date Installed



NOTES:

BEI 023436

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

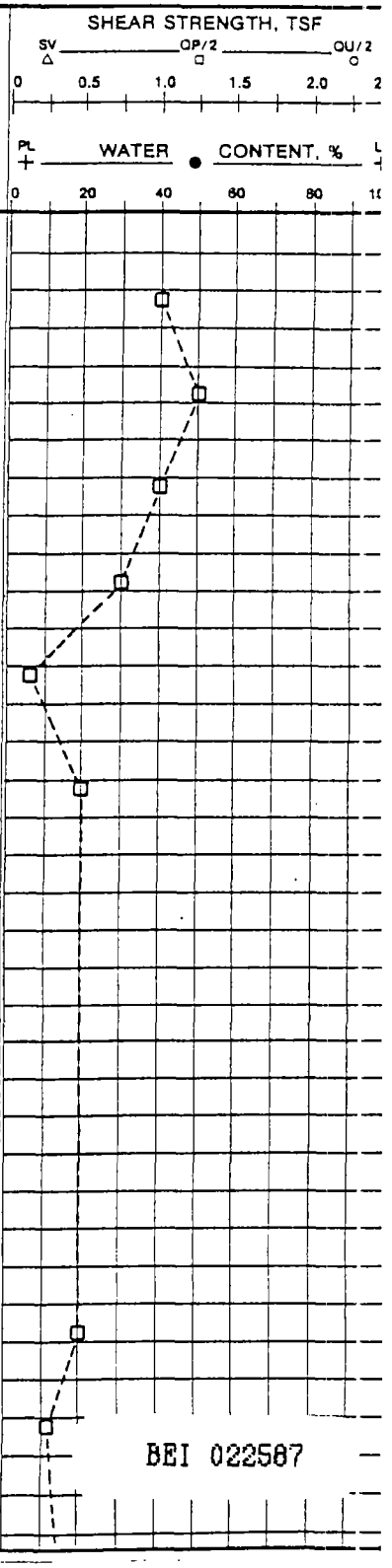
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 20 (HB-20) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Black
PROJECT Phase II, Hydrocarbon Rec. DATE DRILLED 6/12/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Black Silty CINDERS		
	1	SS		Black CLAY w/Silt	2-3	
5	2	SS		Dark Gray CLAY	2-5	
	3	SS		Gr.CLAY w/Silt, Oxidized Spots & Stains & Traces of Fine Sand	2-3	
10	4	SS		Gray CLAY w/Oxidized Spots & Stains	2-3	
	5	SS		Brownish-Gray Fine Sandy Silty CLAY	1-1	
15	6	SS		Gr.CLAY w/Silt Seams	1-2	
	7	SS		Gray Silty CLAY w/Traces of Fine Sand	1-1	
20	8	SS			1-1	
	9	SS		Gray Fine Sandy SILT w/1" Clay Seams @ 23.0'	1-2	
25	10	SS		Gray Silty CLAY w/Fine Sand & 3" Clay Seam @ 25.5'	3-2	
	11	SS		Dark Gray Fine Sandy Silty CLAY w/Clay Seams	2-2	
30	12	SS		Dark Gray CLAY w/Silt	1-2	
	13	SS		-Dark Brown & Gray w/ Traces of Fine Sand @ 31.5'	2-3	
35	14	SS		Cont'd	8-12	



BEI 022587

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 20 Cont'd (HB-20) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 4/12/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Rec. DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Dk. Gray Silty Fine SAND -Gray Fine to Medium w/ Silt @ 36.5'		
	15	SS			5-7	
40	16	SS		Dark Gray Silty CLAY w/ Fine Sand -Interbedded w/Fine Sand Seams & Partings @ 41.5'	W/H-4	
	17	SS			2-4	
45	18	SS		Dark Gray CLAY w/Silt	8-17	
	19	SS		Gray Coarse to Fine SAND w/Silt & Fuel Odor -Fine to Medium @ 46.5' -Fine to Coarse @ 49.0'	21-25	
50	20	SS		T.O.B.	12-14	
55						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2.

WATER CONTENT, % — PL + LL + — 0 20 40 60 80 10

BEI 022588

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

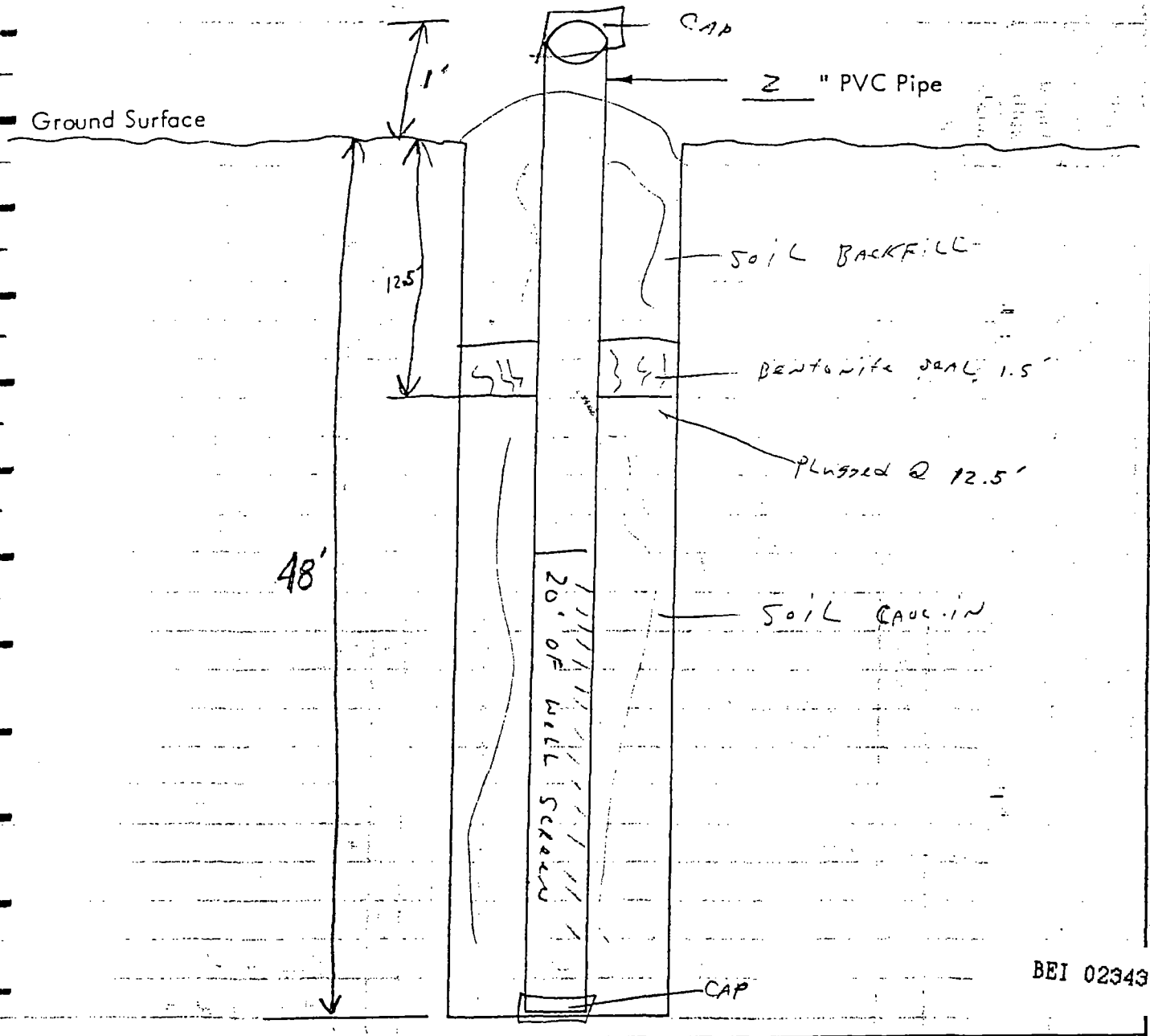
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-20 (HB-20) Contract No. 465 Date Installed 6-12-78



BEI 023439

NOTES: Hole plugged @ 13' - Re-drilled 25', plugged again @ 12.5'

formation Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

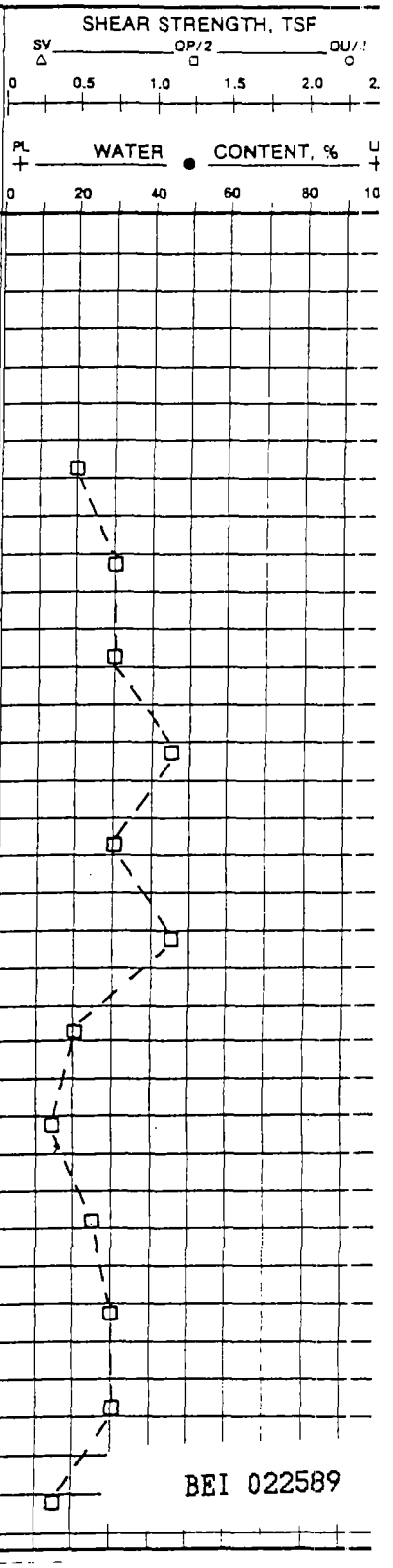
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 23 (HB-23) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert
PROJECT Phase II Hydrocarbon Recovery DATE DRILLED 5/24/78
DRILLING METHOD Hollow Auger PIEZOMETER None

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dk. Br. Si. CLAY w/Traces Of Fine Sand & Roots	1-2	
5	2	SS		Brown Clayey Fine Sandy SILT	2-1	
	3	SS		Grayish-Br. CLAY w/Silt & Fine Sandy Pockets	2-2	
10	4	SS		Grayish-Brown CLAY w/Oxi. Spots & Stains	2-3	
	5	SS		Brownish-Gray Silty CLAY	4-4	
15	6	SS		Dk. Gr. To Br. CLAY w/Oxi. Spots -w/Silty Pockets @ 13.5'	5-6	
	7	SS		-w/Oxidized Stains @ 18.5'	5-6	
20	8	SS			3-5	
	9	SS		Gray CLAY w/Silt & Traces Of Fine Sand -w/Clay & Silt Pockets @ 23.5'	2-1	
25	10	SS			2-2	
	11	SS		Dk. Gr. Silty CLAY w/Traces Of Fine Sand	3-5	
30	12	SS		Grayish-Brown CLAY w/Si., Si. Fi. Sandy Pockets & A Faint Fuel Odor	3-5	
	13	SS		Reddish Br. CLAY w/Traces Of Sand & A Faint Fuel Odor	3-6	
35	14	SS		Gr.-Br. Si. CLAY w/Traces Of Fi. Sa. & A Fuel Odor Cont'd	2-6	



BEI 022589

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 23 Cont'd (HB-23) CONTRACT 465-78

LOGGED BY Schweigert
PIEZOMETER None
DATE DRILLED 5/24/78
DRILLING METHOD Hollow Auger
DRILLED BY Roberts
PROJECT Phase II Hydrocarbon Recovery

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	15	SS		Br. Med. To Fine SAND -w/Gravel @ 36'	19-27	
40	16	SS		-w/A Fuel Odor From 36' To 45' -Silty Coarse To Fine @ 38.5'	16-21	
	17	SS		-Fine To Medium @ 41'	27-34	
45	18	SS		-Fine To Coarse w/Si. & Grav. @ 43.5'	19-21	
	19	SS		-Fine To Coarse w/Traces Of Gravel @ 46' T. O. B.	16-18	
50						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QL/2 ○ — 0 0.5 1.0 1.5 2.0

WATER CONTENT, % — PL + ● — 0 20 40 60 80

BEI 022590

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

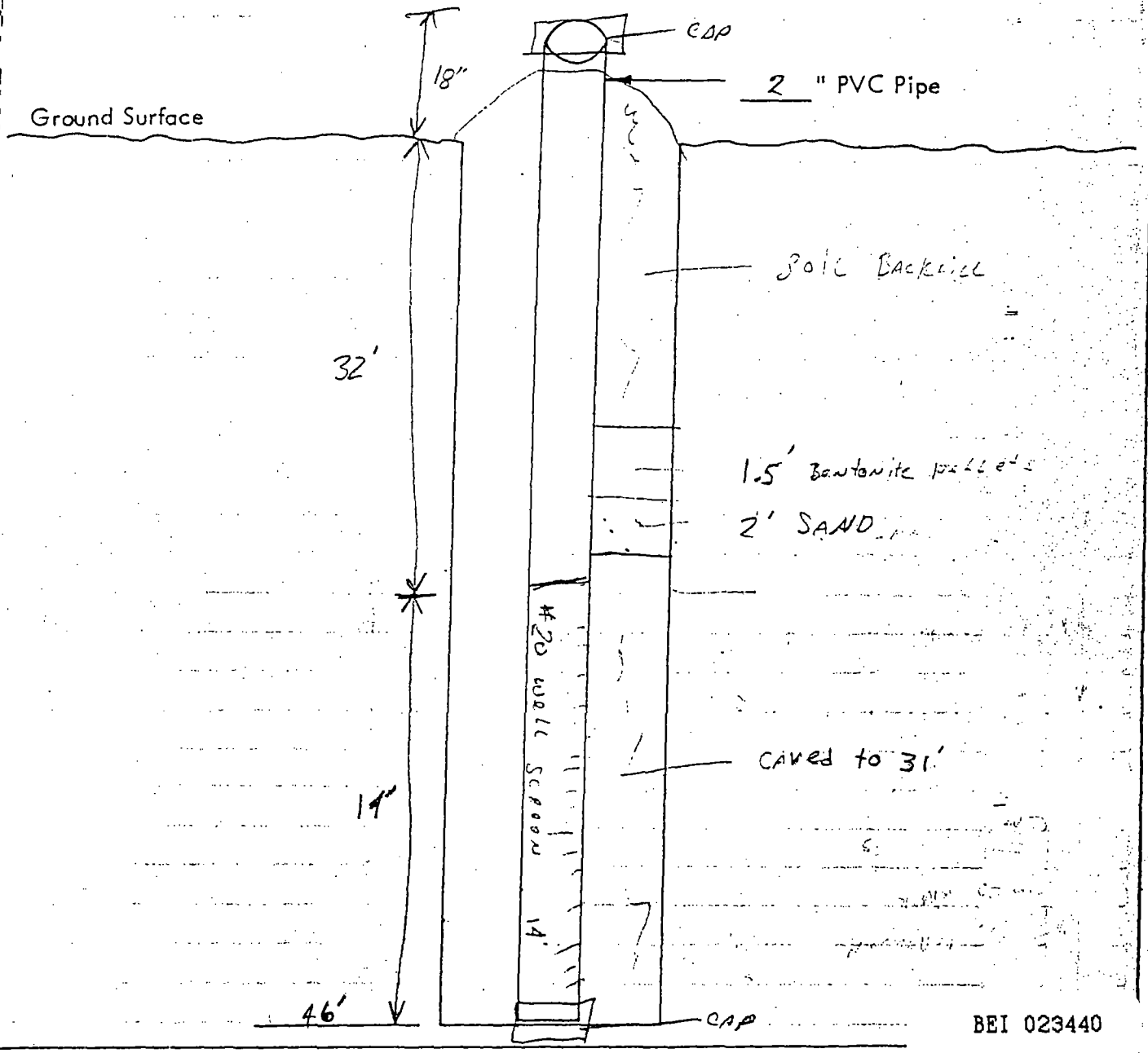
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-23 (HB-23) Contract No. 465 Date Installed 5-24-78



BEI 023440

NOTES:

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

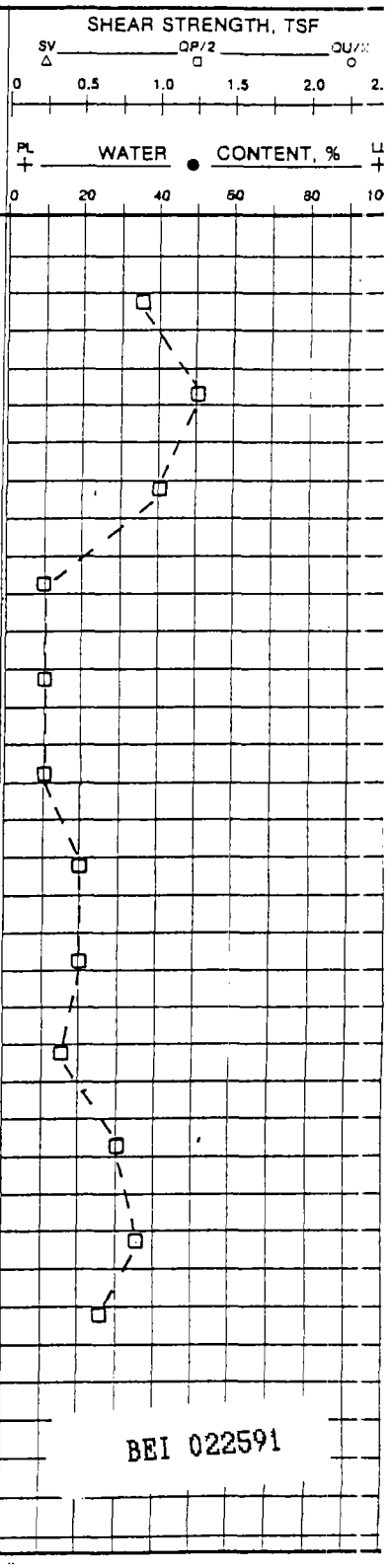
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 24 (HB-24) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert
PROJECT Phase II Hydrocarbon Recovery DATE DRILLED 5-24-78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Br. CLAY w/Silt & Silty Pockets	3-4	
5	2	SS		Br. & Gr. CLAY w/Si. Pockets & Oxidized Spots	4-5	
	3	SS		Brownish-Gr. & Br. CLAY w/Si., Si. Fine Sandy Pockets, ~~& Oxidized Spots~~	3-3	
10	4	SS		Light Gray Clayey SILT w/ Fine Sand	3-3	
	5	SS		Brownish-Gr. Si. CLAY w/ Oxidized Stains, Root Holes,& ~~Traces Of Fine Sand~~	2-2	
15	6	SS		Grayish-Br. CLAY w/Silt & Oxidized Spots & Stains -w/Si. Fi. Sa. Pockets @ 14' -w/Slickensides @ 16.5'	1-1	
	7	SS			1-1	
20	8	SS		Grayish-Br. Si. CLAY w/Fi. Sa. & A Faint Fuel Odor	2-3	
	9	SS		Gr. CLAY w/Si. & Oxidized Spots & Stains -w/Joints @ 21.5' -w/Silty Fine Sandy & Clay Pockets @ 24'	1-2	
25	10	SS			2-2	
	11	SS			2-3	
30	12	SS		Br. Fi. Sand -w/A Fuel Odor From 34' To 45.5' -w/Silt From 31' To 33'	4-9	
	13	SS			9-12	
35				Cont'd		



BEI 022591

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1' = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 24 Cont'd (48-24) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 5/24/78 LOGGED BY Schweigert

PROJECT Phase II Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.5) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 100)
	14	SS			5-9		
				-Fine To Medium w/Silt & Gravel @ 36.5'			
	15	SS			10-13		
40	16	SS		-Fine To Medium w/Silt Below 39'	13-15		
	17	SS			16-18		
45	18	SS		-w/Traces Of Coarse, Sand & Gravel @ 44'	15-10		
	19	SS		T. O. B.	22-32		
50							

BEI 022592

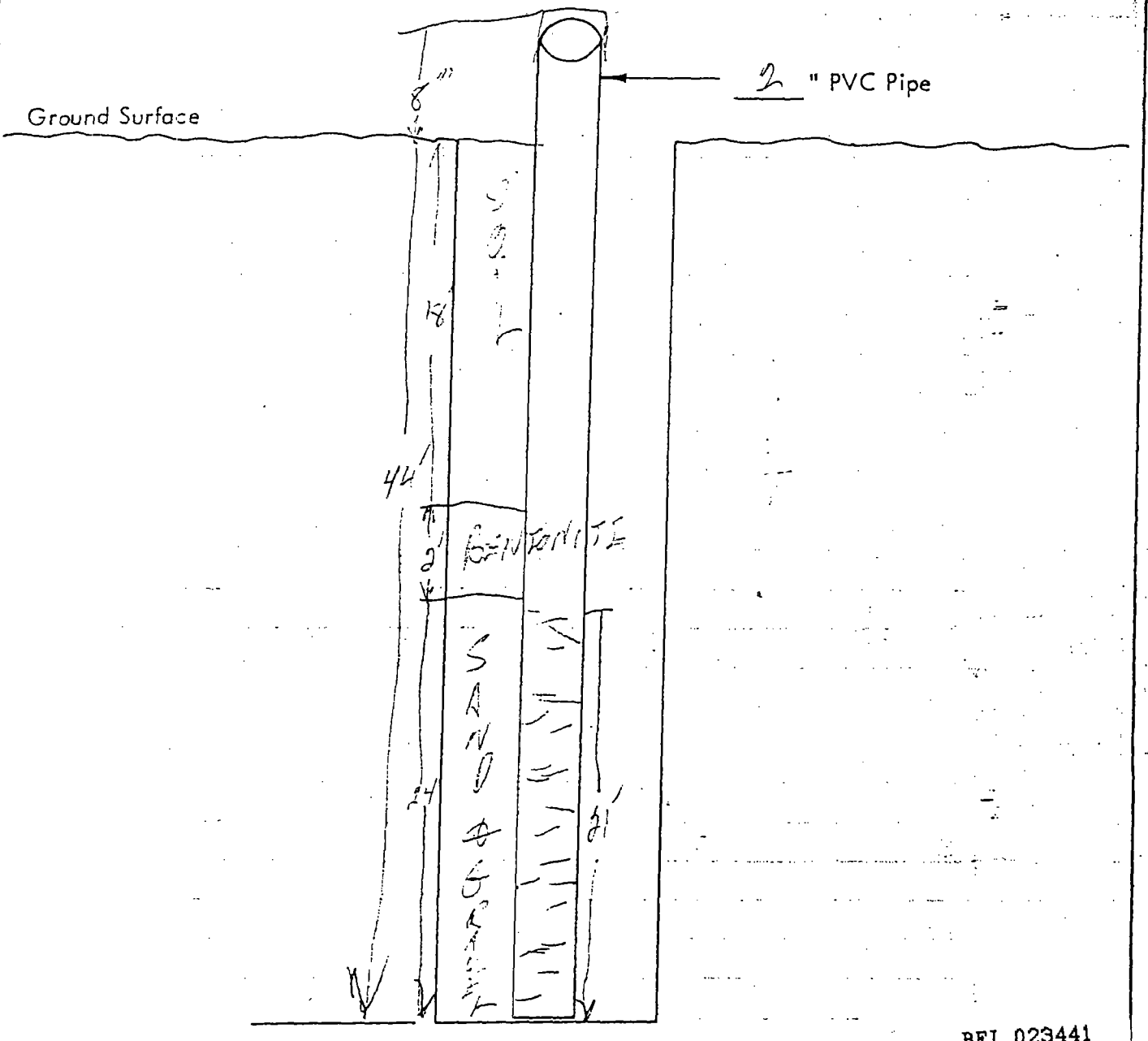
GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 24 (HB-24) Contract No. Date Installed



BEI 023441

NOTES:

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

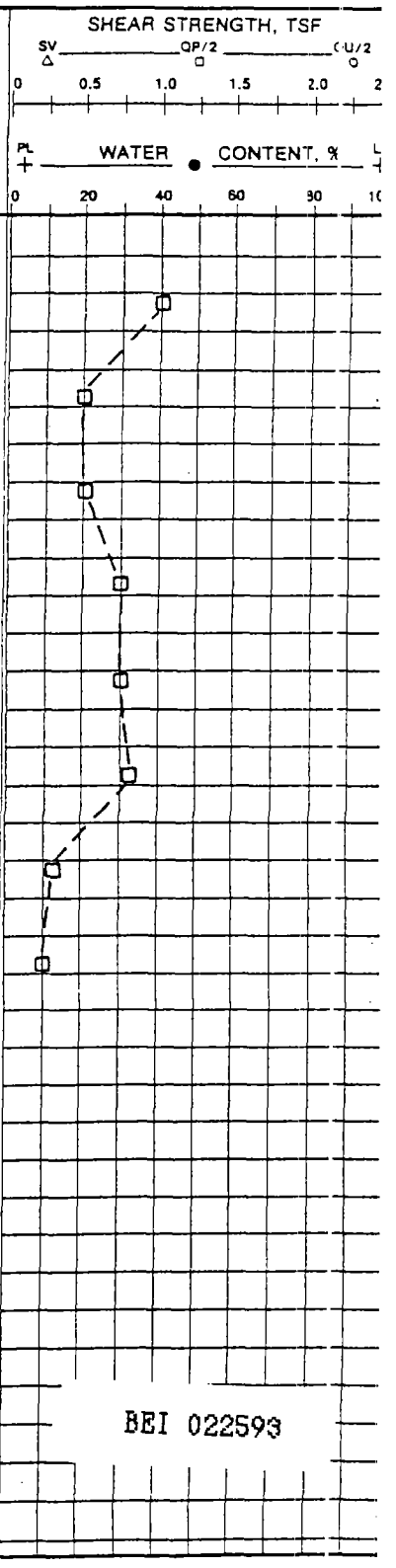
BORING 25 (HB-25) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/31/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Brown Silty CLAY w/Roots & Traces Of Fine Sand		
	1	SS		Brown CLAY w/Silt & Traces Of Fine Sand	1-2	
5	2	SS		Brown Silty, Clayey Fine SAND	1-1	
	3	SS		Gray Silty CLAY w/Oxidized Stains & Traces Of Fine Sand	1-1	
10	4	SS		Gray CLAY w/Oxidized Spots & Stains	1-3	
	5	SS		-Mottled Dark Gray & Gray w/Slickensides @ 11.5'	3-4	
15	6	SS		-Mottled Gray & Brown @ 14'	3-3	
	7	SS		Gray Clayey SILT w/Oxidized Stains, Sand Lenses, & Traces Of Fine Sand	2-4	
20	8	SS		Brown Silty CLAY w/Rootholes & Oxidized Stains	2-2	
				~~Brown & Gray CLAY~~		
	9	SS		Brown To Gray SILT w/A Fuel Odor	2-3	
25	10	SS		-Clayey w/Oxidized Stains @ 21.5' -Fine Sandy w/Clay @ 24'	2-3	
	11	SS		Grayish-Brown Fine Silty SAND w/A Fuel Odor	3-6	
30	12	SS		Brown Fine Sandy SILT w/A Fuel Odor & Traces Of Clay	3-6	
	13	SS		Gray To Dark Gray Silty Fine SAND w/A Fuel Odor	13-17	
35				Cont'd		



BEI 022593

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 25 Cont'd (H8-25) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 5/31/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, CU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 10)
	14	SS		-w/Traces Of Clay Below 34'	3-7		
	15	SS			9-11		
40	16	SS		T. O. B.	8-12		
45							

BEI 022594

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

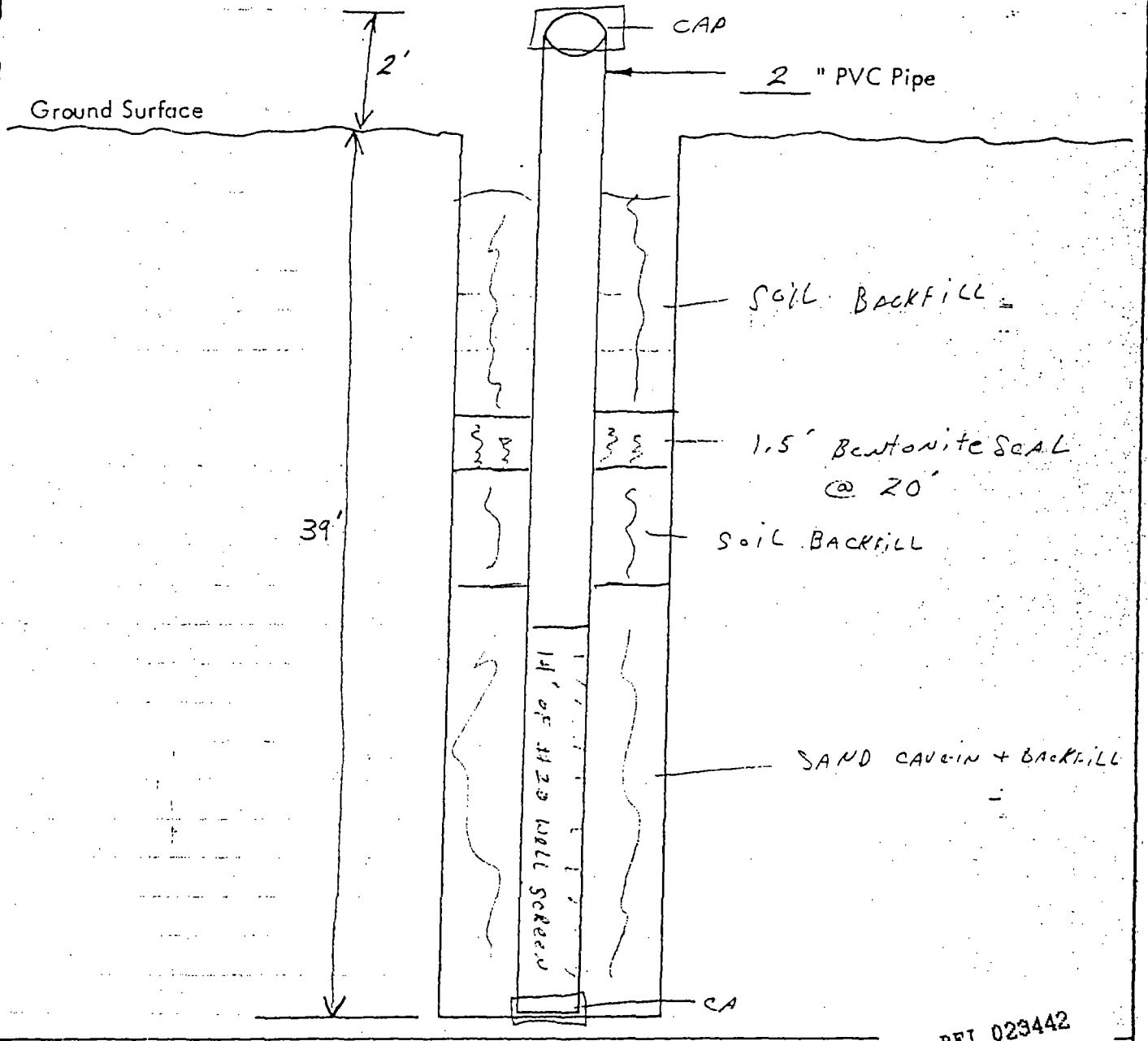
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-25 (HB-25) Contract No. 465 Date Installed 5-31-78



BEI 023442

NOTES:

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 26 (HB-26) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Gotsch DATE DRILLED 5/31/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Brown CLAY w/Silt		
	1	SS			2-3	
				Brown Silty Fine SAND w/ Traces Of Clay -Gray Below 6.5'		
5	2	SS			1-1	
	3	SS			2-2	
10	4	SS			2-3	
				Br. CLAY w/Oxidized Spots		
	5	SS		Brown To Gray SILT w/Traces Of Sand	4-4	
15	6	SS		-w/Clay Lenses @ 16.5'	4-5	
	7	SS			5-6	
20	8	SS		Gray & Brown CLAY w/Oxi. Spots & Traces Of Sand	3-4	
	9	SS		Gr.Si.CLAY w/Oxidized Stains	1-2	
				Gr. CLAY w/Silt, Oxidized Stns. & Silty To Sandy Pockets		
25	10	SS		Dark Gray Clayey SILT w/ Traces Of Sand & Fuel Odor	2-2	
	11	SS			2-3	
30	12	SS		Brown Fine SAND w/Silt & Fuel Odor -Silty Below 31.5'	10-14	
	13	SS		-w/Traces Of Clay @ 34.0'	10-11	
35	14	SS		Cont'd	10-11	

SHEAR STRENGTH, TSF — SV △ — QP/2 □ — QU/2 ○ — 0 0.5 1.0 1.5 2.0 2.

PL + — WATER ● CONTENT, % — + LL — 0 20 40 60 80 10

BEI 022595

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 26 (HB-26) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 5/31/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ●; 0, 20, 40, 60, 80)
	14	SS		Brown Silty Fine SAND w/Fuel Odor & Traces Of Clay			
	15	SS		Brown & Dark Gray Below 36.5'	6-8		
				-w/Clayey Pockets @ 39.0'			
40	16	SS		T. O. B.	7-9		
45							

BEI 022596

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

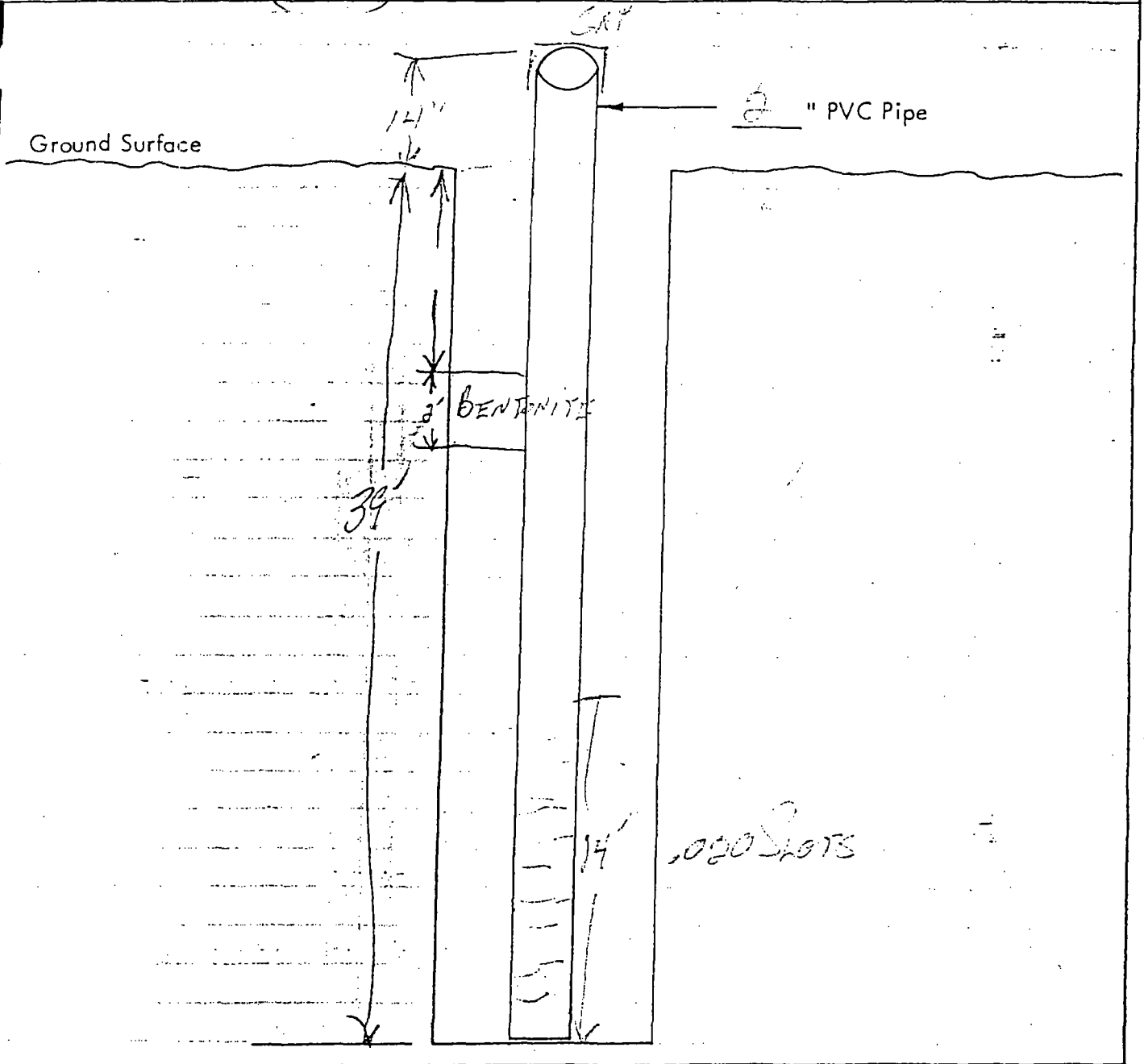
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 26 (HB-26) Contract No. Date Installed



NOTES:

BEI 029449

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

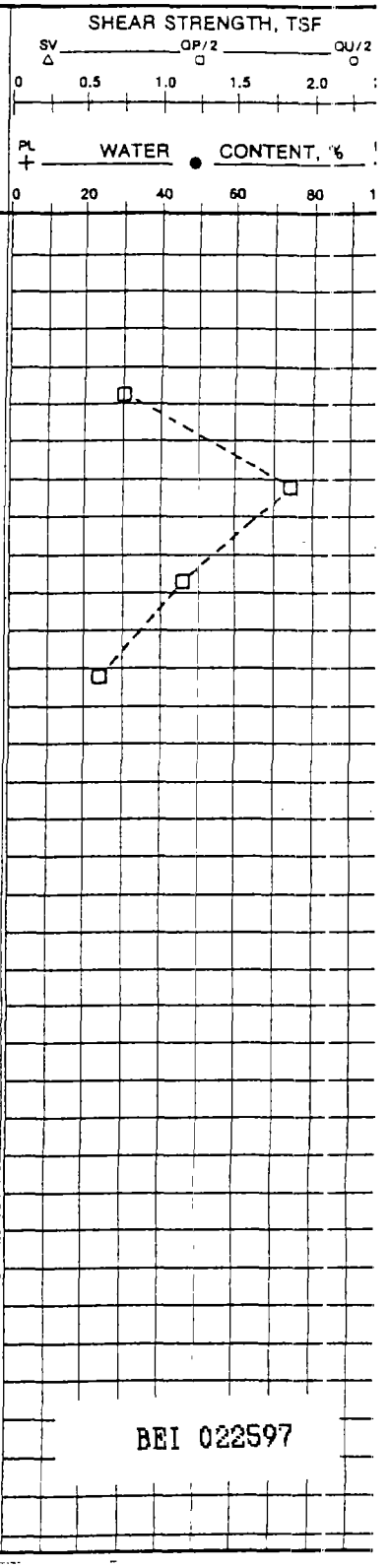
RECORD OF SUBSURFACE EXPLORATION

BORING 27 (HB-27) CONTRACT 465-78

DRILLED BY Gatsch DATE DRILLED 6/9/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				CINDERS & SOIL		
				Black CLAY & CINDERS		
	1	SS			2-3	
				Brownish-Gray CLAY w/Oxi. Spots, Stains & Silty Pockets		
5	2	SS			3-3	
	3	SS			4-5	
10	4	SS			2-2	
				Interbedded Gray CLAY Silty CLAY & Fine Sandy SILT Seams		
	5	SS			2-3	
				Gray Silty CLAY w/Sandy & Silt Seams		
15	6	SS			3-2	
	7	SS			4-3	
				Brown Fine SAND		
				-Silty To 28.0'		
20	8	SS		-w/Clayey Pockets @ 19.0'	5-8	
	9	SS			4-6	
				-w/Traces Of Clay @ 24.0'		
25	10	SS			4-6	
				-Gray From 26.5' To 33.0'		
	11	SS			5-5	
				-w/Silt @ 29.0'		
30	12	SS			10-12	
				-Silty From 31.5' To 38.0'		
	13	SS		-w/Traces Of Clay @ 31.5'	5-7	
				-Brown @ 34.0'		
35	14	SS		Cont'd	4-5	



BEI 022597

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 27 Cont'd (H8-27) CONTRACT 465-78

DRILLED BY Gotsch
PROJECT Phase II, Hydrocarbon Recovery
DATE DRILLED 6/9/78
DRILLING METHOD Investigation Hollow Auger
LOGGED BY Schweigert
PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Brown Silty Fine SAND		
				-Brownish-Gray @ 36.5'		
	15	SS			17-19	
				-Gray w/Silt @ 39.0'		
40	16	SS		T. O. B.	7-9	
45						

SHEAR STRENGTH, TSF — SV, QP/2, QU/2 — 0, 0.5, 1.0, 1.5, 2.0, 2.5

WATER CONTENT, % — PL, LL — 0, 20, 40, 60, 80, 100

BEI 022598

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

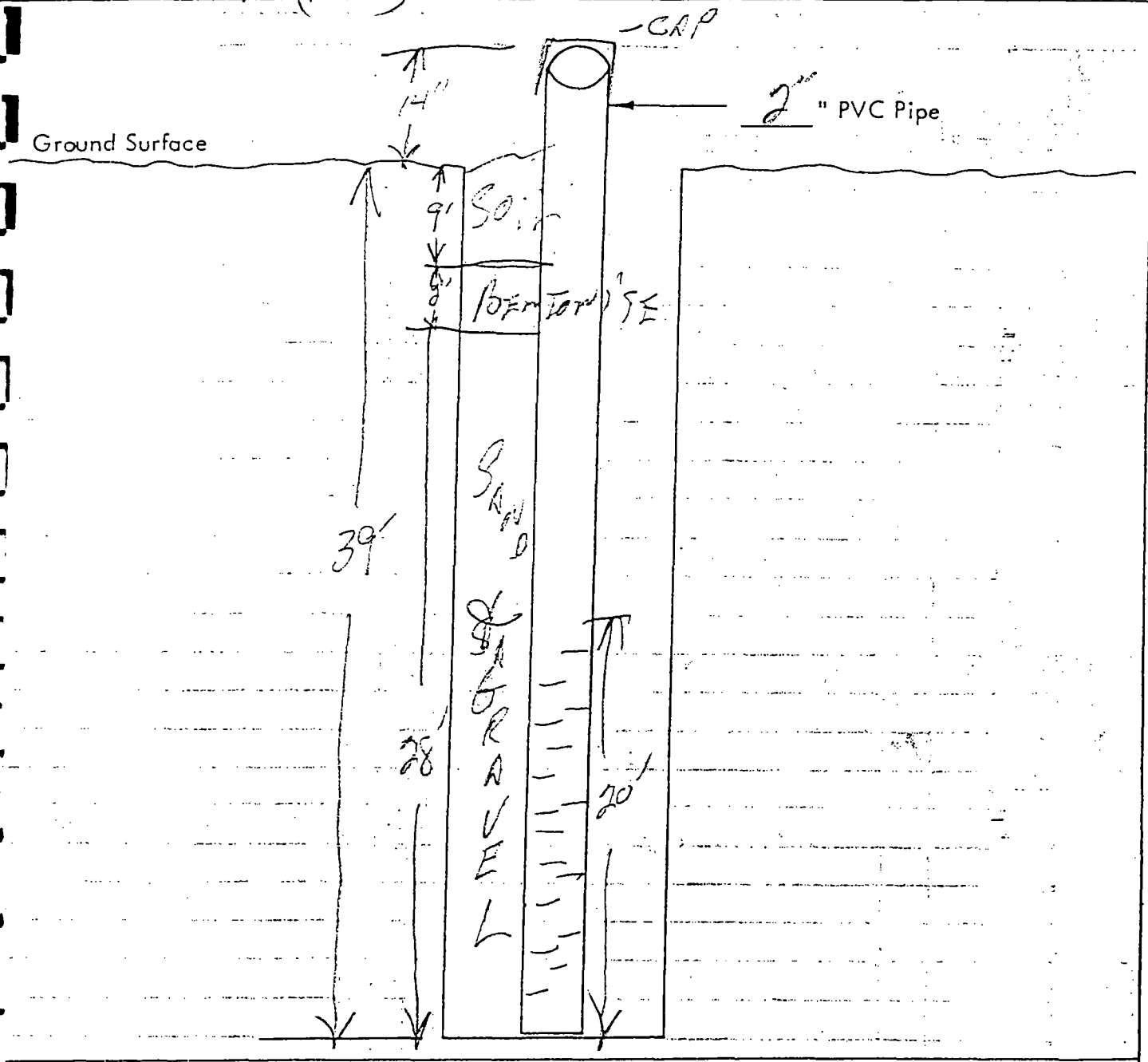
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 27 (HB-27) Contract No. Date Installed



NOTES:

BEI 023444

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

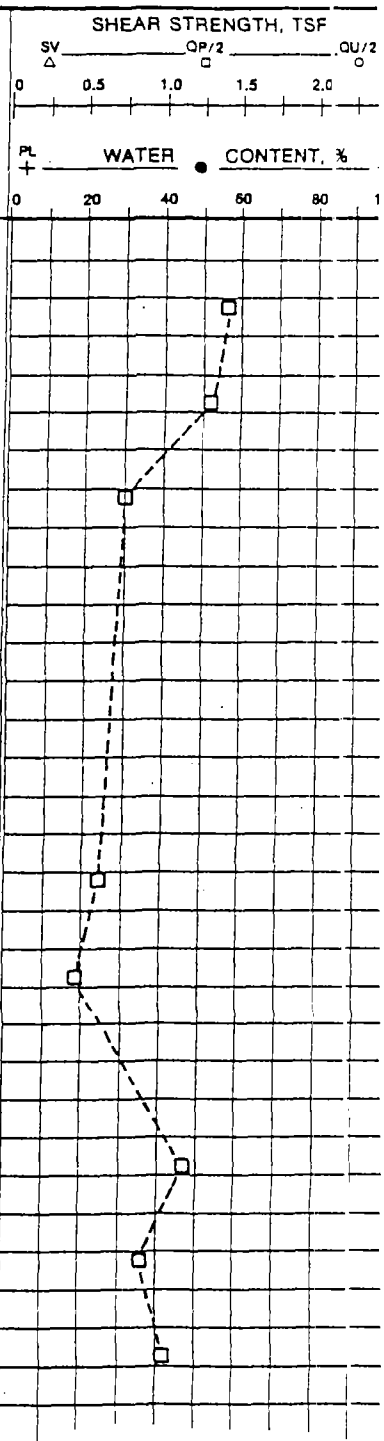
BORING 28 (HB-28) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/8/78

PIEZOMETER Yes DRILLING METHOD Hollow Auger

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Brown & Dk. Gr. Silty CLAY		
	1	SS		Dk. Br. CLAY w/Silt & Traces Of Fine Sand	6-7	
5	2	SS		Brown & Dark Gray CLAY w/ Oxidized Spots	3-5	
	3	SS		Brownish-Gray CLAY w/Silt Oxidized Stains & Traces Of Sand	2-2	
10	4	SS		Gray Silty CLAY w/Traces Of Fine Sand	2-4	
	5	SS		Brown Fine Sandy SILT	1-2	
15	6	SS		Gray Fine Sandy Clayey SILT	1/12"-1	
	7	SS		Gray CLAY w/Silt	2-3	
20	8	SS		Dk. Gr. & Gr. CLAY w/Silt & Traces Of Fine Sand	1-2	
	9	SS		Gray Clayey Fine Sandy SILT	1-2	
25	10	SS		Gray Silty CLAY & CLAY w/Si. & Traces Of Fine Sand	2-3	
	11	SS		Mottled Gray & Brown CLAY	2-3	
30	12	SS		-Gray @ 29.0'	2-3	
	13	SS		Gray Silty CLAY Brown Fine SAND w/Fuel Odor	7-8	
35	14	SS		-Fine To Medium @ 34.0' Cont'd	7-10	



BEI 022599

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 28 Cont'd (HB-28) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/8/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Brown Fine Fine To Medium SAND w/Fuel Odor		
	15	SS		-Brownish-Gray Fine @ 36.5'	13-15	
45	16	SS		-Gray Fine To Medium Below 44.0'	17-19	
	17	SS		T. O. B.	13-16	
50						

SHEAR STRENGTH, TSF — SV △ — QP/2 □ — QU/2 ○ — 0 0.5 1.0 1.5 2.0

PL + — WATER ● CONTENT, % — 0 20 40 60 80

BEI 022600

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

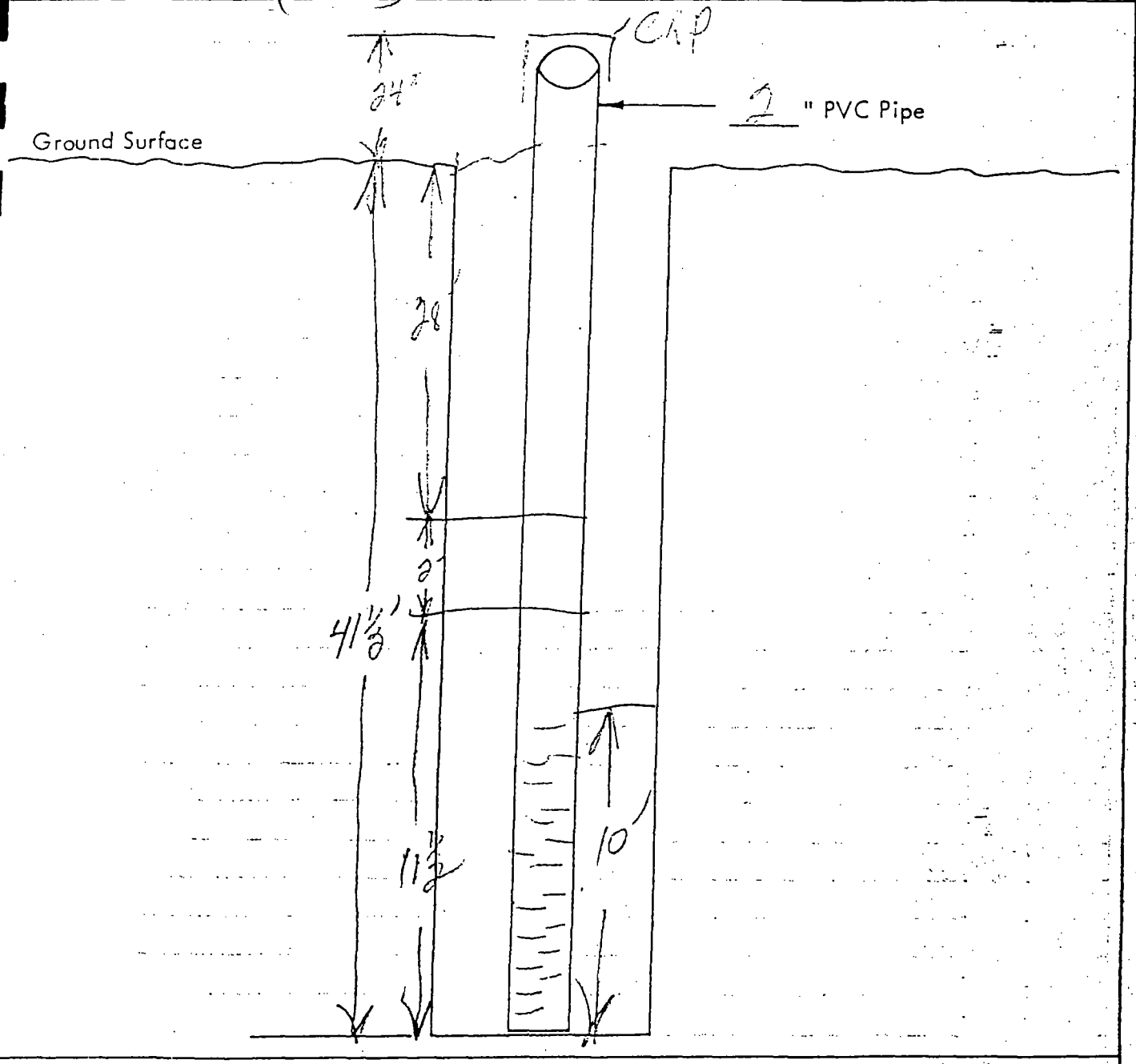
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 28 (HB-28) Contract No. Date Installed



NOTES:

BEI 023445

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

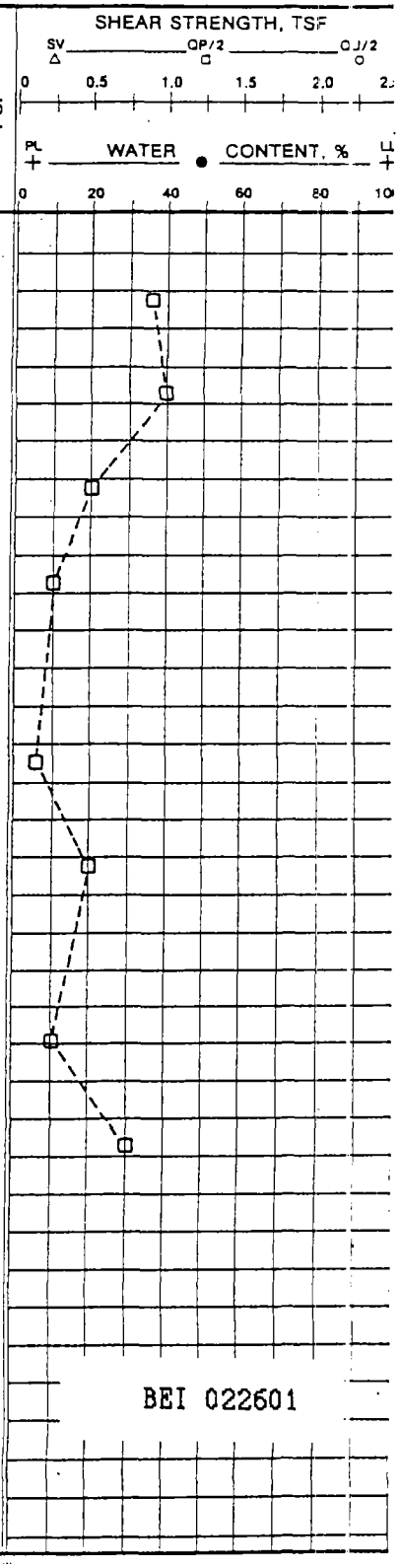
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 29 (HB-29) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert
PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/9/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. Silty CLAY w/Roots		
	1	SS		Gray CLAY w/Oxidized Spots & Stains	2-4	
				-w/Silty Pockets @ 4.0'		
5	2	SS			3-6	
	3	SS		Brown & Gray CLAY w/Silt & Traces Of Sand	1-3	
10	4	SS		Gray SILT w/Oxidized Stains & Traces Of Sand	3-4	
	5	SS		Brown Clayey Silt w/Traces Of Fine Sand	1-1	
15	6	SS		Gray Silty CLAY	2-2	
	7	SS		Gray CLAY w/Oxidized Stains	2-3	
20	8	SS		Intermixed Gray CLAY & CLAY w/Si. & Oxidized Stains	1-W/H	
	9	SS		Gray CLAY w/Si. & Traces Of Sand	W/H-2	
25	10	SS		Gray CLAY w/Oxidized Spots & Stains	2-3	
	11	SS		Brown Fine SAND w/Fuel Odor -Silty From 26.5' To 33.0' -Gray From 31.0' To 43.0'	5-3	
30	12	SS		-w/Clayey Lenses @ 31.5'	4-10	
	13	SS		-w/Silt @ 34.0'	6-7	
35	14	SS		Cont'd	14-17	



BEI 022601

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 29 Cont'd (HB-29) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts — DATE DRILLED 6/9/78 — LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation — DRILLING METHOD Hollow Auger — PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Gray Fine SAND w/Fuel Odor		
				-w/Silt @ 34.0		
	15	SS		-Gravelly Fine To Coarse @36.5	20-22	
				-Fine To Medium @ 39.0'		
40	16	SS			7-17	
				-Fine To Coarse @ 41.5'		
	17	SS			12-17	
				-Brownish-Gray Fine To Med. From 44.0' To 48.0'		
45	18	SS			21-31	
	19	SS			14-17	
				-Brown Fine To Coarse w/ Gravel @ 49.0'		
50	20	SS			16-17	
				T. O. B.		
55						

SHEAR STRENGTH, TSF — SV △ — OP/2 □ — OU ○ — 0 0.5 1.0 1.5 2.0

PL + — WATER ● CONTENT, % — 0 20 40 60 80

BEI 022602

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

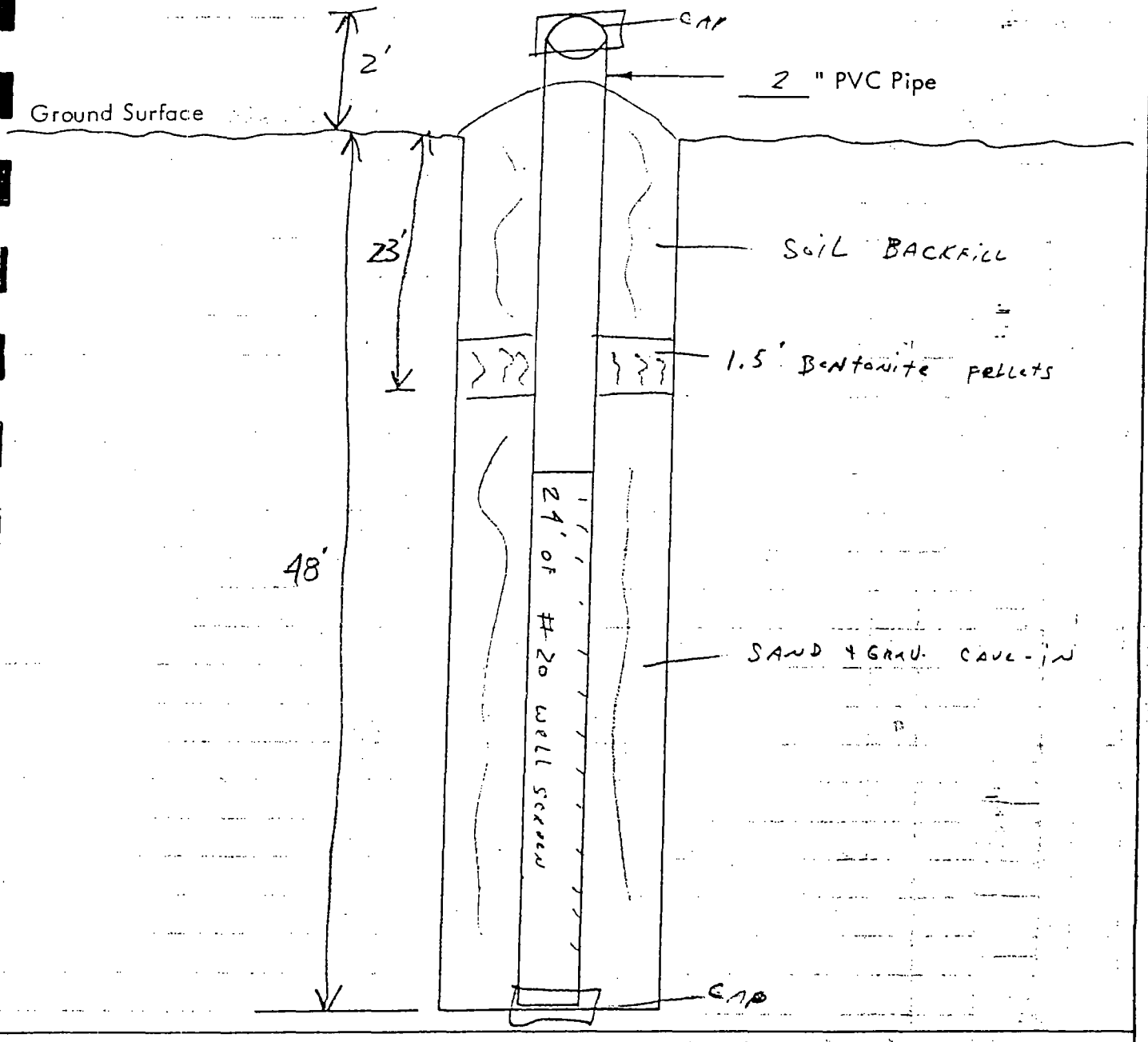
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-29 (HB-29) Contract No. 465 Date Installed 6-9-78



NOTES:

BEI 023446

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

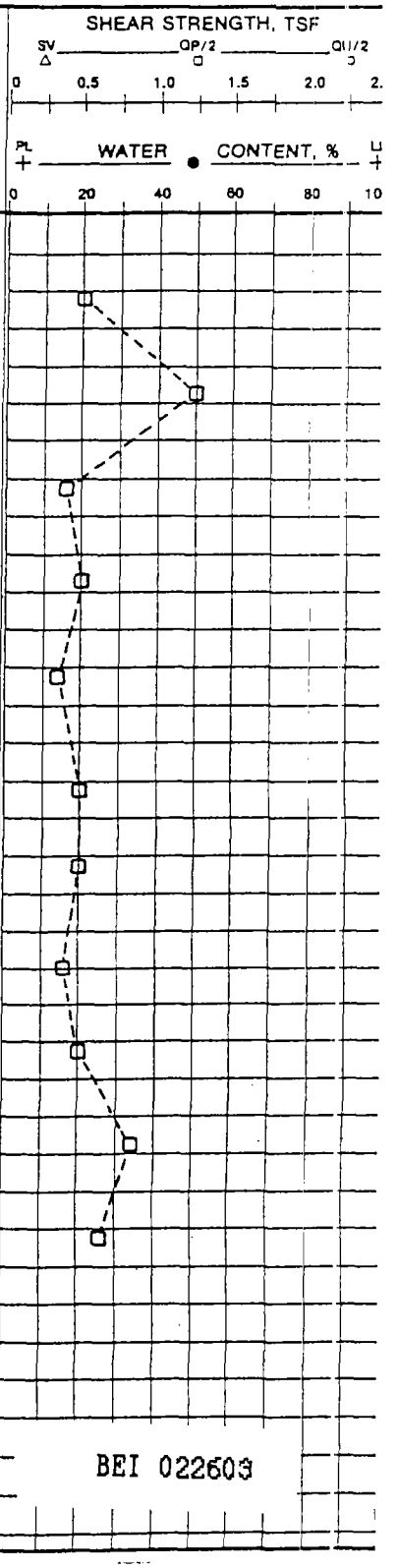
RECORD OF SUBSURFACE EXPLORATION

BORING 30 (HB-30) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts LOGGED BY Black
PROJECT Phase II, Hydrocarbon Rec. DATE DRILLED 6/8/78
PIEZOMETER Yes DRILLING METHOD H.A.

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dark Brown Silty CLAY w/ Roots & Traces of Fine Sand	2-3	
5	2	SS		Dark Gray CLAY w/Oxidized Spots	3-5	
	3	SS		Gr.CLAY w/Silt, Oxid.Spots & Stains & Traces of Sand	2-3	
10	4	SS		Gray Silty CLAY w/Fine Sand, Oxidized Stains & Clayey Silt Seams	2-2	
	5	SS			2-2	
15	6	SS			1-3	
	7	SS		Brownish-Gray CLAY w/Silt, Oxidized Stains & Silty Seams	2-2	
20	8	SS		Gr.Fi.Sa.SILT w/Oxidized Stains & Fuel Odor	3-3	
	9	SS		Gray Fine Sandy Silty CLAY w/Oxidized Stains & Fuel Odor	2-1	
25	10	SS		Gray CLAY w/Oxidized Spots & Stains, Sandy Partings & Seams & Fuel Odor	2-4	
	11	SS			2-3	
30	12	SS		Brown Fine SAND w/Fuel Odor -w/Silt @ 28.0' -Grayish-Brown @ 31.5'	9-13	
	13	SS		-Dark Grayish-Br.@ 33.0'	10-13	
35	14	SS		Cont'd	5-11	



BEI 022603

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 30 Cont'd (HB-30) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 6/8/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Rec. DRILLING METHOD H.A. PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 10)
	14	SS		Dk. Grayish-Br. Fine SAND w/Fuel Odor			
	15	SS		-Brownish-Gray Fine to Med. w/Silt Below 36.5'	12-13		
40	16	SS		T.O.B.	8-12		
45							

BEI 022604

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

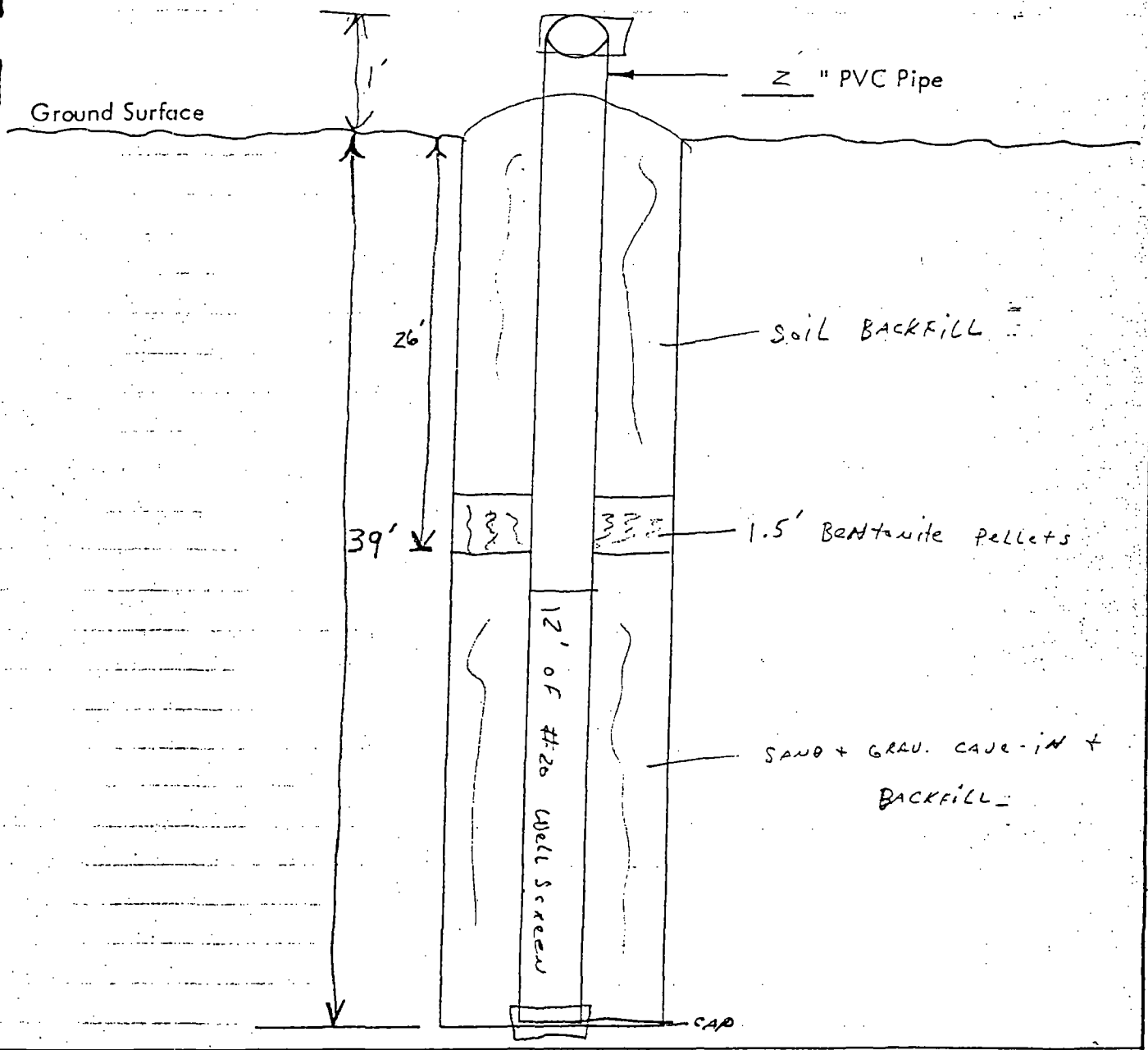
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-30 (HB-30) Contract No. 465 Date Installed 6-9-78



NOTES: Installed Piezo., pulled up w/ Augers. Pulled out Redrilled + Reset 8' of fine sand in 1st Piezo.

BEI 023447

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

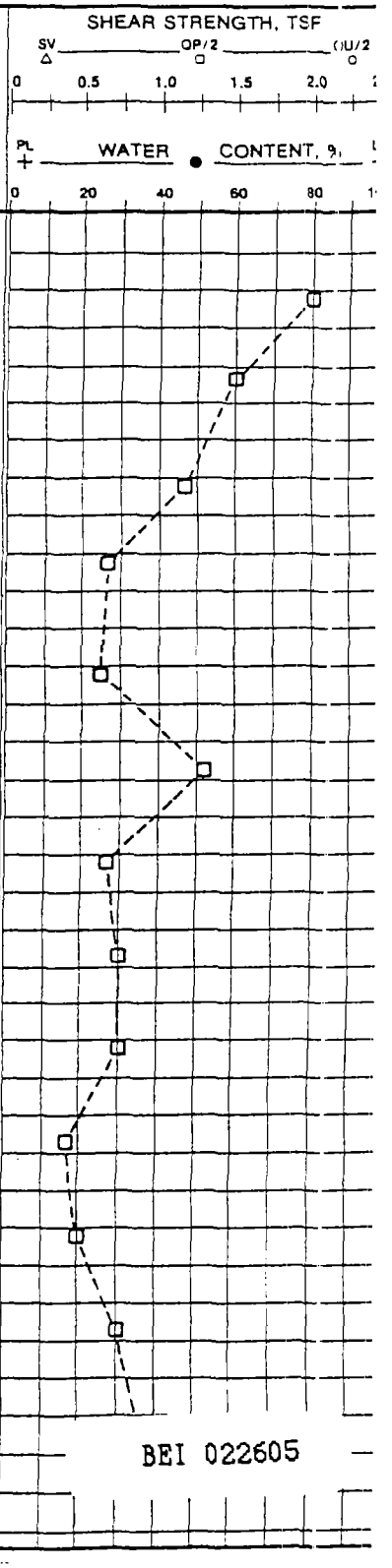
RECORD OF SUBSURFACE EXPLORATION

BORING 31 (HB-31) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/8/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Rec. DRILLING METHOD H.A. PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Gr.& Br.Si.CLAY &CLAY w/Roots		
	1	SS		Dark Gray Silty CLAY w/Fine Roots & Traces of Sand	2-2	
				Dark Gray CLAY		
5	2	SS		Gray CLAY w/Silt, Fine Sand Oxidized Spots & Stains	2-4	
	3	SS			3-4	
10	4	SS		Gray Silty CLAY w/Sandy Seams	2-2	
	5	SS		Interbedded Gray Si.CLAY & CLAY w/Silt & Silty Fine SAND Seams	2-2	
15	6	SS		Gray Fine Sandy Clayey SILT w/Oxidized Stains	1/12"-1	
	7	SS		Gray Fine Sandy SILT	1-2	
				Gray Silty CLAY w/Oxidized Stains		
20	8	SS		Gray CLAY w/Oxidized Spots & Stains	1-3	
	9	SS		Gray CLAY w/Silt Oxidized Spots & Stains	2-2	
25	10	SS		Gray to Dark Gray Silty CLAY interbedded w/Fine Sandy Silt Partings & Seams	2-2	
	11	SS			1-2	
30	12	SS			2-2	
	13	SS		Dark Gray CLAY	2-4	
35	14	SS		cont'd	6-7	



BEI 022605

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 31 Cont'd (HB-31) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/8/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Rec. DRILLING METHOD H.A. PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Gray Fi.SAND w/Fuel Odor		
				-Silty @ 34.5'		
				-Dark Gray @ 36.5'		
	15	SS		-Br.-Gr., Gravelly @ 39.0'	4-7	
				-Fine to Coarse w/Silt From 39.0 to 43.0'		
40	16	SS			6-11	
				-Gray Below 41.5'		
	17	SS		-Traces of Gravel @ 41.5'	17-22	
				-Coarse to Fine w/Gravel @ 44.0'		
45	18	SS			18-17	
				T.O.B.		
50						

SHEAR STRENGTH, TSF: SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0

PL + WATER CONTENT, % ● — 0 20 40 60 80

BEI 022606

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

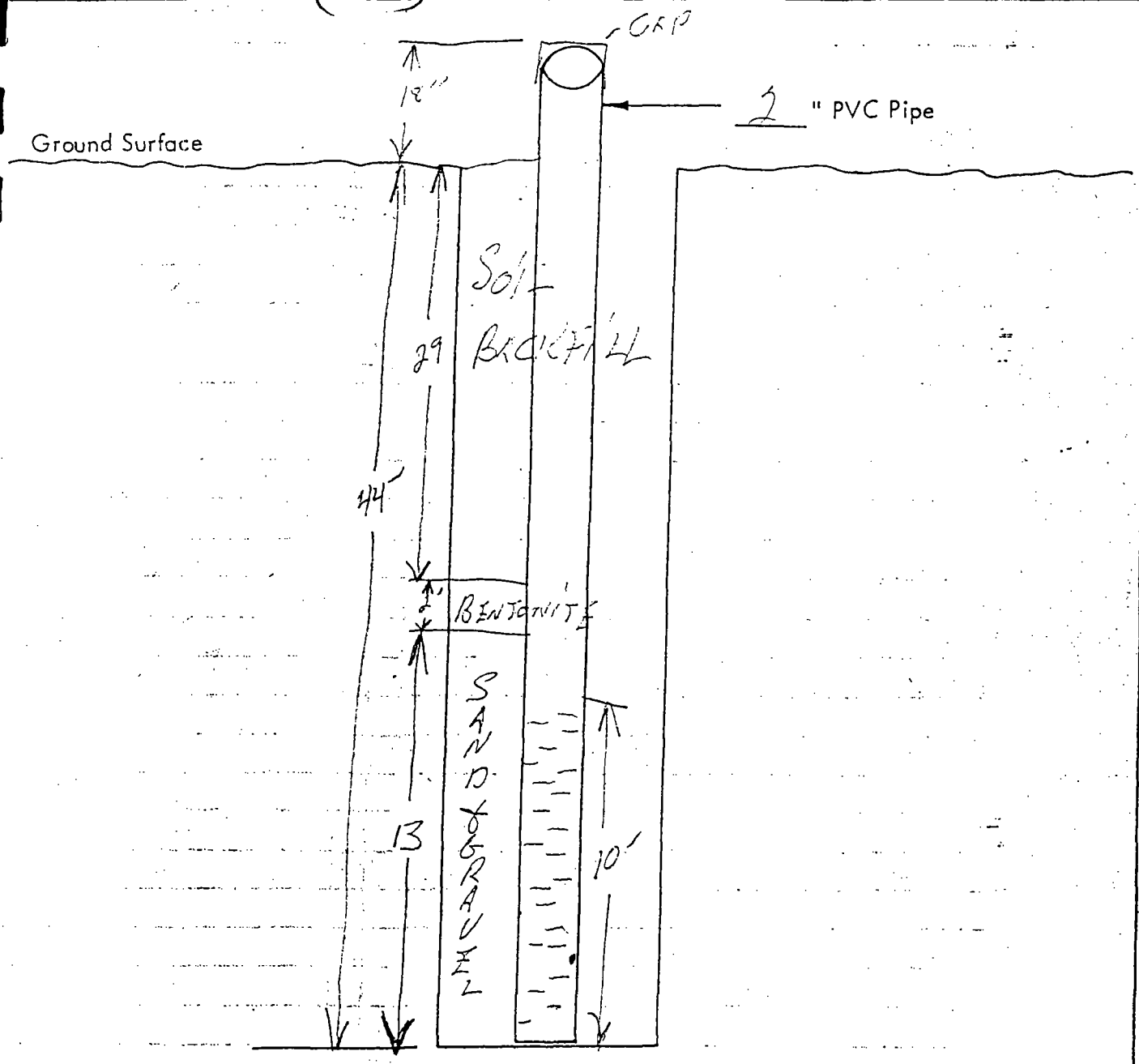
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 31 (HB-31) Contract No. Date Installed



NOTES:

BEI 023448

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

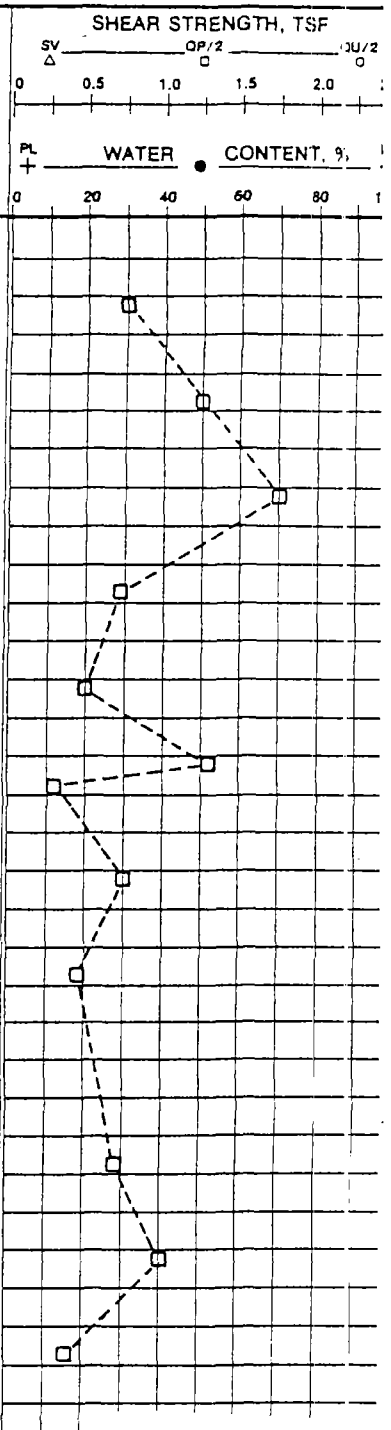
RECORD OF SUBSURFACE EXPLORATION

BORING 32 (HB-32) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/6/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Dk.Gr. Si. CLAY & CLAY w/Roots		
	1	SS		Dk. Gr. Si. CLAY w/Grayish Brown Fine Sandy Silty Clay Seam	4-4	
5	2	SS		Dk. Gr. CLAY w/Oxidized Spots	3-5	
	3	SS		Dk. Gr. & Gray Sandy CLAY w/Oxidized Spots	3-4	
10	4	SS		Dk. Gr. & Gr. Sa. Si. CLAY w/ Oxi. Spots	2-3	
	5	SS		Gray CLAY w/Oxidized Spots & Stains, Fi. Sandy Silt Lenses & Silty Clay Seams	2-2	
15	6	SS	Encountered Water @ 14.0'	-w/Fuel Odor @ 14.0'	1-2	
	7	SS		Gray Silty CLAY w/Fine Sandy Lenses, Sand Seams & Pockets w/Fuel Odor	1-2	
20	8	SS			1/12"-1"	
	9	SS		Dk. Gr. Fine Sandy Silty CLAY	1-2	
25	10	SS		Gr. CLAY w/Fuel Odor -w/Fine Sand Partings @ 24.0'	2-2	
	11	SS		-w/Oxidized Stains @ 26.5'	2-3	
30	12	SS			1-2	
	13	SS		Brownish-Gr. Fine To Medium SAND w/Silt & Fuel Odor	6-7	
35	14	SS		Gray Silty CLAY w/Fuel Odor Cont'd	6-9	



BEI 022607

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 32 Cont'd (HB-32) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/6/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Dk. Gr. Fine To Coarse SAND w/Fuel Odor		
	15	SS		-w/Silt To 43.0' -Gray Below 36.5' -Fine @ 36.5'	6-7	
40	16	SS		-Gravelly Fine To Coarse @ 39.0'	9-13	
	17	SS		-Gravelly Fine To Medium @ 41.5' -Fine To Coarse @ 44.0'	13-14	
45	18	SS	N/R	T. O. B.	16-19	
50						

SHEAR STRENGTH, TSF — SV △ QP/2 □ CU/2 ○ — 0 0.5 1.0 1.5 2.0

WATER CONTENT, % — PL + ● — 0 20 40 60 80 1

BEI 022608

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

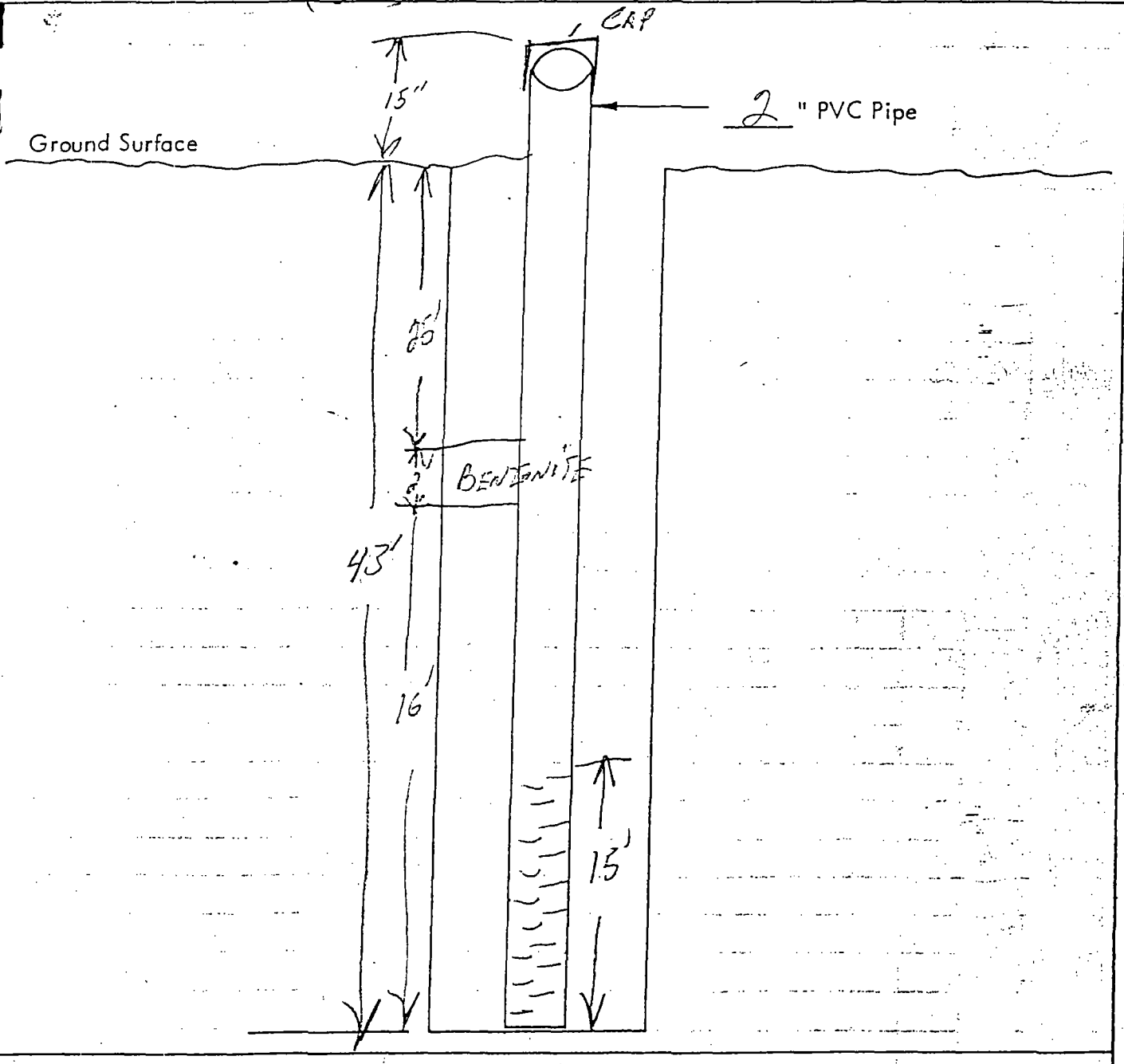
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 32 (HB-32) Contract No. Date Installed



NOTES:

BEI 023449

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

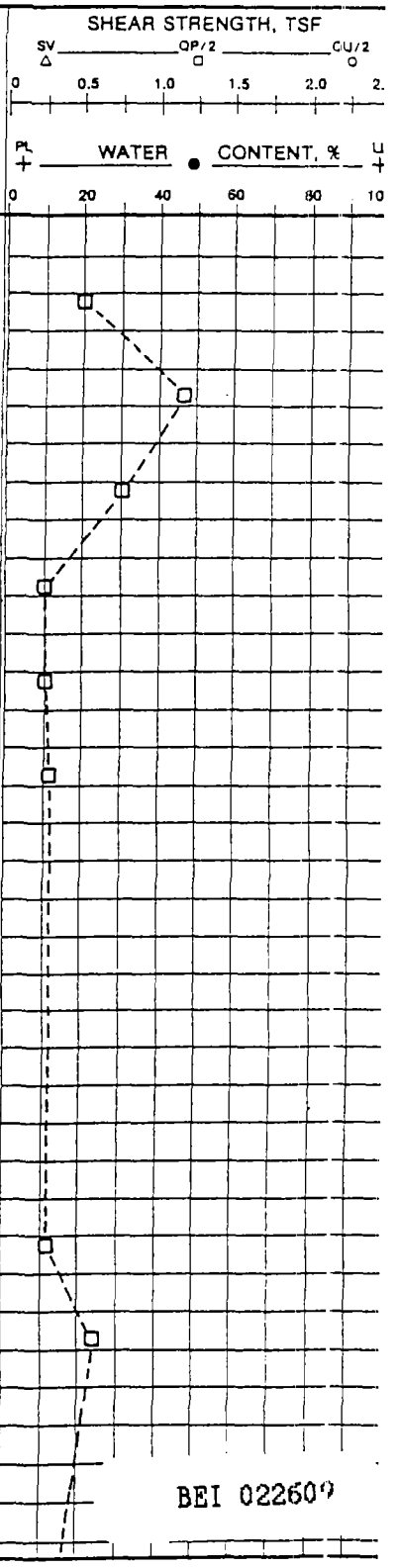
RECORD OF SUBSURFACE EXPLORATION

BORING 33 (HB-33) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 6/6/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dk. Br. CLAY w/Si. & Traces Of Sand	4-3	
5	2	SS		Dk. Gr. CLAY w/Oxidized Spots	4-7	
	3	SS		-Gray w/Oxidized Spots & Stains & Traces Of Sand From 6.0'	2-3	
10	4	SS		Gray & Brown Sandy Clayey SILT	2-3	
	5	SS		Gray & Brown Silty CLAY w/ Fine Sand	2-1	
15	6	SS		-w/Calcareous Matter @ 14.0'	1-2	
	7	SS		Gray & Brown Clayey SILT w/ Fine Sand	1-1	
20	8	SS		Gr. & Br. Fine Sandy Silty CLAY -Brown From 21.5'	1-1	
	9	SS			3-4	
25	10	SS		Gr. Fine Sandy SILT	1-2	
	11	SS		Dk. Gr. Silty CLAY	1-2	
30	12	SS		Dk. Gr. CLAY w/Silt	2-3	
	13	SS		Gr. Fine SAND w/Silt & Fuel Odor	10-14	
35	14	SS		Cont'd	11-14	



BEI 022609

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 33 Cont'd (HB-33) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/6/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Gr. Fine SAND w/Silt & Fuel Odor		
	15	SS			10-7	
				Dk. Gr. Silty CLAY		
40	16	SS			2-25	
	17	SS		Gr. Fine To Coarse SAND w/Silt & Fuel Odor -Gravelly From 40.3' To 43.0'	23-22	
45	18	SS		-w/Gravel @ 44.0'	12-20	
	19	SS		-Fine To Medium @ 46.5'	20-26	
				T. O. B.		
50						

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0)

PL + — WATER ● CONTENT, % (0, 20, 40, 60, 80)

BEI 022610

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

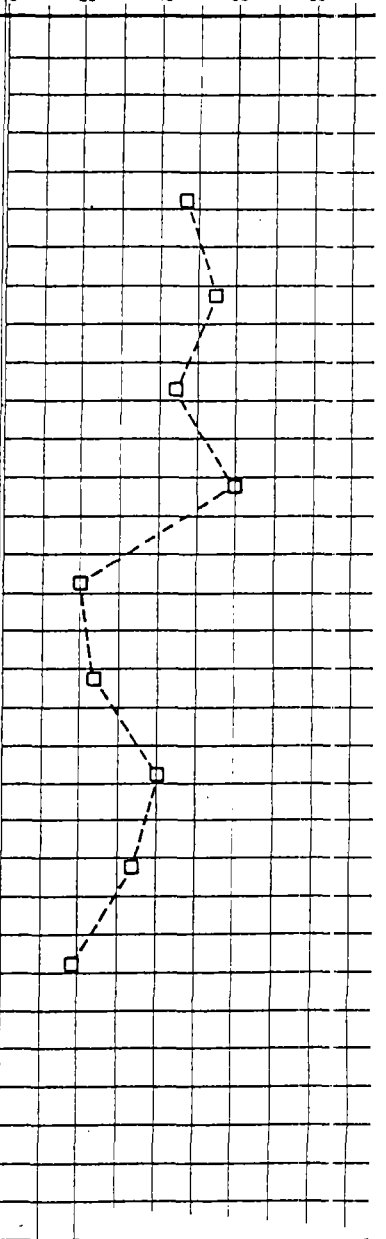
BORING 34 (HB-34) CONTRACT 465-78

DRILLED BY Gotsch LOGGED BY Black
PROJECT Phase II, Hydrocarbon Recovery Investigation DATE DRILLED 6/12/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dk. Gr. To Dk. Br. Silty CLAY w/Roots & Traces Of Sand	2-3	
				Brownish-Gr. CLAY w/Sandy Lenses & Silt		
5	2	SS		Dk. Gr. CLAY w/Oxidized Spots & Sand	1-2	
	3	SS			2-4	
10	4	SS		Gray Silty CLAY w/Oxidized Stains & Fine Sand	3-4	
	5	SS		Gray CLAY w/Silt, Oxidized Spots & Stains	3-5	
15	6	SS		-w/Fuel Odor Below 14.0'	2-1	
	7	SS		-w/Traces Of Fine Sand @ 16.5'	1-2	
20	8	SS			2-2	
	9	SS		Gr. CLAY w/Oxidized Spots & Stains & Fuel Odor	2-3	
25	10	SS		Brownish-Gray CLAY w/Silt, Fine Sand, Sandy Lenses & Fuel Odor	2-1	
	11	SS		Gr. Si. w/Fuel Odor & Traces Of Fine Sand	2-4	
30	12	SS		Gray Fine SAND w/Fuel Odor -Silty w/Clay @ 27.5' -Fine To Medium w/Silt @29.0'	4-4	
	13	SS		Gray CLAY Gr. Fine To Medium Silty SAND w/Fuel Odor	6-7	
35	14	SS		Cont'd	10-10	

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0)

WATER CONTENT, % (0, 20, 40, 60, 80)



BEI 022611

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 34 Cont'd (HB-34) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/12/78 LOGGED BY Black

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △ — QP/2 □ — QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.) / WATER CONTENT, % (PL + — ● — LL +; 0, 20, 40, 60, 80, 10)
				Gray Fine To Medium SAND w/Fuel Odor			
	15	SS		-Silty To 35.5'	5-6		
				-Fine w/Filt From 36.5'			
40	16	SS		T. O. B.	11-15		
45							

BEI 022612

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

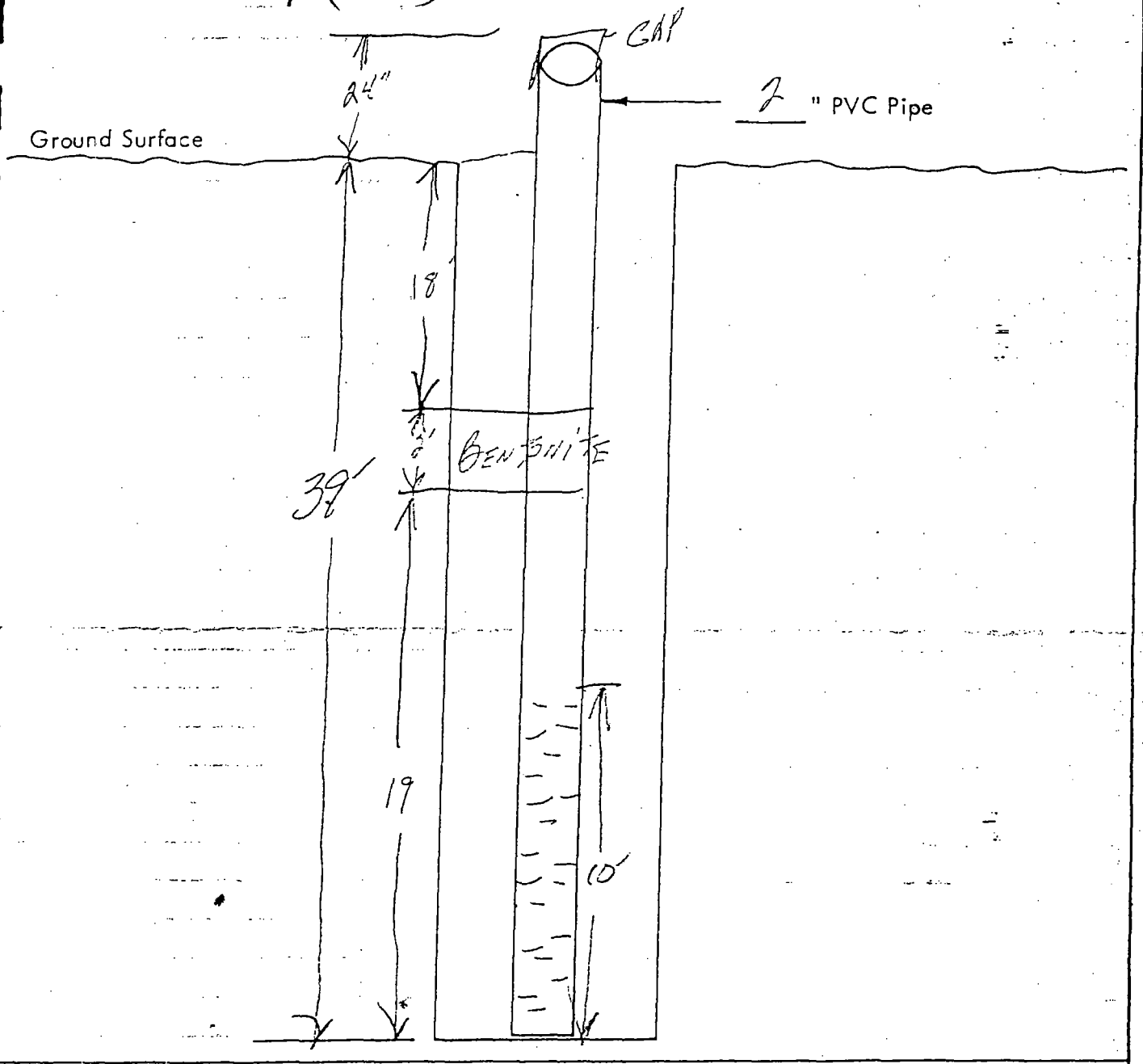
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 34 (HB-34) Contract No. Date Installed



NOTES:

BEI 023451

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

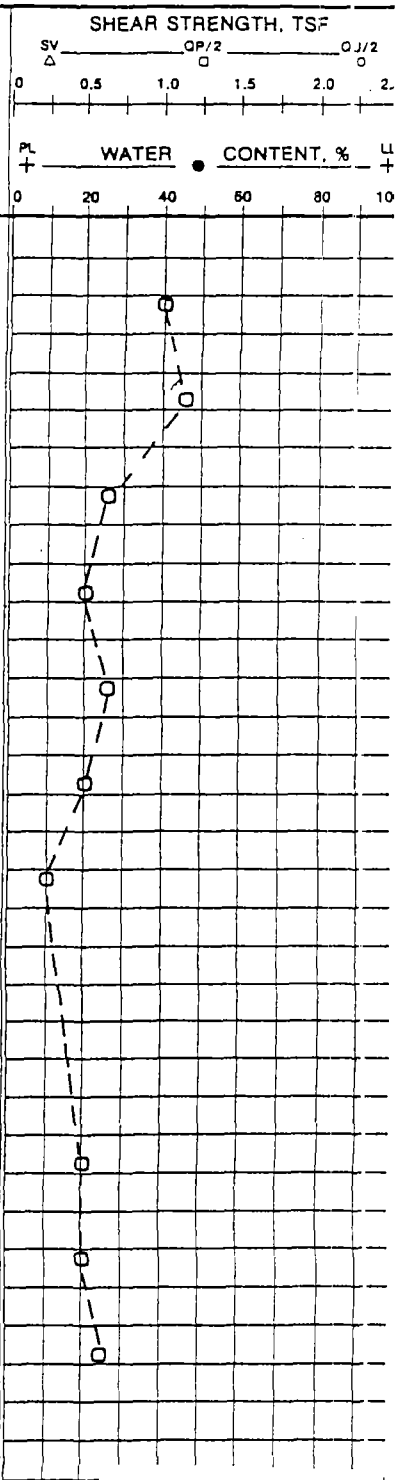
BORING 35 (HB-35) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 6/13/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Dk. Br. Silty CLAY w/ Traces Of Roots		
	1	SS		Dk. Br. & Dk. Gr. CLAY w/ Silt & Traces Of Fine Sand	2-2	
5	2	SS		Dk. Gr. & Br. To Grayish-Brown CLAY w/Oxidized Spots & Stains	4-6	
	3	SS			2-3	
10	4	SS		Gray CLAY w/Silt, Silty & Clayey Pockets, & Oxidized Spots & Stains	4-3	
	5	SS		Gray & Brown To Gray CLAY -w/Oxidized Spots & Stains @ 14'	2-2	
15	6	SS			2-1	
	7	SS		Dk. Gr. Silty CLAY w/Traces Of Fine Sand	1-1	
20	8	SS			1-2	
	9	SS		Dk. Gr. Clayey SILT w/ Traces Of Fine Sand	1-2	
				Gray CLAY		
25	10	SS			3-4	
				Dk. Gr. CLAY w/Silt		
	11	SS		Gray CLAY	1-2	
30	12	SS			2-3	
	13	SS		Br. To Gr. Fine SAND -w/Clayey Pockets @ 31.5' -w/Silt & A Fuel Odor From 31.5' To 38'	7-11	
35	14	SS		Cont'd	4-7	



BEI 022613

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 35 Cont'd (HB-35) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 6/13/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery Investigation DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ● ; 0, 20, 40, 60, 80)
	14	SS		Gr. Fine SAND w/Silt & A Fuel Odor			
	15	SS			9-16		
				-Silty @ 39'			
40	16	SS		T. O. B.	8-15		
45							

BEI 022614

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

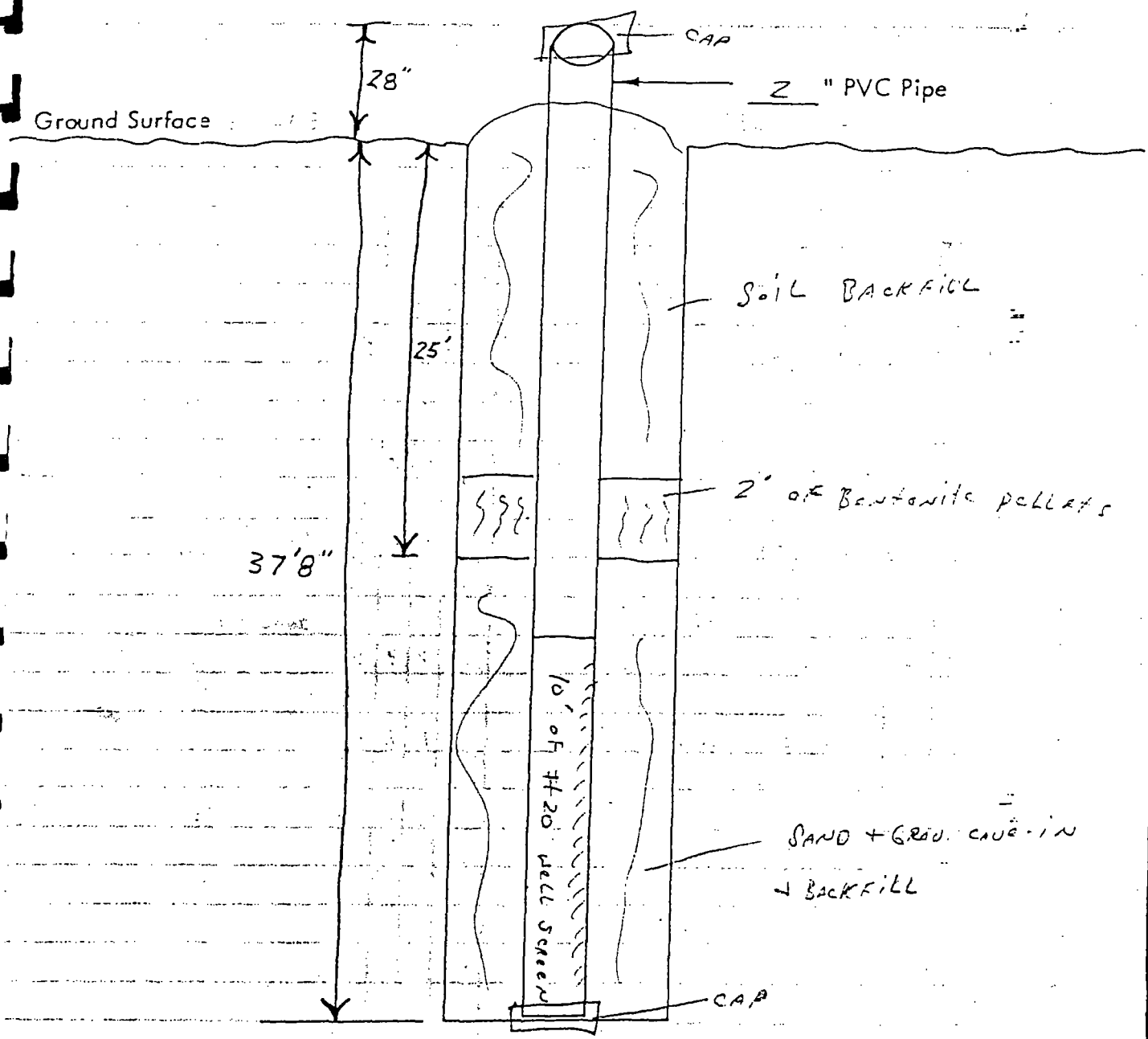
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-35 (HB-35) Contract No. 465 Date Installed 6-14-78



NOTES:

BEI 023452

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 36 (HB-36) CONTRACT 465-78

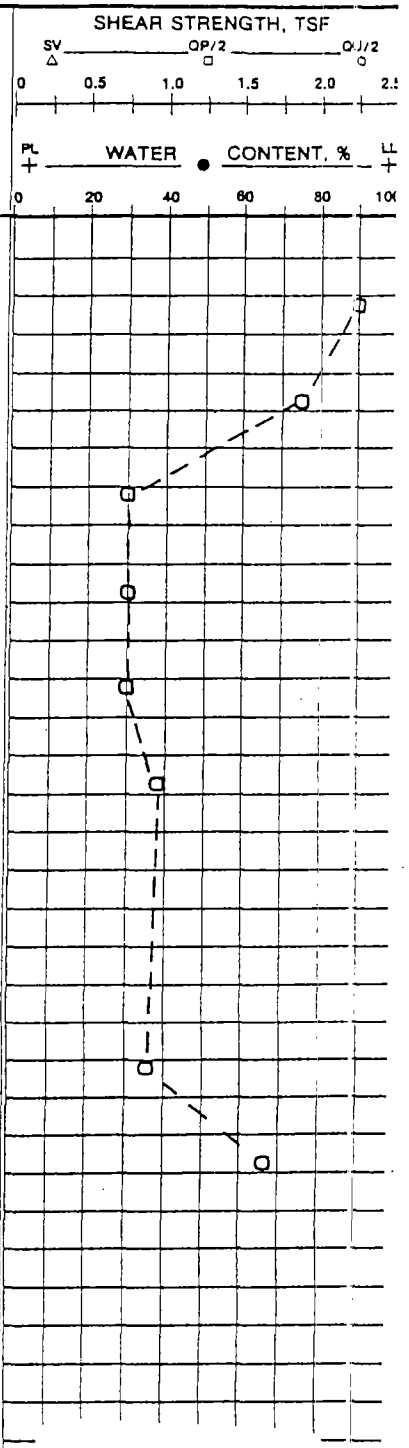
DRILLED BY Gotsch LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 6/13/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

SURFACE ELEVATION

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Br. Si. CLAY & CLAY w/Roots		
	1	SS		Dk. Br. CLAY	4-5	
5	2	SS		-w/Oxidized Spots @ 4'	4-6	
	3	SS		Brownish-Gray CLAY w/Silt & Oxidized Spots & Stains	2-3	
10	4	SS		Brownish-Gray Silty CLAY w/Oxidized Spots, Stains, & Traces Of Fine Sand	3-2	
	5	SS		Brown & Gray CLAY w/Silty Pockets	2-3	
15	6	SS		Brown & Gray CLAY w/Silt	2-2	
	7	SS		Brown Silty CLAY w/Traces Of Fine Sand	3-4	
20	8	SS		Brown Clayey SILT w/Traces Of Fine Sand	2-4	
	9	SS		Gr. CLAY & Silty CLAY w/ Oxidized Spots, & Stains, & Partings	3-3	
25	10	SS		Gray To Brown CLAY w/Oxi. Spots & Stains.	3-4	
	11	SS		Brown Fine SAND -Clayey @ 26.5'	4-9	
30	12	SS		-w/Silt & A Fuel Odor From 29' To 40.5'	8-13	
	13	SS		-w/Traces Of Gravel @31.5'	7-8	
35	14	SS		Cont'd	8-11	



BEI 022615

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 36 Cont'd (HB-36) CONTRACT 465-78

DRILLED BY Gotsch DATE DRILLED 6/13/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL SURFACE ELEVATION	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ●; 0, 20, 40, 60, 80)
	14	SS		Brown Fine Sand w/Silt & A Fuel Odor			
	15	SS		-Fine To Medium @ 39'			
40	16	SS		T. O. B.			
45							

BBI 022616

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

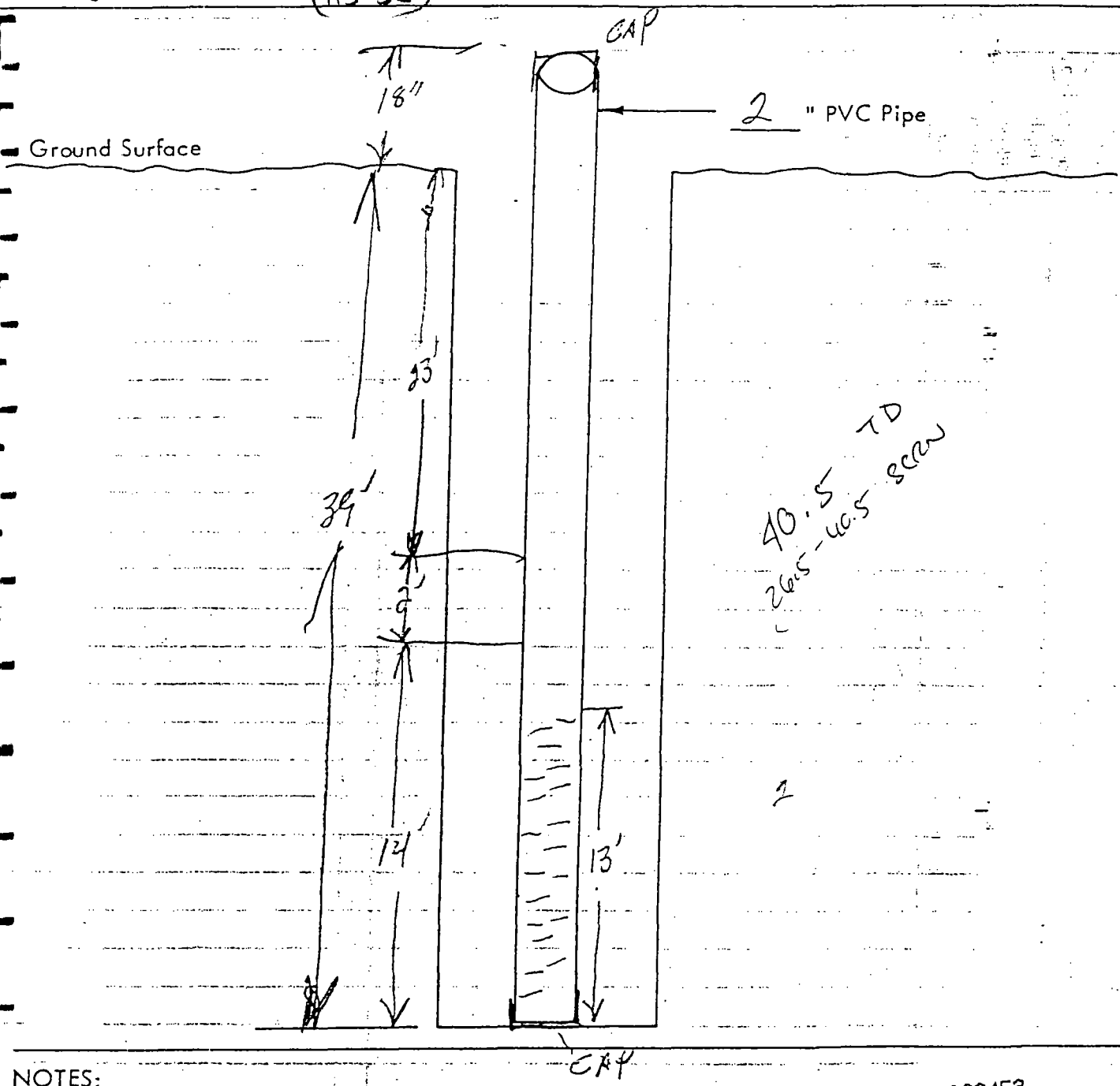
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 36 (HB-36) Contract No. Date Installed



NOTES:

BEI 023453

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

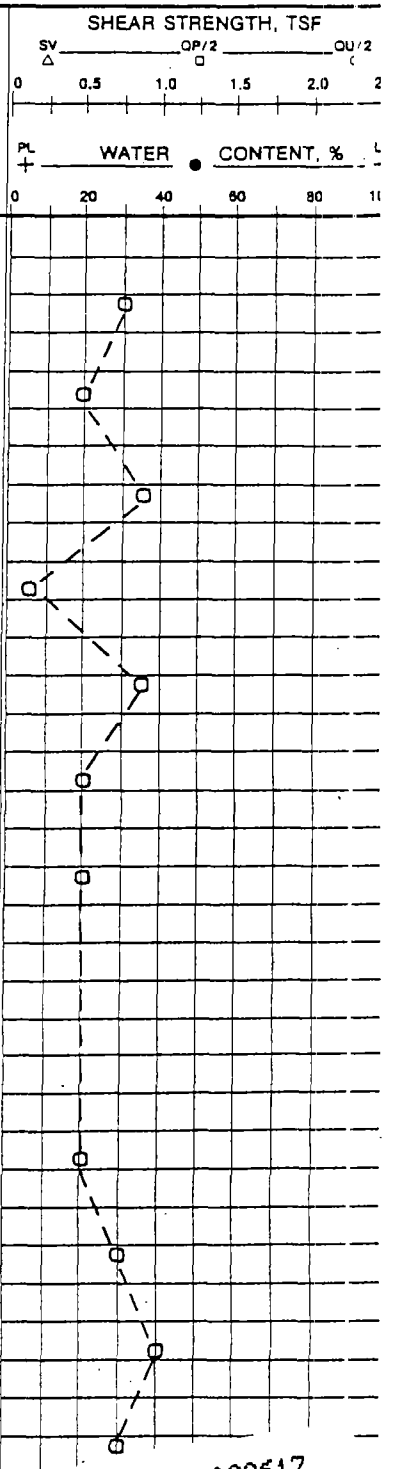
BORING 37 (HB-37) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 6/14/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Dk. Br. Si. CLAY w/Roots		
	1	SS		Dk. Br. To Br. CLAY w/Silt	3-4	
5	2	SS			2-2	
	3	SS		Dk. Br. CLAY w/Oxidized Spots	3-3	
10	4	SS		Gr. Silty CLAY w/Oxidized Spots & Stains	2-3	
	5	SS		Gr. CLAY w/Oxidized Spots & Stains	3-3	
15	6	SS		Gr. Silty CLAY w/Oxidized Spots & Stains	1-2	
	7	SS		Brown & Gr. CLAY w/Silt	1-2	
20	8	SS		Gr. Clayey SILT w/Traces Of Fine Sand	2-2	
	9	SS		Br. SILT w/Clay & Traces Of Fine Sand	2-1	
25	10	SS		Gr. CLAY w/Silt	2-2	
	11	SS		Gr. CLAY -w/Oxidized Spots & Stains @ 26.5'	2-3	
30	12	SS		-w/Fine Sandy Lenses @ 29'	2-3	
	13	SS		Br. CLAY w/Silt	2-9	
35	14	SS		Br. Fine SAND -Silty @ 32.5' Cont'd	6-11	



BEI 022617

GROUND WATER DEPTH AT COMPLETION ____ AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 37 Cont'd (HB-37) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts DATE DRILLED 6/14/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL SURFACE ELEVATION	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, CU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 10)
	14	SS		-w/A Fuel Odor From 34' To 40.5'			
	15	SS		-Gray Fine To Medium Below 36.5'	6-11		
40	16	SS		T. O. B.	7-11		
45							

BEI 022618

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

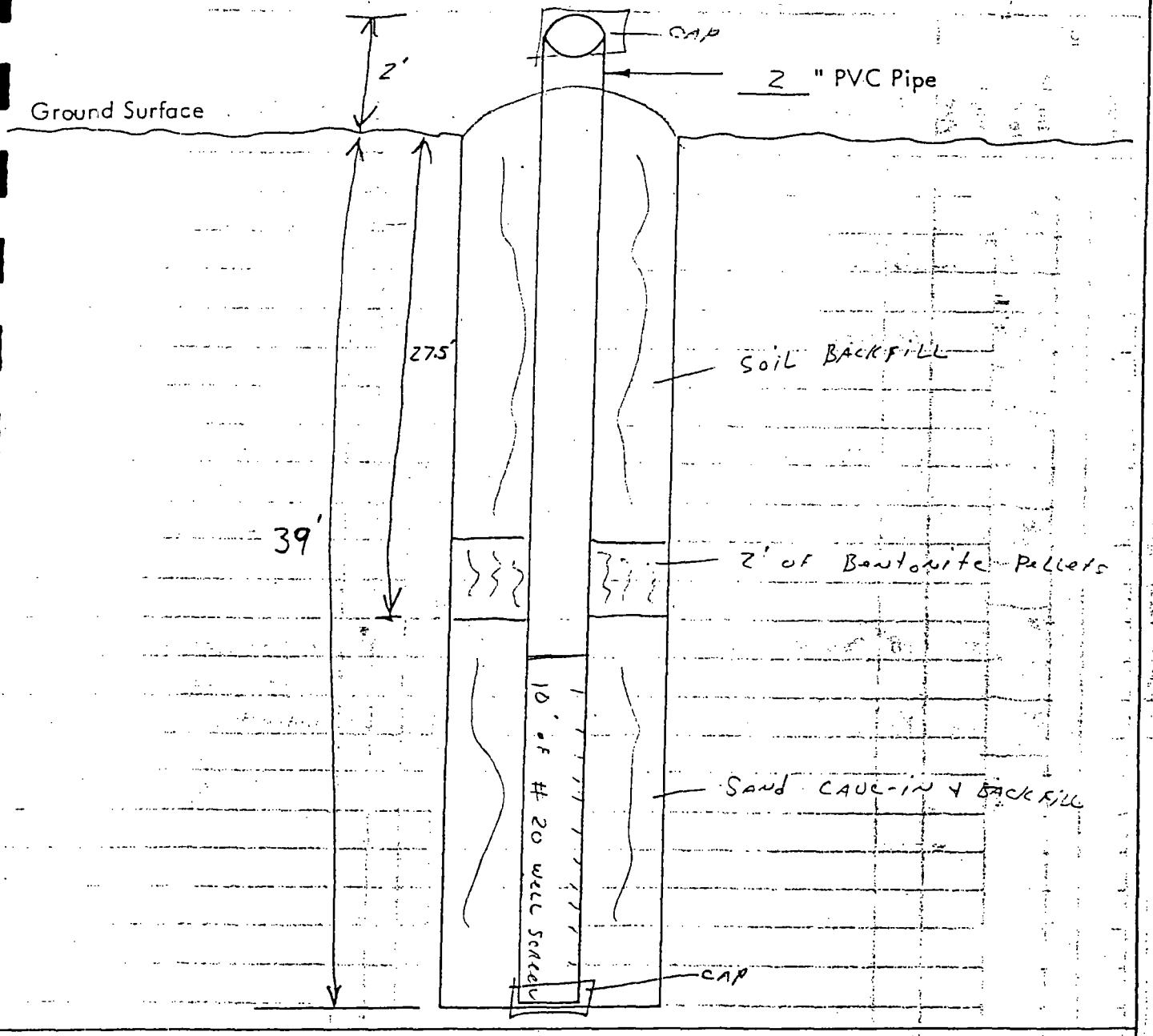
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-37 (HB-37) Contract No. 465 Date Installed 6-14-78



NOTES:

BEI 023454

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

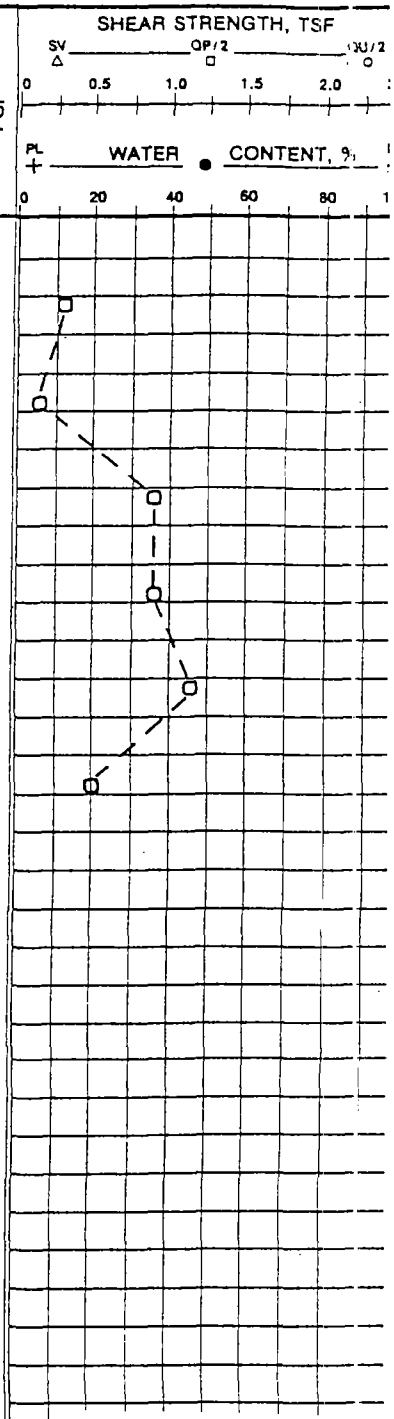
RECORD OF SUBSURFACE EXPLORATION

BORING 38 (HB-38) CONTRACT 465-78

DRILLED BY Roberts DATE DRILLED 6/15/78 LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	1	SS		Dark Brown Silty CLAY -w/Traces Of Fine Sand@1.5'	1-1	
5	2	SS		Brown Silty Fine SAND w/ Clay	1-1	
	3	SS		Brownish-Gray To Gray CLAY w/Oxidized Spots	2-2	
10	4	SS			2-4	
	5	SS			3-4	
15	6	SS		Gr. Si. CLAY w/Oxidized Stains	2-2	
	7	SS		Brown Fine SAND -Silty From 16.5' To 23'	5-7	
20	8	SS			5-7	
	9	SS			9-14	
25	10	SS		-Gray From 24' To 28' -w/Silt @ 24'	9-14	
	11	SS			6-6	
30	12	SS		-w/Silt From 29' To 38' -w/Black Spots From 29' To 33'	3-9	
	13	SS		-Fine To Medium Lens @ 32.5'	9-10	
35	14	SS		Cont'd	13-13	



BEI 022619

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 38 Cont'd (HB-38) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II Hydrocarbon Recovery DATE DRILLED 6/15/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL SURFACE ELEVATION	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, CU/2 ○; 0, 0.5, 1.0, 1.5, 2.0) / WATER CONTENT, % (PL +, ● ; 0, 20, 40, 60, 80)
	14	SS		Brown Fine SAND w/Silt			
	15	SS			5-7		
				-Silty w/Clay @ 39'			
40	16	SS		T. O. B.	6-7		
45							

BEI 022620

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

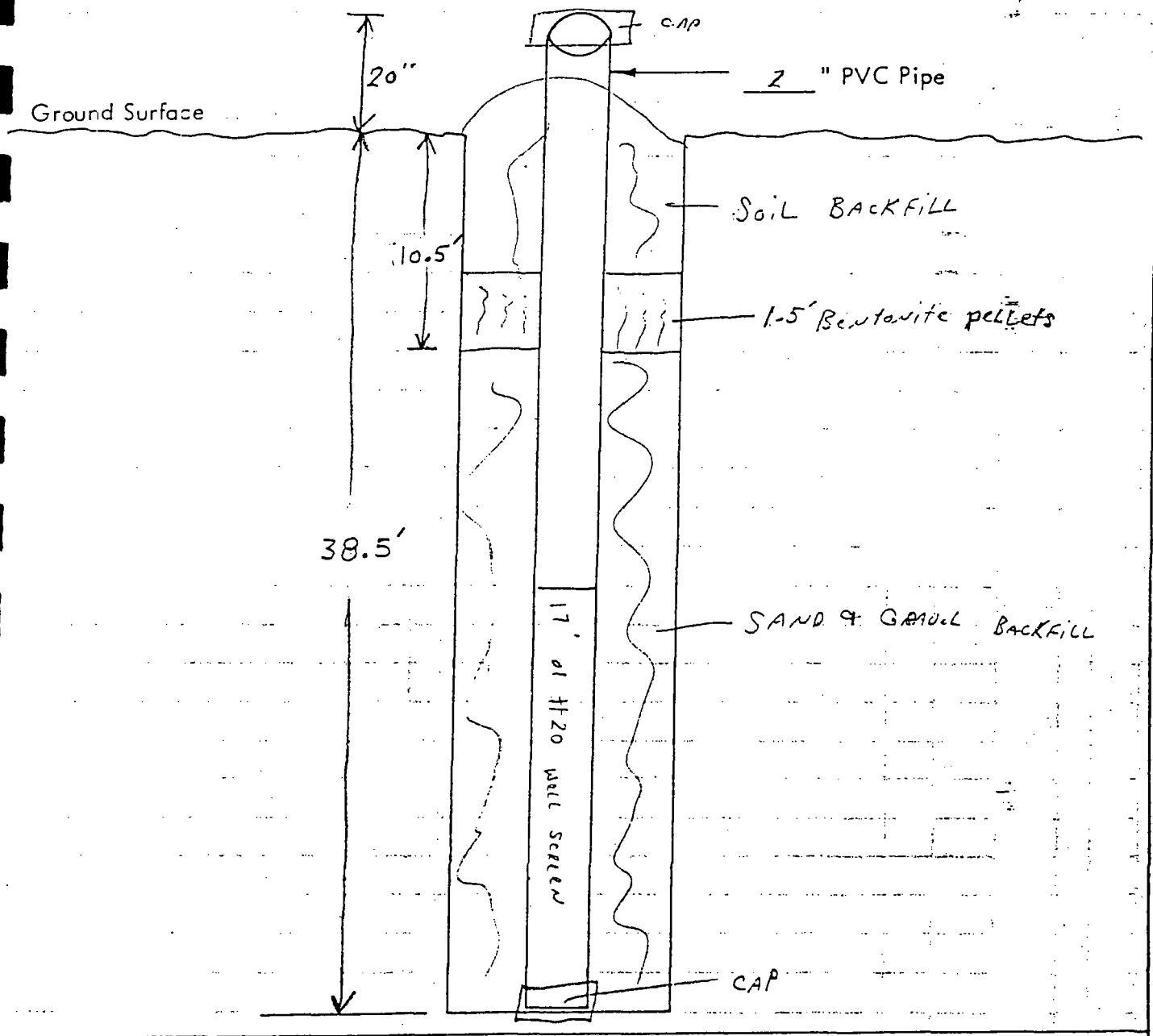
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-38 (HB-38) Contract No. 465 Date Installed 6-15-78



NOTES:

BEI 023455

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

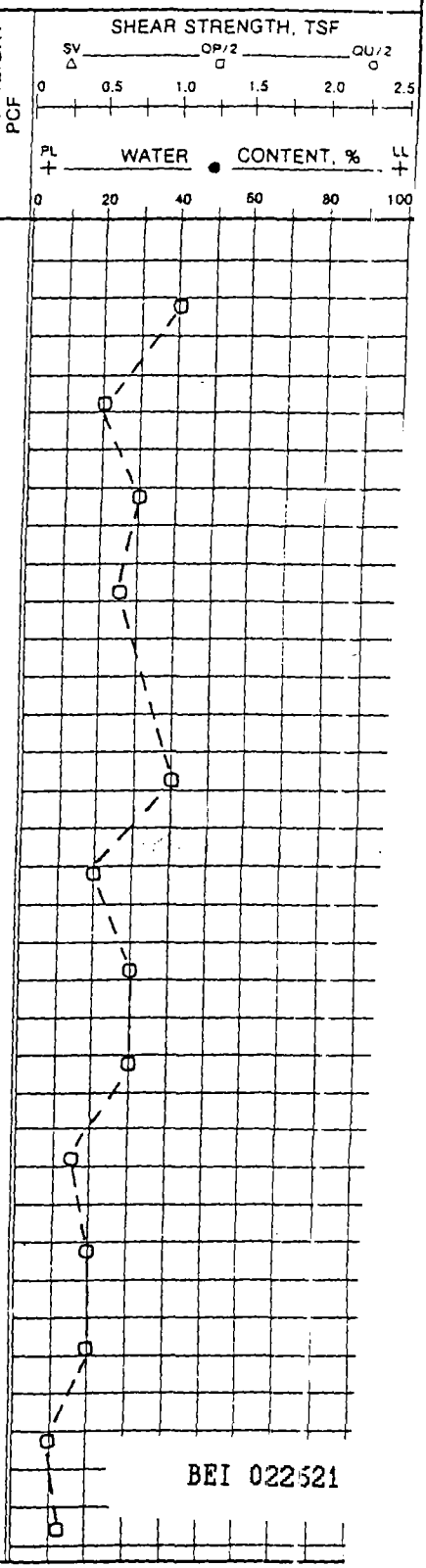
Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

BORING 39 (HB-39) CONTRACT 465-78

DRILLED BY Roberts LOGGED BY Schweigert
PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 6/15/78
DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
				Br. Si. CLAY & Crushed STONE	Fill	
	1	SS		Gr. & Grayish-Br. CLAY w/ Silt & Silty CLAY, Fill	2-3	
5	2	SS		Dk. Gr. CLAY w/Traces Of Sand & Gravel, Fill	2-22	
	3	SS		Gr. CLAY w/Oxidized Spots & Stains	3-4	
10	4	SS		Gr. CLAY w/Silt, Si. Pockets & Oxidized Spots	2-2	
	5	SS		Gr. Clayey SILT w/ A Faint Fuel Odor	1-2	
15	6	SS		Grayish-Br. CLAY w/A Faint Fuel Odor	2-3	
	7	SS		Gr. Silty CLAY w/A Fuel Odor	2-3	
20	8	SS			2-2	
	9	SS		Gr. CLAY w/A Faint Fuel Odor	2-2	
25	10	SS		Gr. & Br. Si. CLAY w/A Fuel Odor	1-2	
	11	SS		Gr. CLAY w/Silt & A Fuel Odor	2-3	
30	12	SS		Gray To Dark Gray Silty CLAY w/A Faint Fuel Odor	2-2	
	13	SS			2-2	
35	14	SS		Cont'd	1-2	



BEI 022521

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING 39 Cont'd (HB-39) CONTRACT 465-78

JOHN MATHES & ASSOCIATES

DRILLED BY Roberts LOGGED BY Schweigert

PROJECT Phase II, Hydrocarbon Recovery DATE DRILLED 6/15/78

DRILLING METHOD Hollow Auger PIEZOMETER Yes

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF
	14	SS		Dk. Gr. Si. CLAY		
	15	SS		Dk. Gr. Clayey SILT w/Traces Of Fine Sand	4-5	
40	16	SS		Dk. Gr. To Gr. Silty CLAY	4-4	
	17	SS		-w/Traces Of Fine Sand @ 41.5'	2-2	
45	18	SS		Br. & Gr. Coarse To Medium SAND	14-18	
	19	SS		-w/Fine Sand @ 44' -Gr. Fine To Medium w/ Coarse Sand Below 46.5'	14-10	
50	20	SS		T. O. B.	6-7	
55						

SHEAR STRENGTH, TSF — SV △ QP/2 □ QU/2 ○ — 0 0.5 1.0 1.5 2.0 2.5

WATER CONTENT, % — PL + ● + LL — 0 20 40 60 80 100

BEI 022622

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ HRS. _____ AFTER _____ HRS. _____

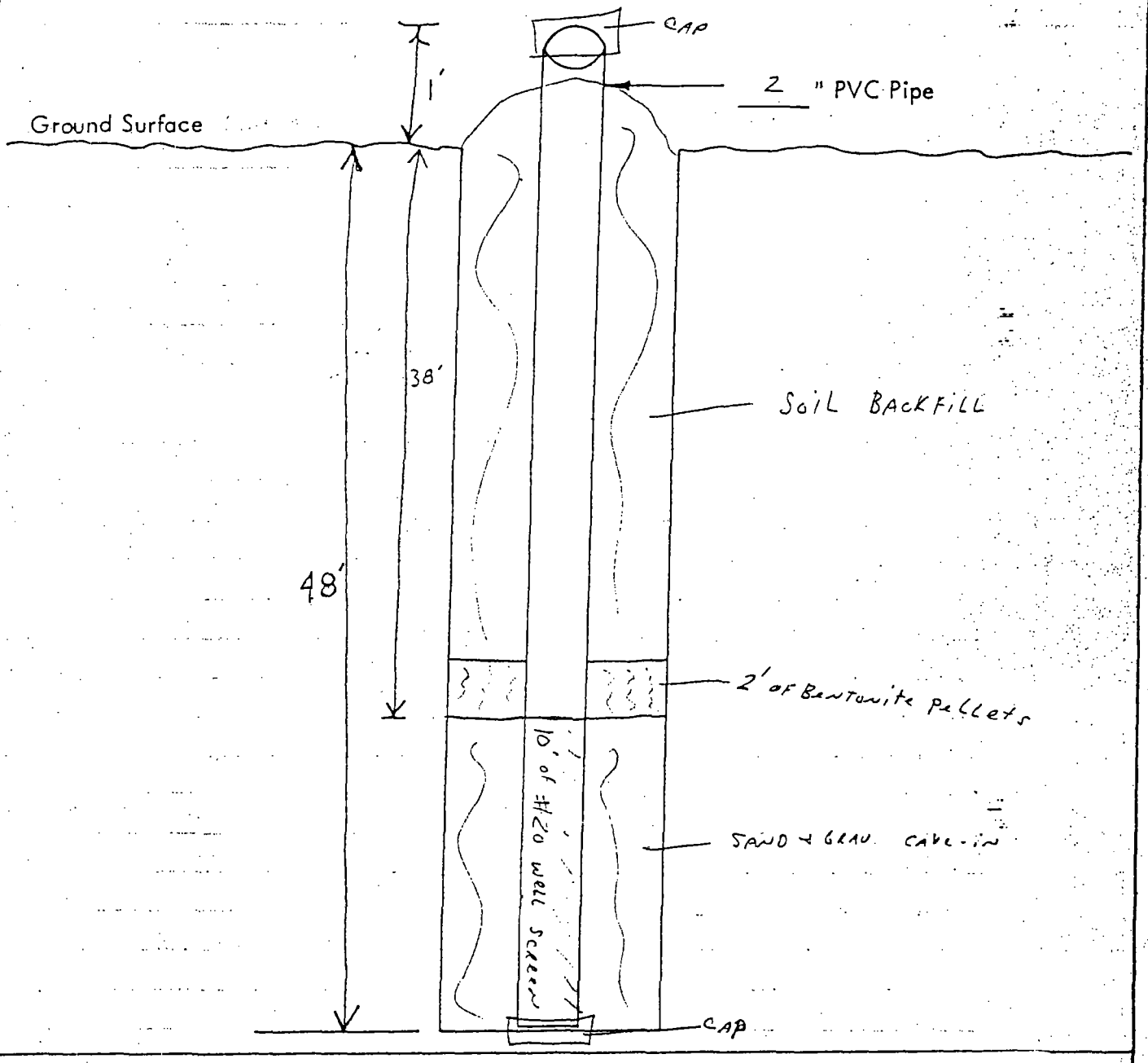
SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-39 (HB-39) Contract No. 465 Date Installed 6-16-78



NOTES:

BEI 023456

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

Clayton
GROUP SERVICES

HMW / VW-1 WELLS

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County MADISON Well # HMW-1

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 3819.606 Easting 6166.095

Drilling Contractor: MATHES Date Drilled Start: 11-19-90

Driller: K. RUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-19-90

Drilling Method: HSA 4 1/4"; Drilling Fluids (type): NONE

Annular Space Details

Type of Surface Seal: CONCRETE

Type of Annular Sealant: (PORTLAND CEMENT + BENTONITE) GROUT

Amount of cement: # of bags 1.5 lbs. per bag 94

Amount of bentonite: # of bags 0.2 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WR-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 2.0 lbs. per bag 100

Well Construction Materials

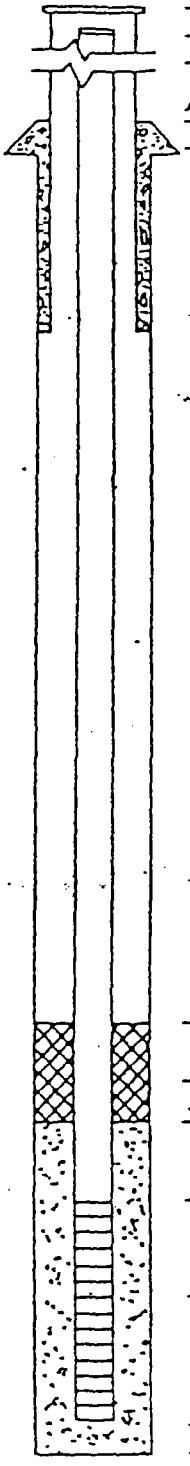
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A*			
Riser pipe above w.t.			SCH. 40	
Riser pipe below w.t.			SCH 40	
Screen (0.01" SLOT)			SCH 40	
Coupling joint screen to riser	N/A*			
Protective casing	N/A			

* - USED FLUSH THREADED MATERIALS.

Measurements to .01 ft. (where applicable)

Riser pipe length	17.70
Protective casing length	N/A
Screen length	5.08
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH.



Elevations — .01 ft.

430.97 MSL Top of Protective Casing

430.65 MSL Top of Riser Pipe

____ ft. Casing Stickup *

430.97 MSL Ground Surface

429.67 ft. Top of annular sealant

416.77 ft. Top of Seal

2.10 ft. Total Seal Interval

414.67 ft. Top of Sand

412.95 ft. Top of Screen

5.08 ft. Total Screen Interval

407.87 ft. Bottom of Screen

407.87 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.R. CURLEW + ASSOC. Ill. registration # 3709134G3

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-2
Well No. HMW-2

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4879-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES — GWL: depth DRY Δ — date/time 11-19-90 1215
DRILLED BY: K. BUNSELMEYER — GWL: depth DRY — date/time 11-21-90 1210
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT SPOON SAMPLING
DATE/TIME STARTED: 11-19-90 1140 — DATE/TIME COMPLETION (S): 11-19-90 1215
AIR MONITORING TYPE: HNU * / CGI ' — BZ = Breathing Zone; BH = Borehole; S = Sample

SAMPLES DESCRIBED FROM AUGER CUTTINGS
SAMPLE DESCRIPTION — CLASSIFICATION SYSTEM: USCS

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION	USCS SYMBOL	DEPTH CHNG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				GRASS AT SURFACE						
				DK BRN CLAYEY SILT GRADING TO SILTY CLAY, COHESIVE, STIFF,	ML/CL		0	0.0	0.0	
5										
					ML/CL		0	0.0	0.0	
10				Δ TO LIGHT BROWN CLAYEY SILT AND SILTY CLAYS, STIFF, COHESIVE.						
15				BEGIN GREEN DISCOLORATION OF SILTS/CLAYS (S.A.A)	ML/CL		0.0	0.0	0.2	
20										
				LESS SILT/CLAY IN CUTTINGS. (FEWER CUTTINGS UP) MORE SANDYISH SILT IN NATURE						
25				BECOMING MORE LIKE SILTY SAND IN CUTTINGS	SM					COMMENT "GETTING SANDIER BY FEEL"
										SPOON HAD TO BE POUNDED / RATHER THAN PUSHED
30	1	30/32	10"	POORLY GRADED FINE, LOOSE TAN SAND SLIGHTLY SILTED - FEW FINES	SP		0.0	0.0	14	

PMTOC

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.
Δ SAND MOIST (GASOLINE ODOR)
NO WATER RECHARGE NOTICED PRIOR TO WELL SETTING

GEOLOGIST SIGNATURE Mark Jefferies

DECONTAMINATED CUTTINGS / TOC ATTACHED

EXHIBIT 444 1/17/94

BEI 024423

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-2
Well No. HMW-2

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION PROJECT NO: 122489-4827-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES GWL: depth DRY 4 date/time 11-19-90 1215
DRILLED BY: K. BUNSELMEYER GWL: depth DRY 4 date/time 11-21-90 1210
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT SPOON SAMPLING
DATE/TIME STARTED: 11-19-90 DATE/TIME COMPLETION (S): 11-19-90
AIR MONITORING TYPE: HNU * / CGI ' BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHNG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)	
	1	30/32	10"	(SAND DESCRIPTION PREVIOUS PAGE)	SP		0.0	0.0	14	SPOON POUNDED	PHOT 2
				MODERATE TO STRONG GASOLINE ODORS							
35				CGI = 0% LEL							
										TD AT 36.4'	
										TO SET 10' SCREEN APPROX 26-36'	

BEI 024424

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.
Δ SAND MOIST, (GASOLINE ODOR)
NO WATER RECHARGED NOTICED PRIOR TO WELL SETTING.

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County MADISON Well # HMW-2

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 3828.350 Easting 6167.403

Drilling Contractor: MATHES. Date Drilled Start: 11-19-90

Driller: K. RUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-19-90

Drilling Method: HSA 4 1/4" Drilling Fluids (type): NONE

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 2.0 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WR-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 4.0 lbs. per bag 100

Well Construction Materials

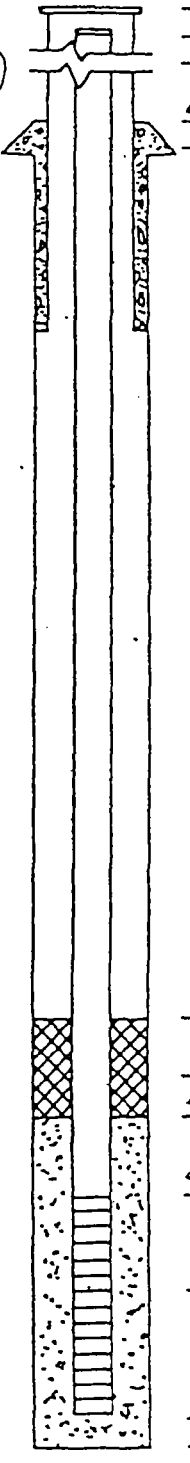
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen (0.01" SLOT)			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSHTHREADED MATERIALS -

Measurements to .01 ft. (where applicable)

Riser pipe length	25.72
Protective casing length	N/A
Screen length	10.17
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH.



Elevations — .01 ft.

430.71 MSL Top of Protective Casing

430.19 MSL Top of Riser Pipe

— ft. Casing Stickup

430.71 MSL Ground Surface

429.11 ft. Top of annular sealant

408.61 ft. Top of Seal

2.10 ft. Total Seal Interval

406.51 ft. Top of Sand

404.47 ft. Top of Screen

10.17 ft. Total Screen Interval

394.30 ft. Bottom of Screen

394.30 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.B. CURLEW + ASSOC Ill. registration # 3709134 63

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-3

Well No. HMW-3

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4829-77

ELEVATION: — BOREHOLE LOCATION/COORDINATES: —

LOGGED BY: M. JEFFERIES — GWL: depth MOIST Δ date/time 11-19-90 1515

DRILLED BY: K BUNSELMEYER — GWL: depth -31.76 date/time 11-21-90 1650

DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING

DATE/TIME STARTED: 11-19-90 1445 — DATE/TIME COMPLETION (S): 11-19-90 1515

AIR MONITORING TYPE: HNU * / CGI ' — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	DESCRIBED FROM AUGER CUTTINGS — SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING * UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				GRASS AT SURFACE.						
				DK BRN CLAYEY SILT GRADING TO SILTY CLAY, COHESIVE, STIFF	ML/CL		0	0.0	0.0	
5										
				S.A.A.	ML/CL		—	—	—	
10				BEGIN GREEN-GREY/GREEN DISCOLORATION						
				S.A.A	ML/CL		0	0.0	0.2	
15				DEEPER GREENISH DISCOLORATION						
				GREENED CLAYEY SILT AND SILTY CLAY, COHESIVE	ML/CL					
20				LOW GASOLINE ODOR			0	0.0	0.3	
25										
				LESS SILT/CLAY IN CUTTINGS (FEW CUTTINGS RETRIEVING)			0.0	0.0	3.0	LOW HNU RESPONSE BUT STRONG GASOLINE VAPORS OUT OF HO
30				SILTY SAND CUTTINGS GASOLINE ODOR PRESENT	SM		0.0	0.0	3.0	CGI = 190% LEL SHUT RIG DOWN 10 MINS

EXHIBIT 446 1/17/94 SEE

BEI 024429

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.
Δ GASOLINE-IMPACTED SAND / MOIST ON BIT.

DRUMMED CUTTINGS/LOG ATTACHED

GEOLOGIST SIGNATURE Mark Jefferies

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-3
Well No. HMW-3

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4829-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES — GWL: depth MOIST[4] date/time 11-19-90 1515
DRILLED BY: K — GWL: depth -31.76 date/time 11-21-90 1450
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT SPOON SAMPLING
DATE/TIME STARTED: 11-19-90 1445 — DATE/TIME COMPLETION (S): 11-19-90 1515
AIR MONITORING TYPE: HNU * / CGI [1] — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHANG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
	(1)	31/33	10"	TOP 7" REC = DK BRN SILTY CLAY, COHESIVE LOW 3" REC = LOOSE, FINE, TAN SAND, FEW FINES (SOME SILT) STRONG GASOLINE ODOR	CL SP	▼	0.0	0.0	18.0	NO/LOW HNU RESPONSE CGI = 8% LEL TO 10% LEL BUZZ TO STOP AT 35'
35										TD AT 35' TO SET 5' SCREEN APPROX 30'-35'

PHO (3)

BEI 024430

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.
Δ GASOLINE IMPACTED SAND / MOIST ON BIT

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County MADISON Well # HMW-3

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 4488.320 Easting 6376.989

Drilling Contractor: MATHES Date Drilled Start: 11-19-90

Driller: K BUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-19-90

Drilling Method: HSA 4 1/4" Drilling Fluids (type): NONE

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 1.0 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WB-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 2.0 lbs. per bag 100

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

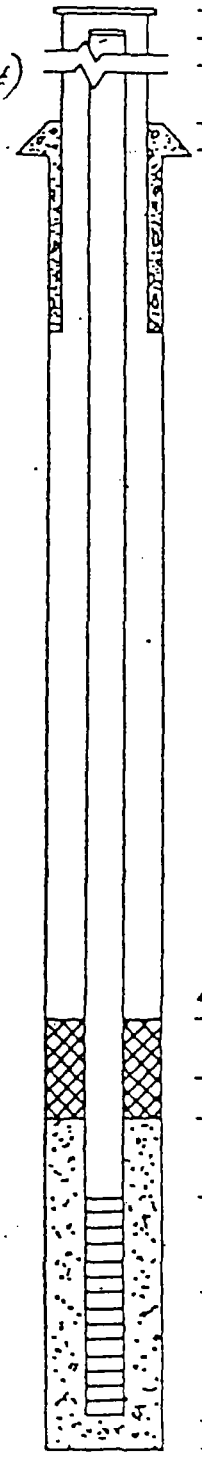
*- USED FLUSH THREADED MATERIALS

Measurements

to .01 ft. (where applicable)

Riser pipe length	29.23
Protective casing length	N/A
Screen length	5.08
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

**-INCLUDED IN TOTAL SCREEN LENGTH



Elevations — .01 ft.

429.93 MSL Top of Protective Casing

429.32 MSL Top of Riser Pipe

— ft. Casing Stickup

429.93 MSL Ground Surface

428.43 ft. Top of annular sealant

404.03 ft. Top of Seal

2.10 ft. Total Seal Interval

401.93 ft. Top of Sand

400.09 ft. Top of Screen

5.08 ft. Total Screen Interval

395.01 ft. Bottom of Screen

394.93 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.E. CORLEW + ASSOC. Ill. registration # 370913463

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-4
Well No. HMW-4

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4829-77

ELEVATION: — BOREHOLE LOCATION/COORDINATES: —

LOGGED BY: M JEFFERIES — GWL: depth @ 18' — date/time 11-20-90 0900

DRILLED BY: K BUNSELMEYER — GWL: depth -18.16 — date/time 11-21-90 1640

DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING

DATE/TIME STARTED: 11-20-90 0815 — DATE/TIME COMPLETION (S): 11-20-90 0900

AIR MONITORING TYPE: HNU * / CGI ' — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHG (feet)	AIR MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				GRASS AT SURFACE.						
				DK BRN CLAYEY SILT ALT W/ SILTY CLAY, COHESIVE, STIFF	ML/CL		0.0	0.0	0.0	
5				S.A.A.						
				BEGIN DISCOLORING GREEN	ML/CL		0.0	0.0	0.2	
10				S.A.A.						
15				LOW GASOLINE ODORS			0.0	0.0	0.2	
				GREENED CLAYEY SILTS AND SILTY CLAYS, STIFF, COHESIVE	ML/CL	▼				
20										BEI 024436
	(1)	22/24	14/1	GREENED FINE, SL-SILTY SAND, MODERATELY-STRONG GASOLINE ODORS.	SM		0.0	0.0	10	CGI = 90 LEL BLOW-IN ABOUT 1.5'
25										
										TD AT 26' TO SET 5' SCREEN FROM APPROX 21-26'
30										

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.

DRILLER CUTTINGS/LOG ATTACHED

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County MADISON Well # HMW-4

Site Name: CLACK OIL - HARTFORD, IL Grid Coordinate: Northing 4478.200 Easting 6374.346

Drilling Contractor: MATHES Date Drilled Start: 11-20-90

Driller: K. BUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-20-90

Drilling Method: HSA 4 1/4" Drilling Fluids (type): NONE

Annular Space Details

Type of Surface Seal: PREMIX CEMENT

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 2.0 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WB-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 1.30 lbs. per bag 100

Well Construction Materials

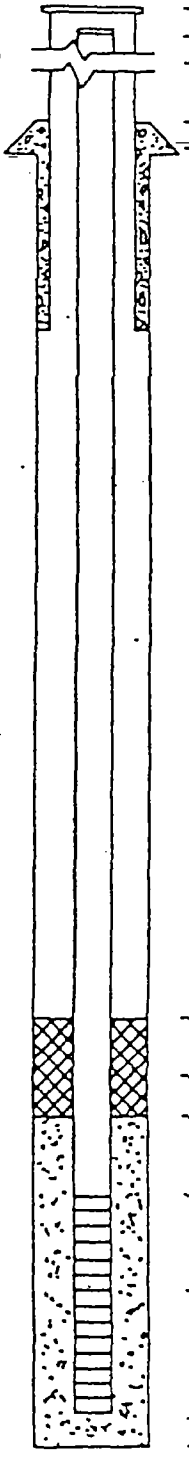
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSHTHREADED MATERIALS

Measurements to .01 ft. (where applicable)

Riser pipe length	20.38
Protective casing length	N/A
Screen length	5.08
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	
Screen slot size	0.010
% of openings in screen	
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH.



Elevations — .01 ft.

430.09 MSL Top of Protective Casing

429.55 MSL Top of Riser Pipe

____ ft. Casing Stickup

430.09 MSL Ground Surface

428.69 ft. Top of annular sealant

413.09 ft. Top of Seal

2.00 ft. Total Seal Interval

411.09 ft. Top of Sand

409.17 ft. Top of Screen

5.08 ft. Total Screen Interval

404.09 ft. Bottom of Screen

404.09 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.B. CORLEW + ASSOC Ill. registration # 3709 13463

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-5
Well No. HMW-5

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4879-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M JEFFERIES — GWL: depth DRY Δ — date/time 11-20-90 1145
DRILLED BY: K BLANSELMEYER — GWL: depth DRY Δ — date/time 11-21-90 1630
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING
DATE/TIME STARTED: 11-20-90 1100 — DATE/TIME COMPLETION (S): 11-20-90 1145
AIR MONITORING TYPE: HNU * / CGI ' — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				GRAVEL LOT 0-0.5' CEMENT 0.5-1.0' APPROX	GM					
				DK BRN CLAYEY SILT GRADING TO ALT W/ SILTY CLAY, STIFF, COHESIVE..	ML/CL		0.0	0.0	0.0	
5										
				DK BRN ↑ / LT TAN ↓ S.A.A (OTHERWISE)	ML/CL		0	0.0	0.4	
10										
				BEGIN GREEN DISCOLORATION S.A.A.	ML/CL		0.0	0.0	0.4	
15										
		17/19	NR	—			—	—	—	CATCHER NOT IN SPOON (NO RECOVERY)
20	(1)	19/21	11"	VERY SLIGHTLY SANDY TAN SILT, SL. DISCOLORED GREENISH, MODERATE GASOLINE ODOR	SM		0.0	0.0	3.0	CGI = 0% LEL
										TD AT 22'
25										TO SET 5' SCREEN FROM APPROX 17-22'
30										

BEI 02444

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.
Δ MOIST AT BOTTOM OF HOLE, NO WATER VISIBLE COMING IN

GEOLOGIST SIGNATURE Mark Jefferies

DRUMMED CUTTINGS/LOG ATTACHED

WCR -

Illinois Environmental Protection Agency — Well Completion Report

Site #: 122489 County: MADISON Well #: HMW-5

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 3893.898 Easting 6617.422

Drilling Contractor: MATHES - Date Drilled Start: 11-20-90

Driller: K. RUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-20-90

Drilling Method: HSA 4¼" Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE.

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 7.5 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLETS

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WB-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 1.5 lbs. per bag 100

Well Construction Materials

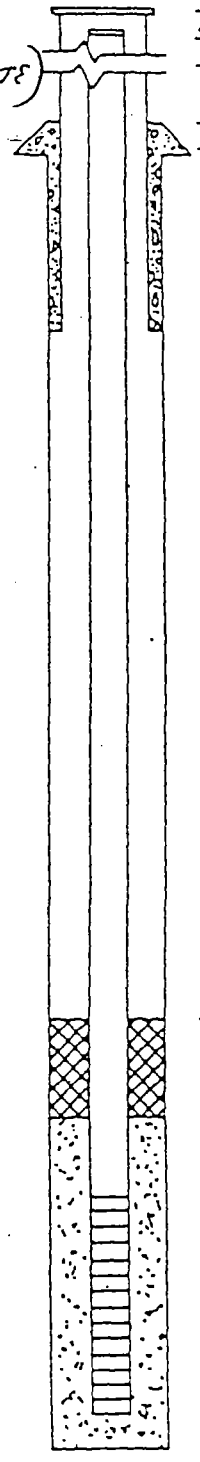
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSH THREADED MATERIALS

Measurements to .01 ft. (where applicable)

Riser pipe length	16.69
Protective casing length	N/A
Screen length	5.08
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	
Screen slot size	0.010
% of openings in screen	
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH



Elevations — .01 ft.

433.22 MSL Top of Protective Casing
432.74 MSL Top of Riser Pipe
____ ft. Casing Stickup
433.22 MSL Ground Surface
431.62 ft. Top of annular sealant

420.22 ft. Top of Seal
2.10 ft. Total Seal Interval
418.12 ft. Top of Sand
416.05 ft. Top of Screen
5.08 ft. Total Screen Interval
410.97 ft. Bottom of Screen
410.97 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.B. CORLEW + ASSOC Ill. registration # 370913463

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-6
Well No. HMW-6

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4879-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES — GWL: depth NO WATER DET. date/time 11-20-90 1345
DRILLED BY: K. BUNSELMEYER — GWL: depth GASOLINE BREAKS - LOWER 1-2' date/time 11-21-90 1645
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING
DATE/TIME STARTED: 11-20-90 1300 — DATE/TIME COMPLETION (S): 11-20-90 1345
AIR MONITORING TYPE: HNU * / CGI ! — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				GRAVEL LOT 0-0.5' CEMENT 0.5-1.0' APPROX.	GM					
				DK BRN CLAYEY SILT GRADING TO ALT/w/ SILTY CLAY, STIFF, COHESIVE	ML/CL		0.0	0.0	0.0	
5										
10				DK BRN ↑ LT TAN ↓			0.0	0.0	0.3	
				S.A.A. (OTHERWISE)	ML/CL					
15				BEGIN GREEN DISCOLORATION			0.0	0.0	0.4	
				GREENED CLAYEY SILT AND COHESIVE, STIFF SILTY CLAY	ML/CL					
20				LOW GASOLINE ODOR						
				LESS SILT/CLAY CUTTINGS COMING UP, THOSE COMING UP SANDY IN NATURE,			0.0	0.0	0.4	
25				MODERATE GASOLINE ODOR	SM					
		28/30	8"	MOD-STRONG GASOLINE ODORS	SP		0.0	0.0	11.	CGI = 0% LEL
30										

PHO (6

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(!) CGI CALIBRATED TO HEXANE.

BEI 024446

GEOLOGIST SIGNATURE Mark Jefferies

DRUMMED CUTTINGS/LOG ATTACHED

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-6
Well No. HMW-6

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION PROJECT NO: 122489-4829-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES GWL: depth NO WATER DET. date/time 11-20-90 1345
DRILLED BY: K. BUNSELMEYER GWL: depth GASOLINE PRODUCT LAYER 1-2' date/time 11-21-90 1645
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT SPOON SAMPLING
DATE/TIME STARTED: 11-20-90 1300 DATE/TIME COMPLETION (S): 11-20-90 1345
AIR MONITORING TYPE: HNU * / CGI 1 BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHNG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				CONTINUED DECREASE IN QUANTITY IN CUTTINGS COMING UP.	SX					DRILLER: SEEMS SANDY
35										CGI = 0% LEL.
40										TD AT 38' TO SET 10' SCREEN APPROX 28-38'

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.

BEI 024447

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency — Well Completion Report

Site #: 122489 County: MADISON Well #: HMW-6

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 3902.763 Easting 6616.424

Drilling Contractor: MATHES Date Drilled Start: 11-20-90

Driller: K. BUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-20-90

Drilling Method: HSA 4¼" Drilling Fluids (type): NONE.

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 25 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET.

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: HB-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 3.50 lbs. per bag 100

Well Construction Materials

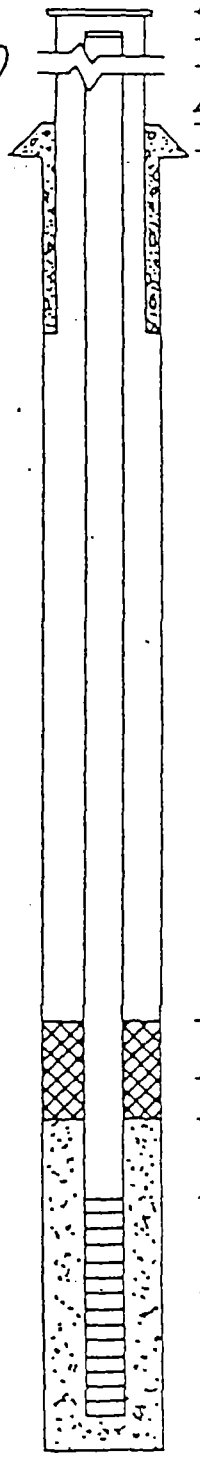
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSH THREADED MATERIALS

Measurements to .01 ft. (where applicable)

Riser pipe length	27.63
Protective casing length	N/A.
Screen length	10.17
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH.



Elevations — .01 ft.

432.83 MSL Top of Protective Casing

432.39 MSL Top of Riser Pipe

— ft. Casing Stickup

432.83 MSL Ground Surface

431.13 ft. Top of annular sealant

408.83 ft. Top of Seal

2.00 ft. Total Seal Interval

406.83 ft. Top of Sand

404.76 ft. Top of Screen

10.17 ft. Total Screen Interval

394.59 ft. Bottom of Screen

394.59 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.B. CORCEW + ASSOC Ill. registration # 3709 13463

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMW B-7

Well No. HMW-7.

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION PROJECT NO: 122489-4879-77

ELEVATION: — BOREHOLE LOCATION/COORDINATES: —

LOGGED BY: M. JEFFERIES GWL: depth DRY date/time 11-20-90 1600

DRILLED BY: K. BUNSCHMEYER GWL: depth DRY date/time 11-21-90 1715

DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING

DATE/TIME STARTED: 11-20-90 1530 DATE/TIME COMPLETION (S): 11-20-90 1600

AIR MONITORING TYPE: HNU * / CGI (1) BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	FROM AUGER CUTTINGS SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				DK BROWN CLAYEY SILT ALT W/ SILTY CLAY, STIFF, COHESIVE.	CL/ML		0.0	0.0	0.0	
5										
				DK BROWN CLAYEY SILT ALT/W/ SILTY CLAY, STIFF, COHESIVE.	CL/ML		0.0	0.0	0.0	
10										
				BEGIN DISCOLORATION GREEN	CL/ML		0.0	0.0	0.2	
15										
		17/19	9"	GREENED SL-SANDY SILT. NO NOTICED GASOLINE ODORS	SM		0.0	0.0	0.2	PHO (7)
20				S.A.A. INFERRED ONLY NO CHANGE IN CONDITIONS, CUTTINGS UP STILL SL-SANDY SILT.	?					
25										CGI = 0% LEL
										TD AT 27' TO SET 10' SCREEN APPROX 17-27'
30										

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.

BEI 024452

DRUMMED CUTTINGS/LOG ATTACHED

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County MADISON Well # HMW-7

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 4204.109 Easting 6538.672

Drilling Contractor: MATHES Date Drilled Start: 11-20-90

Driller: K. BUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-20-90

Drilling Method: HSA 4¼" Drilling Fluids (type): NONE

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 1.00 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WB-40 (WASHED) SILICA

Source of Sand:

Amount of Sand: # of bags 4.0 lbs. per bag 100

Well Construction Materials

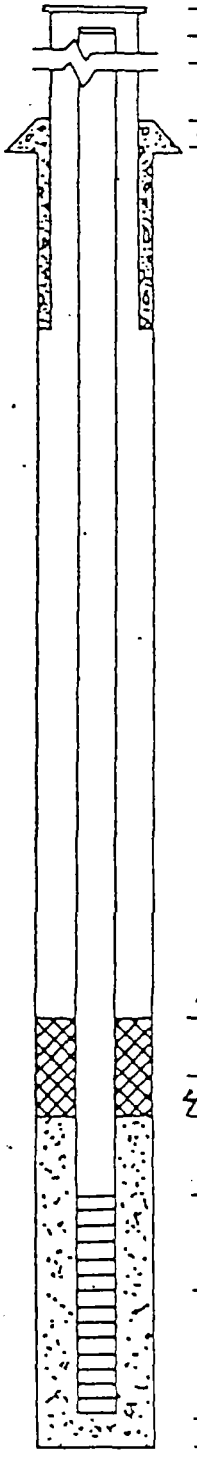
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSH THREADED MATERIALS -

Measurements to .01 ft. (where applicable)

Riser pipe length	16.52
Protective casing length	N/A
Screen length	10.17
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH



Elevations — .01 ft.

430.51 MSL Top of Protective Casing
430.17 MSL Top of Riser Pipe
— — ft. Casing Stickup
430.51 MSL Ground Surface
429.21 ft. Top of annular sealant

417.41 ft. Top of Seal
1.90 ft. Total Seal Interval
415.51 ft. Top of Sand
413.65 ft. Top of Screen
10.17 ft. Total Screen Interval
403.48 ft. Bottom of Screen
403.48 ft. Bottom of Borehole

Completed by: M. JEFFERIES Surveyed by: M.B. CURLEW + ASSOC Ill. registration # 370913463

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-8
Well No. HMW-8

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4879-77
ELEVATION: — BORSHOLE LOCATION/COORDINATES: —
LOGGED BY: M JEFFERIES GWL: depth — date/time 11-21-90 —
DRILLED BY: K RUNSELMEYER GWL: depth (SEE BELOW) date/time 11-21-90, 1730
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT SPOON SAMPLING
DATE/TIME STARTED: 11-21-90 0800 DATE/TIME COMPLETION (S): 11-21-90, 0930
AIR MONITORING TYPE: HNU * / CGI ' BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	FROM AUGER CUTTINGS SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHANG (feet)	AIR * MONITORING UNITS ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
				DK BRN CLAYEY SILT ALT W/ SILTY CLAY, STIFF, COHESIVE	CL/ML		0.0	0.0	0.0	
5										
10				S.A.A.	CL/ML		0.0	0.0	0.0	
15				DK BRN ↑ LT. BRN ↓ W/ GREEN DISCOLORATIONS (LOW GASOLINE ODORS)			—	0.0	0.2	
20				GREENED SL-SANDY SILT. DECREASE IN CUTTINGS COMING UP. (LOW GASOLINE ODORS)	SM		0.0	0.0	0.2	
25				GREENED SL. SANDY SILT	SM		0.0	0.0	0.2	
30					ML		0.0	0.0	0.4	

BEI 024457

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.

LATER IN DAY —
4 EWLI NOT FUNCTIONING — RAINY CONDITION PREVENTED VISIBLE WETNESS ON TAPE (RAINING TOO HARD)

GEOLOGIST SIGNATURE Mark Jefferies

DRAINED CUTTINGS / LOG ATTACHED

John Mathies & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No. HMWB-8
Well No. HMW-8

PROJECT NAME: CLARK OIL SUBSURFACE INVESTIGATION — PROJECT NO: 122489-4879-77
ELEVATION: — BOREHOLE LOCATION/COORDINATES: —
LOGGED BY: M. JEFFERIES — GWL: depth — date/time 11-21-90; —
DRILLED BY: K. BUASELMEYER — GWL: depth (SEE BELOW) date/time 11-21-90; 1730
DRILLING/RIG METHODS: HSA 4¼" SELECTED SPLIT-SPOON SAMPLING
DATE/TIME STARTED: 11-21-90 0800 — DATE/TIME COMPLETION (S): 11-21-90 0930
AIR MONITORING TYPE: HNU * / CGI ' — BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	FROM AUGER CUTTINGS – SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS PPM * BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
	1	33/35	12"	POORLY-GRADED, LOOSE, FINE, TAN SAND	SP		0.0	0.0	12	CGI = 4% LEL AT BOREHOLE (2½" ABOVE)
35	2	35/37	12"	S.A.A.	SP		0.0	0.0	12	STRONG GASOLINE ODORS
	3	37/39	12"	S.A.A. (w/ ⅛" TO ¼" BLACK SHALE FRAGMENTS APPEARS NON-CONFINING NON-CONTINUOUS LAYERS)	SP		0.0	0.0	12	BUT HNU SHOWING LOW RESPONSE AT RETRIEVAL TIME
40	4	39/41	18"	MODERATELY-SORTED, LOOSE, TAN SAND w/ SUB-RND QTZ PEBBLES –	SW		0.0	0.0	12	
	5	41/43	18"	MODERATELY-WELL SORTED SAND, TAN, LOOSE, LOWEST 5" COARSE QTZ GRAVEL PEBBS	SW		0.0	0.0	12	2' BLOW-IN
45										TD AT. 43'

TO SET 10' SCREEN APPROX 33'-43'

BEI 024458

COMMENTS: *HNU CALIBRATED TO 100 ppm ISOBUTYLENE IN AIR; 1 NDU (NEEDLE DEFLECTION UNIT) = 1 PPM
(1) CGI CALIBRATED TO HEXANE.

Δ LATER IN DAY — EWLI NOT FUNCTIONING + RAINY CONDITIONS PREVENTED VISIBLE WETNESS ON TAPE (RAINING TOO HARD)

GEOLOGIST SIGNATURE Mark Jefferies

WCR -

Illinois Environmental Protection Agency

Well Completion Report

Site #: 1224489 County MADISON Well # HMW-8

Site Name: CLARK OIL - HARTFORD, IL Grid Coordinate: Northing 4186.979 Easting 6539.264

Drilling Contractor: MATHES Date Drilled Start: 11-21-90

Driller: K. RUNSELMEYER Geologist: M. JEFFERIES Date Completed: 11-21-90

Drilling Method: HSA 4¼" Drilling Fluids (type): NONE -

Annular Space Details

Type of Surface Seal: PREMIX CONCRETE

Type of Annular Sealant: GROUT (PORTLAND CEMENT + BENTONITE)

Amount of cement: # of bags 3.0 lbs. per bag 94

Amount of bentonite: # of bags 0.20 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): PELLET

Amount of bentonite: # of Bags 1.0 lbs. per bag 50

Type of Sand Pack: WB-40 (WASHED) SILICA.

Source of Sand:

Amount of Sand: # of bags 3.0 lbs. per bag 100

Elevations — .01 ft.

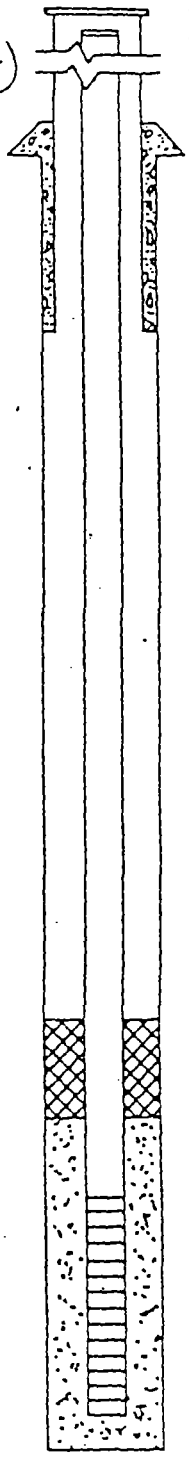
430.81 MSL Top of Protective Casing

430.31 MSL Top of Riser Pipe

— — ft. Casing Stickup

430.81 MSL Ground Surface

429.21 ft. Top of annular sealant



402.31 ft. Top of Seal

2.00 ft. Total Seal Interval

400.31 ft. Top of Sand

398.33 ft. Top of Screen

10.17 ft. Total Screen Interval

388.16 ft. Bottom of Screen

387.81 ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	N/A *			
Riser pipe above w.t.			SCH 40	
Riser pipe below w.t.			SCH 40	
Screen			SCH 40	
Coupling joint screen to riser	N/A *			
Protective casing	N/A			

* - USED FLUSH THREADED MATERIALS

Measurements to .01 ft. (where applicable)

Riser pipe length	31.98
Protective casing length	N/A
Screen length	10.17
Bottom of screen to end cap	0.25 **
Top of screen to first joint	0.10 **
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	8
ID of riser pipe (in)	2

** - INCLUDED IN TOTAL SCREEN LENGTH

Completed by: M. JEFFERIES Surveyed by: M.B. CURLEW + ASSOC. Ill. registration # 3709913463

Illinois Environmental Protection Agency — Well Completion Report

Site #: 1224 89 County: Madison Well #: HMW-9

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-21-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-22-91

Drilling Method: 8 1/4" H.S.A. Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete.

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/4 lbs. per bag 50

Type of Bentonite Seal (Granular, Pelled): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Silica Sand 8-14

Source of Sand: Colorado Silica Sand

Amount of Sand: # of bags 10 lbs. per bag 100

Well Construction Materials

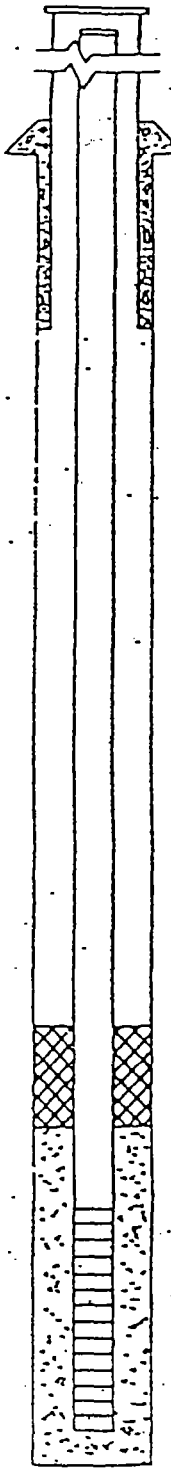
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			sch 40	
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements

to .01 ft. (where applicable)

Riser pipe length	12.47
Protective casing length	.60
Screen length	10.2
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
% of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.33	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
8.0	ft. Top of Seal
2.0	ft. Total Seal Interval
10.0	ft. Top of Sand
12.80	ft. Top of Screen
10.2	ft. Total Screen Interval
23.0	ft. Bottom of Screen
	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration #: _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: AMW-10

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-21-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-22-91

Drilling Method: 8 1/4" H.S.A. Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: _____

Type of Annular Sealant: _____

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): _____

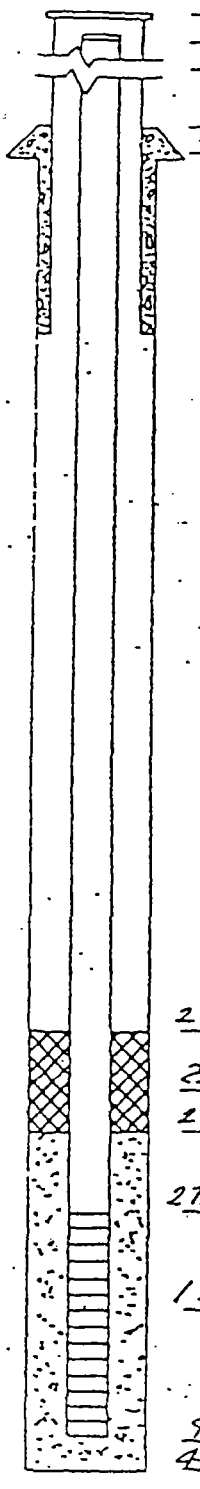
Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Silica Sand 8-14

Source of Sand: _____

Amount of Sand: # of bags 13 lbs. per bag 100

Elevations — .01 ft.



	MSL Top of Protective Cap
.37	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
	ft. Top of annular sealant
24.0	ft. Top of Seal
2.0	ft. Total Seal Interval
26.0	ft. Top of Sand
27.7	ft. Top of Screen
15.3	ft. Total Screen Interval
43.0	ft. Bottom of Screen
43.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			sch 40	
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements

to .01 ft. (where applicable)

Riser pipe length	27.33
Protective casing length	.60
Screen length	15.3
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122484 County: Madison Well #: HMW-11

Site Name: Clark Pilot Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-19-91

Driller: C. Hebel Geologist: J. Garcia Date Completed: 3-20-91

Drilling Method: 8 1/4" H.S.A. Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: pre-mix Concrete

Type of Annular Sealant: Grout

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: WB-40

Source of Sand: _____

Amount of Sand: # of bags 8 lbs. per bag 100

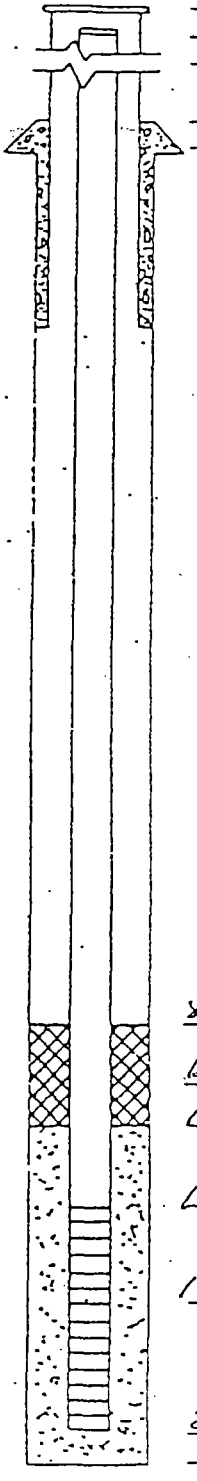
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements to .01 ft. (where applicable)

Riser pipe length	16.38
Protective casing length	1.0
Screen length	10.0
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.62	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
2.0	ft. Top of annular sealant
8.5	ft. Top of Seal
6.5	ft. Total Seal Interval
10	ft. Top of Sand
16.0	ft. Top of Screen
10.0	ft. Total Screen Interval
21.0	ft. Bottom of Screen
	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration #: _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: HMW-12

Site Name: Clark pilot Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-19-91

Driller: C. Hebel Geologist: J. Garcia Date Completed: 3-20-91

Drilling Method: 8 1/4" H.S.A Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: _____

Type of Annular Sealant: _____

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: WB-40 Sand

Source of Sand: _____

Amount of Sand: # of bags 11 lbs. per bag 100

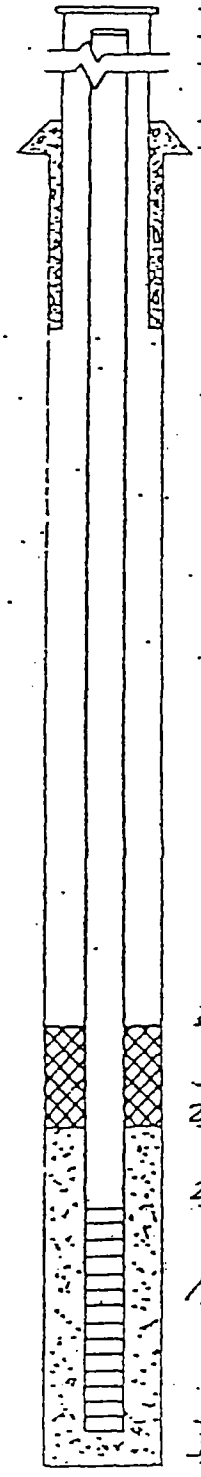
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements to .01 ft. (where applicable)

Riser pipe length	23.32
Protective casing length	1.0
Screen length	15.0
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



_____ MSL Top of Protective Cap

.68 MSL Top of Riser Pipe

_____ ft. Casing Stickup

_____ MSL Ground Surface

2.0 ft. Top of annular sealant

22.0 ft. Top of Seal

1.5 ft. Total Seal Interval

23.5 ft. Top of Sand

24.0 ft. Top of Screen

15.0 ft. Total Screen Interval

39 ft. Bottom of Screen

39.5 ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: NMW-13

Site Name: Clark Pilot Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-20-91

Driller: C. Hebel Geologist: J. Garcia Date Completed: 3-20-91

Drilling Method: 8 1/4" H.S.A. Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix concrete.

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1.5 lbs. per bag 50

Type of Sand Pack: WB-40 sand

Source of Sand: _____

Amount of Sand: # of bags 7 lbs. per bag 94

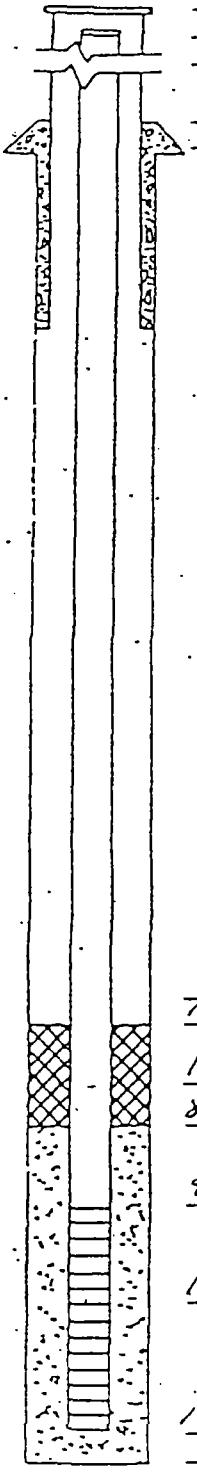
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.				
Screen			sch. 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements to .01 ft. (where applicable)

Riser pipe length	8.86
Protective casing length	1.0
Screen length	10.1
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.54	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
7.0	ft. Top of Seal
1.3	ft. Total Seal Interval
8.3	ft. Top of Sand
9.40	ft. Top of Screen
10.1	ft. Total Screen Interval
19.5	ft. Bottom of Screen
	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: HMW-14

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-20-91

Driller: C. Hebel Geologist: J. Garcia Date Completed: 3-20-91

Drilling Method: 8 1/4" H.S.A Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix concrete

Type of Annular Sealant: Grout

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/2 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: WB-40 Sand

Source of Sand: _____

Amount of Sand: # of bags 13 lbs. per bag 94

Well Construction Materials

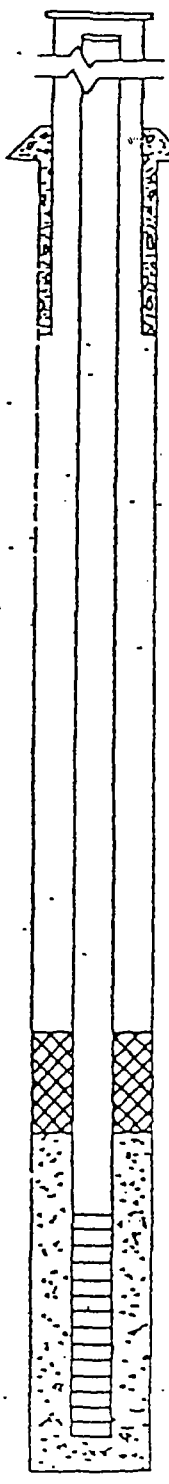
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements

to .01 ft. (where applicable)

Riser pipe length	22.50
Protective casing length	1.0
Screen length	15.3
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.60	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
20.0	ft. Top of Seal
1.0	ft. Total Seal Interval
21.0	ft. Top of Sand
22.9	ft. Top of Screen
15.3	ft. Total Screen Interval
38.2	ft. Bottom of Screen
39.5	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122989 County: Madison Well #: HMW-15

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-20-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-21-91

Drilling Method: 8 1/4" H.S.A. Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular/Pellet): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Silica Sand (20-40)

Source of Sand: Colorado Silica Sand (20-40)

Amount of Sand: # of bags 9 lbs. per bag 100

Well Construction Materials

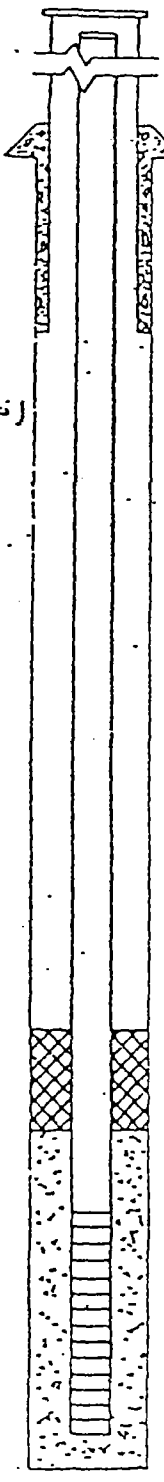
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements

to .01 ft. (where applicable)

Riser pipe length	10.42
Protective casing length	6.7
Screen length	10.2
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
38	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
6.9	ft. Top of Seal
2.1	ft. Total Seal Interval
9.0	ft. Top of Sand
10.8	ft. Top of Screen
10.2	ft. Total Screen Interval
21.0	ft. Bottom of Screen
	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County Madison Well # NMW-16

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Matheis & Assoc. Date Drilled Start: 3-20-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-21-91

Drilling Method: 8 1/4" H.S.A Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Grout.

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: WB-40 Sand

Source of Sand: 6

Amount of Sand: # of bags 13 lbs. per bag 94

Well Construction Materials

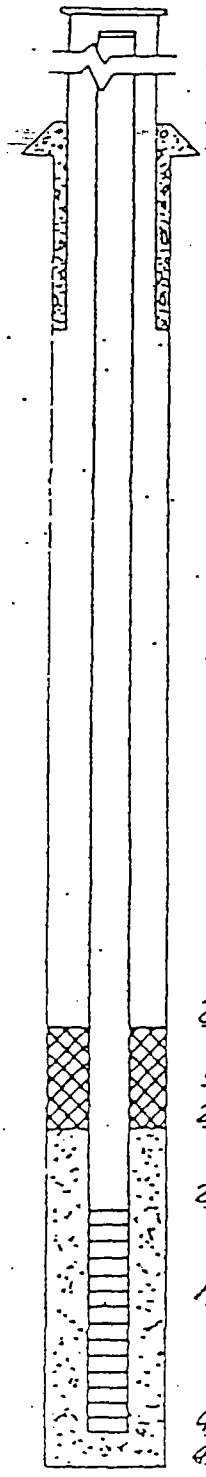
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				cast iron

Measurements

to .01 ft. (where applicable)

Riser pipe length	26.33
Protective casing length	6'
Screen length	15.3
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	—
Diameter of borehole (in)	12"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.37	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
22.0	ft. Top of Seal
2.0	ft. Total Seal Interval
24.0	ft. Top of Sand
26.7	ft. Top of Screen
15.3	ft. Total Screen Interval
42.0	ft. Bottom of Screen
43.5	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: NMW-17

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-25-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-26-91

Drilling Method: 4 1/4" H.S.A. Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: pre-mix concrete

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/4 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): _____

Amount of bentonite: # of Bags 1 lbs. per bag 50

Type of Sand Pack: Colorado Silica sand (8-14)

Source of Sand: _____

Amount of Sand: # of bags 5 lbs. per bag 100

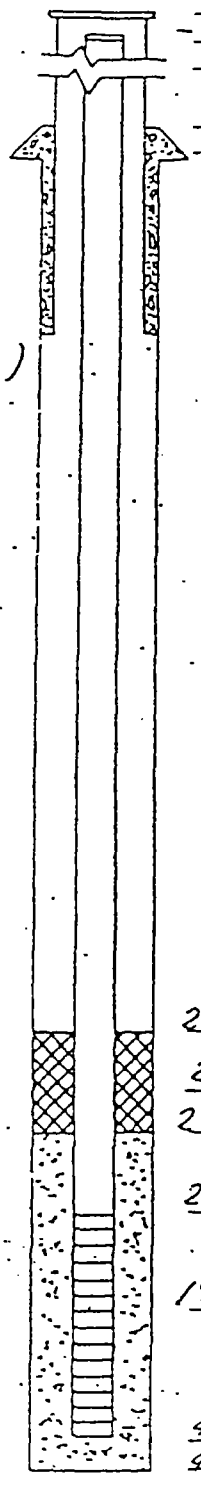
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				Alum. cast.

Measurements to .01 ft. (where applicable)

Riser pipe length	28.35
Protective casing length	6.7
Screen length	15.3
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	
Diameter of borehole (in)	8"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
-.35	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
2.0	ft. Top of annular sealant
23.5	ft. Top of Seal
2.0	ft. Total Seal Interval
25.5	ft. Top of Sand
28.7	ft. Top of Screen
15.3	ft. Total Screen Interval
44	ft. Bottom of Screen
44	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration #: _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: HMW-18

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-26-91

Driller: K. Bansemeyer Geologist: J. Garcia Date Completed: 3-26-91

Drilling Method: 4 1/4" H.S.A Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): _____

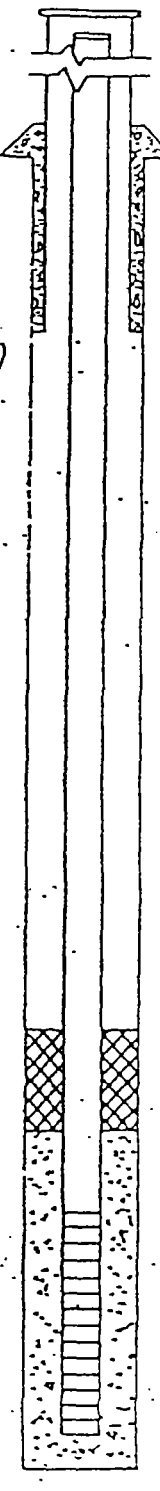
Amount of bentonite: # of Bags 1 lbs. per bag 50

Type of Sand Pack: Colorado Silica. Sand (8-14)

Source of Sand: _____

Amount of Sand: # of bags 5 1/2 lbs. per bag 100

Elevations — .01 ft.



	MSL Top of Protective Cap
-.45	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.25	ft. Top of annular sealant
22.3	ft. Top of Seal
2.2	ft. Total Seal Interval
24.5	ft. Top of Sand
27.7	ft. Top of Screen
15.3	ft. Total Screen Interval
43.0	ft. Bottom of Screen
43.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			sch 40	
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				alum. cast.

Measurements to .01 ft. (where applicable)

Riser pipe length	27.25
Protective casing length	.67
Screen length	15.3
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	
Diameter of borehole (in)	8"
ID of riser pipe (in)	2"

Completed by: J. Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: HMW-19

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc Date Drilled Start: 3-25-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-25-91

Drilling Method: 4 1/4" H.S.A. Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix concrete

Type of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular/Pellet): _____

Amount of bentonite: # of Bags 1 lbs. per bag 50

Type of Sand Pack: Silica Sand 8-14

Source of Sand: _____

Amount of Sand: # of bags 6 lbs. per bag 100

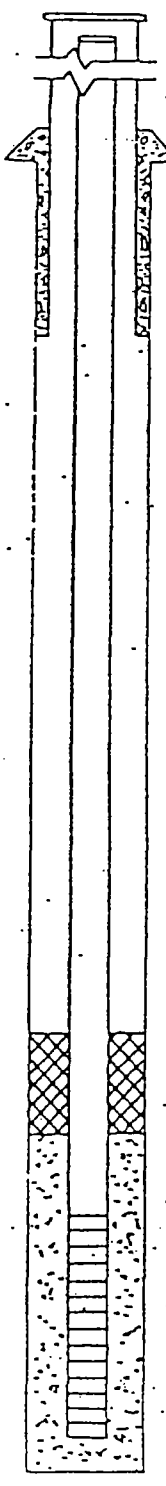
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				plain cast.

Measurements to .01 ft. (where applicable)

Riser pipe length	26.51
Protective casing length	.67
Screen length	15.6
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	
Diameter of borehole (in)	8"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.29	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
2.0	ft. Top of annular sealant
22.0	ft. Top of Seal
2.0	ft. Total Seal Interval
24	ft. Top of Sand
26.80	ft. Top of Screen
15.6	ft. Total Screen Interval
42.40	ft. Bottom of Screen
43.0	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ Ill. registration #: _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: Madison Well #: AMW-20

Site Name: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 3-25-91

Driller: K. Bunselmeyer Geologist: J. Garcia Date Completed: 3-25-91

Drilling Method: 4 1/4" H.S.A Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Grout

Amount of cement: # of bags 3 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular/Pellet): _____

Amount of bentonite: # of Bags 1 lbs. per bag 50

Type of Sand Pack: Silica Sand (8-12)

Source of Sand: Colorado Silica Sand

Amount of Sand: # of bags 5 lbs. per bag 100

Well Construction Materials

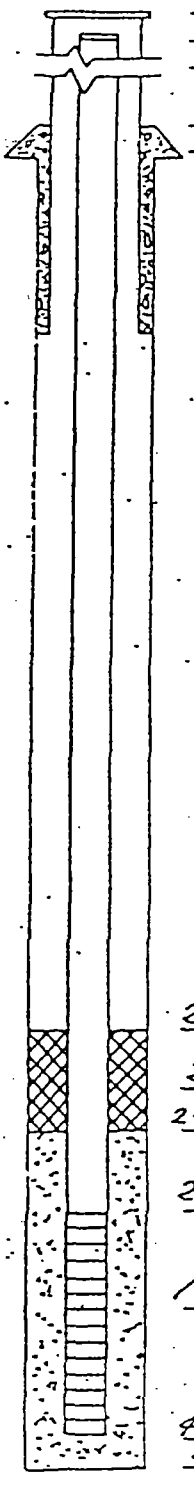
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			Sch 40	
Riser pipe above w.t.			Sch 40	
Riser pipe below w.t.			Sch 40	
Screen			Sch 40	
Coupling joint screen to riser				
Protective casing				Aluminum

Measurements

to .01 ft. (where applicable)

Riser pipe length	26.75
Protective casing length	.67
Screen length	15.3'
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	0.010
# of openings in screen	
Diameter of borehole (in)	8"
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Cap
.40	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
1.5	ft. Top of annular sealant
22.0	ft. Top of Seal
2.0	ft. Total Seal Interval
24.3	ft. Top of Sand
27.15	ft. Top of Screen
15.30	ft. Total Screen Interval
42.45	ft. Bottom of Screen
43.0	ft. Bottom of Borehole

Completed by: J. Garcia Surveyed by: _____ IIL registration #: _____

ohn Mathes & ssociates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No.

Well No. HMW 21-22

PROJECT NAME: Clark Oil Hartford PROJECT NO: 122489

ELEVATION: BOREHOLE LOCATION/COORDINATES:

LOGGED BY: J. Garcia GWL: depth date/time

DRILLED BY: J. Breeding GWL: depth date/time

DRILLING/RIG METHODS: 6 1/4" H.S.A 5750 ATV.

DATE/TIME STARTED: 9-9-91 13:00 DATE/TIME COMPLETION(S): 9-9-91 13:4

AIR MONITORING TYPE: HNU, CGI BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS: ppm BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
5				dk Brn silty clay damp slight plasticity	CL		1.0	0	0	
10				brn silty Clay moist med plasticity. med soft	CL	≈7½	0	1.0	0	
15				lt gry-brn sandy silt moist v. soft w/clay	ML	≈14	0	.2	0	
20				green-gry sandy silt	ML/SM	≈18	0	1.0	.2	
25				S.A.A.	ML/SM	≈24	.3	1.4	.4	X ≈ 25-27'
30				gry silty SAND moist wet.	SM		2	2.0	.6	

COMMENTS: No sampling
Logged cuttings

BEI 024346

GEOLOGIST SIGNATURE Angel Garcia

John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No.
Well No. NMW-21-22

PROJECT NAME: Clark Oil, Hartford PROJECT NO: 122484
ELEVATION: BOREHOLE LOCATION/COORDINATES:
LOGGED BY: J. Garcia GWL: depth date/time
DRILLED BY: J. Breeding GWL: depth date/time
DRILLING/RIG METHODS: 6 1/4" H.S.A. 550 ATV
DATE/TIME STARTED: 9-4-91 13:00 DATE/TIME COMPLETION(S): 9-4-91 13:40
AIR MONITORING TYPE: HNU, CGI BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS: NDU BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
35				gry sandy silt wet. v. soft	SM/ML		0	1.5	0.2	slight odor
40				gray silty sand fine grain wet	SM		4 6	30 50	30 40	strong hydro carbon odor.
				TDB @ 41'						

COMMENTS: No sampling
Logged cuttings
Hydrocarbon odors 30-40

BEI 024348

GEOLOGIST SIGNATURE: Jorge Garcia

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County _____ Well # NMW-21

Site Name: Clark Oil Hartford Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Date Drilled Start: 9-9-91

Driller J. Breeding Geologist: J. Garcia Date Completed: 9-9-91

Drilling Method: 6 1/4" H.S.A. Drilling Fluids (type): None

Annular Space Details

Type of Surface Seal: premix concrete

Type of Annular Sealant: grout

Amount of cement: # of bags 2 lbs. per bag 94

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Nucleply

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Colorado Silica SAND 20-40

Source of Sand: _____

Amount of Sand: # of bags 5.5 lbs. per bag 100

Well Construction Materials

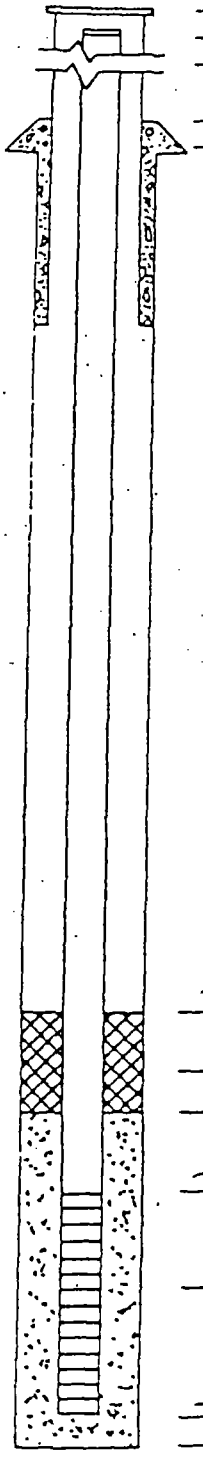
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			sch 40	
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch. 40	
Coupling joint screen to riser				
Protective casing				Alumin

Measurements

to .01 ft. (where applicable)

Riser pipe length	14.35'
Protective casing length	— 11 inches
Screen length	10.2'
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	10 slot
% of openings in screen	—
Diameter of borehole (in)	10 1/2"
ID of riser pipe (in)	2"

Elevations — .01 ft.



—	MSL Top of Protective Ca
—	MSL Top of Riser Pipe
.52	ft. Casing Stickup
—	MSL Ground Surface
0	ft. Top of annular sealan
10.2	ft. Top of Seal
1.8	ft. Total Seal Interval
12.0	ft. Top of Sand
14.2	ft. Top of Screen
10.2	ft. Total Screen Interval
24.4	ft. Bottom of Screen
—	ft. Bottom of Borehole

BEI 024368

Completed by: Jorge Garcia Surveyed by: _____ Ill. registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: _____ Well #: MW-22

Site Name: C/2-K Oil Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc Date Drilled Start: 9-4-91

Driller: J. Brooding Geologist: J. Garcia Date Completed: 9-4-91

Drilling Method: 6 1/4" H.S.A. Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: pre-mix concrete

Type of Annular Sealant: grout

Amount of cement: # of bags 2 lbs. per bag 94

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Volcplug

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Colorado Silica Sand 20-40

Source of Sand: _____

Amount of Sand: # of bags 5.5 lbs. per bag 100

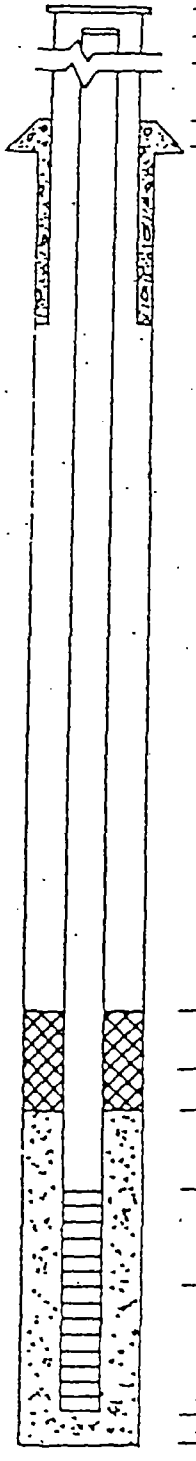
Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			Sch 40	
Riser pipe below w.t.			Sch 40	
Screen			Sch 40	
Coupling joint screen to riser				
Protective casing				Alum

Measurements to .01 ft. (where applicable)

Riser pipe length	30.47'
Protective casing length	11"
Screen length	10.2
Bottom of screen to end cap	
Top of screen to first joint	
Total length of casing	
Screen slot size	0.20
# of openings in screen	—
Diameter of borehole (in)	10 1/2
ID of riser pipe (in)	2"

Elevations — .01 ft.



—	MSL Top of Protective Ca
—	MSL Top of Riser Pipe
.28	ft. Casing Stickup
—	MSL Ground Surface
0	ft. Top of annular sealan
24.5	ft. Top of Seal
1.8	ft. Total Seal Interval
26.3	ft. Top of Sand
29.8	ft. Top of Screen
10.2	ft. Total Screen Interval
40	ft. Bottom of Screen
40	ft. Bottom of Borehole

BEI 024369

Completed by: Jorge Garcia Surveyed by: _____ Ill. registration # _____

Jolin Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No.
Well No. HMW-23-24

PROJECT NAME: Clark Oil - Hartford PROJECT NO: 12 24 89
ELEVATION: BOREHOLE LOCATION/COORDINATES:
LOGGED BY: J. Garcia GWL: depth date/time
DRILLED BY: J. Bradley GWL: depth date/time
DRILLING/RIG METHODS: 6 1/4" H.S.A. / 550 ATV
DATE/TIME STARTED: 9-3-91 13:15 DATE/TIME COMPLETION(S): 9-4-91 9:35
AIR MONITORING TYPE: HNU, CGI BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION (CLASSIFICATION SYSTEM: USCS)	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS: VDU's BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
5				dk Brn silty clay damp slight plast	CL		0	0	0	
10				Brn silty clay med plasticity med soft.	CL	≈1	0	0	0	
15				green-gry SANDY SILT Moist soft. trace clay	ML	14	0	0	1.0	
20				green-gry SANDY SILT - silty SAND v. fine grain moist.	ML/SM	≈19	0	0	0	
25				green-gry silty SAND slight cohesiveness damp	SM		1.0	1.0	.2	▼ ≈ 26-27'
30				gry silty SAND wet	SM		-	1.0	0	slight odor

9-4-
8:40

COMMENTS: * No sampling
Logged cuttings

BEI 024342

13:30 - 15:40 stand-by

GEOLOGIST SIGNATURE Lloyd Garcia

ohn Mathes & ssociates, Inc.

RECORD OF SUBSURFACE EXPLORATION

Borehole No.
Well No. HMW# 23-24

PROJECT NAME: Clark Oil - Hartford PROJECT NO: 122489
ELEVATION: BOREHOLE LOCATION/COORDINATES:
LOGGED BY: J. Garcia GWL: depth date/time
DRILLED BY: J. Breeding GWL: depth date/time
DRILLING/RIG METHODS: 6 1/4" H.S.A. 55° ATV.
DATE/TIME STARTED: 9-3-91 13:15 DATE/TIME COMPLETION(S): 9-4-91 9:30
AIR MONITORING TYPE: HNU, CGI BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: USCS	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS NDU's BZ	BH	S	DRILLING CONDITIONS AND (BLOW COUNTS)
35				Dry silty SAND wet, slight cohesiveness	SM		2.0 2.1	10	5.0	Hydrocarbon odors
40				Dry SAND saturated fine grain size, trace silt. T.O.B @ 40'	SM/SP		30	30	45	strong Hydrocarbon odors

COMMENTS: High Hydrocarbon odor 35-40'

BEI 024344

GEOLOGIST SIGNATURE: Angel Garcia

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County _____ Well # HMW-23

Site Name: Clark Oil Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathes & Assoc. Inc. Date Drilled Start: 9-4-91

Driller: J. Breeding Geologist: J. Garcia Date Completed: 9-4-91

Drilling Method: 6 1/4" H.S.A Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: pre-mix concrete

Type of Annular Sealant: grout cement bentonite

Amount of cement: # of bags 2 lbs. per bag 94

Amount of bentonite: # of bags 1/2 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Hole plug

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Colorado silica sand 20-40

Source of Sand: _____

Amount of Sand: # of bags 5.5 lbs. per bag 100

Well Construction Materials

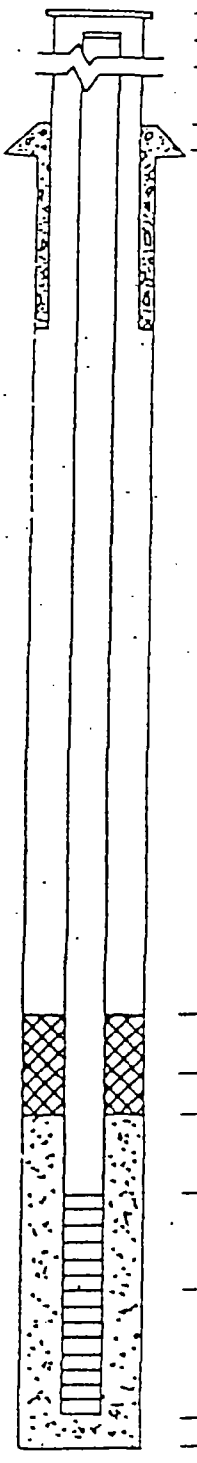
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	14.52
Protective casing length	.70
Screen length	10.2
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	20 slot
# of openings in screen	—
Diameter of borehole (in)	10 1/2
ID of riser pipe (in)	2"

Elevations — .01 ft.



____	MSL Top of Protective Ca
____	MSL Top of Riser Pipe
.52	ft. Casing Stickup
____	MSL Ground Surface
0	ft. Top of annular sealan
10.3	ft. Top of Seal
1.7	ft. Total Seal Interval
12.0	ft. Top of Sand
14.5	ft. Top of Screen
10.2	ft. Total Screen Interval
24.7	ft. Bottom of Screen
____	ft. Bottom of Borehole

BEI 024370

Completed by: Jorge Garcia Surveyed by: _____ Ill. registration # _____

Illinois Environmental Protection Agency

Well Completion Report

Site #: 122489 County: _____ Well #: HMW-24

Site Name: Clark Oil Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: John Mathis & Assoc. Inc Date Drilled Start: 9-4-91

Driller: J. Breeding Geologist: J. Garcia Date Completed: 9-4-91

Drilling Method: 6 1/4" H.S.A. Drilling Fluids (type): N/A

Annular Space Details

Type of Surface Seal: premix concrete

Type of Annular Sealant: grout cement/bentonite

Amount of cement: # of bags 2 lbs. per bag 94

Amount of bentonite: # of bags 1/5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Holeplug

Amount of bentonite: # of Bags 1 1/2 lbs. per bag 50

Type of Sand Pack: Colorado Silica SAND 20-40

Source of Sand: _____

Amount of Sand: # of bags 6.5 lbs. per bag 100

Well Construction Materials

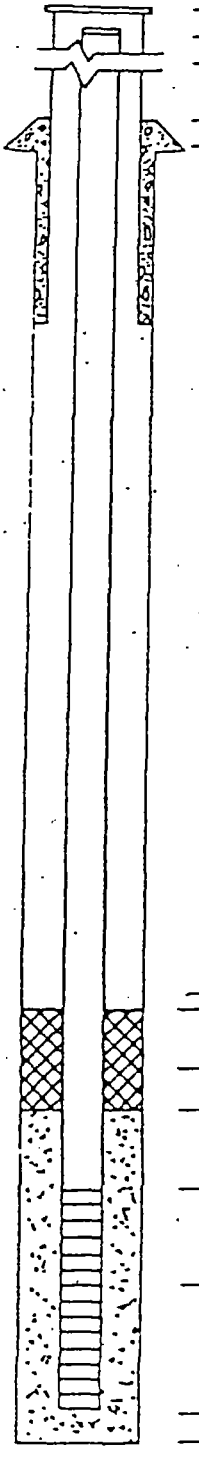
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint				
Riser pipe above w.t.			sch 40	
Riser pipe below w.t.			sch 40	
Screen			sch 40	
Coupling joint screen to riser				
Protective casing				steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	29.55
Protective casing length	—
Screen length	10.2
Bottom of screen to end cap	—
Top of screen to first joint	—
Total length of casing	—
Screen slot size	20 slot
% of openings in screen	—
Diameter of borehole (in)	10 1/2
ID of riser pipe (in)	2"

Elevations — .01 ft.



_____	MSL Top of Protective Cap
_____	MSL Top of Riser Pipe
.52	ft. Casing Stickup
_____	MSL Ground Surface
0	ft. Top of annular sealant
24.9	ft. Top of Seal
2.10	ft. Total Seal Interval
27.0	ft. Top of Sand
29.9	ft. Top of Screen
10.2	ft. Total Screen Interval
39.6	ft. Bottom of Screen
40	ft. Bottom of Borehole

BEI 024371

Completed by: Jorge Garcia Surveyed by: _____ IIL registration # _____

Illinois Environmental Protection Agency — Well Completion Report

ite #: 122489 County: Madison Well #: MW-1

: Clark Pilot. Grid Coordinate: Northing _____ Easting _____

rilling ntractor: John Mathes & Assoc. Date Drilled Start: 3-18-91

riller: C. Hebel Geologist: J. Garcia Date Completed: 3-18-91

illing Method: 8 1/4" H.S.A. Drilling Fluids (type): N/A

nnular Space Details

pe of Surface Seal: _____

pe of Annular Sealant: Grout.

Amount of cement: # of bags 2 lbs. per bag 100

Amount of bentonite: # of bags 1/5 lbs. per bag 50

pe of Bentonite Seal (Granular, Pellet): _____

ount of bentonite: # of Bags 1 1/2 lbs. per bag 50 lb.

pe of Sand Pack: WB-40 Sand

urce of Sand: _____

Amount of Sand: # of bags 15.5 lbs. per bag 100

ell Construction Materials

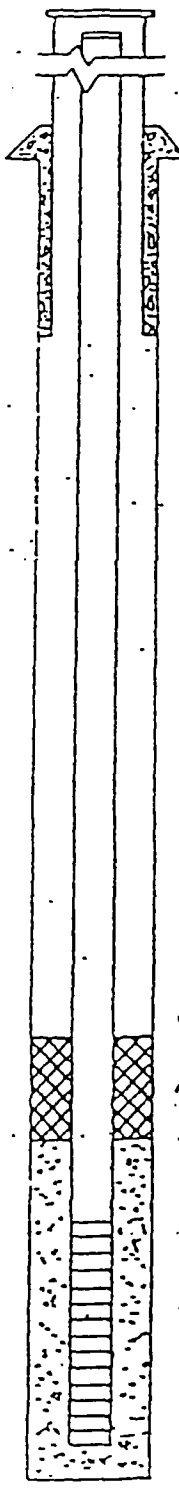
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
iser coupling joint				
iser pipe above w.t.			sch 40	
iser pipe below w.t.				
creen	304		sch 40	
oupling joint screen to riser				
rotective casing				

easurements

to .01 ft. (where applicable)

iser pipe length	
rotective casing length	
creen length	14.90 SS / 14.95 PVC
ottom of screen to end cap	
op of screen to first joint	
otal length of casing	
creen slot size	0.020
of openings in screen	
of borehole (in)	12"
of riser pipe (in)	6"

Elevations — .01 ft.



_____ MSL Top of Protective Cas
_____ MSL Top of Riser Pipe
_____ ft. Casing Stickup

_____ MSL Ground Surface
-1.0 ft. Top of annular sealant

6.60 ft. Top of Seal
1.35 ft. Total Seal Interval
7.95 ft. Top of Sand
8.15 ft. Top of Screen
29.85 ft. Total Screen Interval
38' ft. Bottom of Screen
38' ft. Bottom of Borehole

npleted by: _____ Surveyed by: _____ IIL registration # _____

Clayton
GROUP SERVICES

IEPA WELLS

Illinois Environmental Protection Agency

BORING NO. 1 DATE 4/5/78 ELEV. 430.49

Madison Co.
Hartfort

Personnel
M. Nienkark
D. Tolan
T. Scotese

Location of Boring
SW corner of the intersection of Rand & Delmar (school yard) NE, NE, SE, Sec 33, T5N, R9W

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTENC
5°	6.5						Dk gr & br mot., moist, clay w/ organics
10°	11.5						Br & gr, moist, sand v. fine w/ organics
15°	16.5						Same as above - wetter
20°	21.5						Gr, v. moist, silty clay, some organic, (Petro slight smell)
25°	26.5						Same as above - (no petro. smell)
30°	31.5						Blue gray, moist, clay
							Note: At 30° ft petro smell coming up h
35°	36.5						Gr & br, sand (wet) med. grained - strong petro smel
40°	41.5						gr, wet, silt, some organic mat. (petro smel
							Note: H_2O at 38° feet
							Depth to H_2O 34.2 ft - 3:55 P.M.
							TD 42.2
							5:00 PM - 2 water samples (1 qt each) collected from boring
							6:15 PM - Boring Backfilled with 40 pounds bentonite & bore hole cuttings
							Tuesday April 18, 1978 - Redrilled hole to install PVC pipe - TD 45 ft
							45 ft 2" PVC pipe installed bottom 20 ft slotted - Stick-up = 0.4 ft.
							Gravel Back fill 25 to 45 feet
							Bentonite " 23 to 25 feet
							Bore hole cuttings Backfill 0 to 23 feet
							8.2 ft to H_2O from top of casing 4:05 PM

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 1 CONTRACT 453-78

LOGGED BY
PIEZOMETER 45', 2" PVC Pipe
DATE DRILLED 4/5 3
DRILLING METHOD
PROJECT Hydro Carbon Recov. Invest.
'LLED BY I. E. P. A.

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 430.5')	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, CU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.5) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 100)
				Dark Gray & Brown Mottled CLAY w/Organics			
5	1	SS					
10	2	SS		Brown & Gray Very Fine SAND w/Organics			
15	3	SS					
20	4	SS	Petro. Odor	Gray Silty CLAY, Some Organics			
25	5	SS					
30	6	SS	Petro Odor Coming Up Hole @ 30'	Blueish Gray CLAY			
35				Gray & Brown Medium SAND			

Cont'd

GROUND WATER DEPTH AT COMPLETION 34.2' AFTER — HRS. AFTER HRS.

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. I Cont'd CONTRACT 453-78

DRILLED BY I. E. P. A. LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DATE DRILLED 4/5/78

PIEZOMETER 45', 2" PVC Pipe DRILLING METHOD

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 395.5')	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (0 0.5 1.0 1.5 2.0 2.5) / WATER CONTENT, % (0 20 40 60 80 100)
	7	SS	Strong Petro Odor	Gray & Brown Medium SAND			
40	8	SS	Petro Odor	Gray SILT, Some Organic Matter			
				T. O. B.			
45							

GROUND WATER DEPTH AT COMPLETION 34.2' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 2 DATE 4/11/78 1:00 PM ELEV.

Madison County
Hartford

Personnel
M. Nienker
D. Tolen
T. Scotese

Location of Boring
SW corner Hawthorne & Old St. Louis Road

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTENCY
0°	19½	2½	4½				Brown, very Damp, Sandy loam (fill?)
		5½	6½				Same as above
		7½	9½				Same
		10½	11½				Same
		12½	13½				Same - refusal at 13½
		17½	19½				Same - w/ pieces of wood (lumber)
19½	26½	20½	21½				Br, damp, fine sand (River Sand ?)
		22½	24½				Same
26½	27½	25½	26½				Gr, very damp, silt
							Note: H_2O at 27½
		27½	29½				Br, wet, fine sand
		30½	31½				Same as above very wet
		40½	41½				No Return - Gr, fine sand on outside of spoon - also washed up hole
							TD 39½ feet
							43½ ft 2" PVC Pipe installed
							bottom 20' slotted
							Stick-up 3.5 ft.
							4/11/78 6:45 PM
							28½ ft. to H_2O from Top of Casing
							after installation
							Gravel back fill 18½ to 29½ feet
							Sand caved in bottom 10 feet
							Bentonite pellets 16½ to 17½ feet
							Borehole cuttings 2½ to 16½ feet
							Powdered Bentonite + Top soil mixture Surface to 2½

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 2 CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/11/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 43', 2" PVC Pipe

SURFACE ELEVATION 429.6

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Brown Sandy LOAM, Fill		
	1	SS				
5	2	SS				
	3	SS				
10	4	SS				
	5	SS	Refusal @13'			
15						
				w/Wood (lumber) From 17.5'-19'		
	6	SS				
20	7	SS		Brown Fine SAND		
	8	SS				
25	9	SS				
				Gray Silty CLAY		
				Brown Fine SAND		
	10	SS				
30	11	SS				
35				T. O. B! @ 39.5'		

SHEAR STRENGTH, TSF: SV △ — OP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2.5)

WATER CONTENT, % (0, 20, 40, 60, 80, 100)

GROUND WATER DEPTH AT COMPLETION 28.5' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 3 DATE 4/12/78 10:30A ELEV.

Madison County
Hartford

Personnel
M. Nienker
D. Tolan
T. Scotese

Location of Boring
City of Wood River -- City Garages
Side of town NE corner of fenced in
Intersection of Ferguson & Edwardsville Rd. North of

SAMPLE NO.	SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CON
1	0	14	2	4				Red-Brown, very damp, medium grained
2			5	6				Same as above
3			7	9				Same
4			10	11				Same - becoming wetter & lighter
								Note: H_2O at 14 feet - This is only a
5	14	18	15	16				Gray-Brown, wet, medium grained
6	18	41	20	21				Brown, very damp, medium-coarse grain
7			25	26				Same as above
8			30	31				Same as above
9			35	36				Same
10	41		40	41				Gray-Brown, wet, fine-medium grain
11			50	51				No return - Note H_2O at 41

TD 51

51½ ft 2" PVC pipe installed
bottom 30 ft. slotted

Stick-up 1½ ft.

Backfilled hole with sand
from Borehole

40.85 ft H_2O from Top of Casing

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 3 CONTRACT 453-78

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD DATE DRILLED 4/1/ 3 LOGGED BY PIEZOMETER 51.7', 2" PVC Pipe

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, OP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.5) / WATER CONTENT, % (PL +, ● , LL +; 0, 20, 40, 60, 80, 100)
				Reddish-Brown Medium SAND			
	1	SS					
5	2	SS					
	3	SS					
10	4	SS					
15	5	SS		Grayish-Brown Medium SAND			
20	6	SS		Brown Medium To Coarse SAND			
25	7	SS					
30	8	SS					
35							

Cont'd

GROUND WATER DEPTH AT COMPLETION 40.9' AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 3 Cont'd CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/12/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest BRILLING METHOD PIEZOMETER 51.7', 2" PVC Pipe

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, OP/2 □, OL/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.5) / WATER CONTENT, % (PL +, ●, LL +; 0, 20, 40, 60, 80, 100)
	9	SS		Brown Medium-Coarse SAND			
40	10	SS		Grayish-Brown Fine To Medium SAND			
45							
50	11	SS	No. Rec.	T. O. B.			
55							

GROUND WATER DEPTH AT COMPLETION 40.9' AFTER ____ HRS. ____ AFTER ____ HRS. ____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 4 DATE 4/12/78 - 2:30P ELEV.

Madison County
Hartford

Personnel
M. Nienkark
D. Tolan
T. Scotese

Location of Boring
501 Olive Street - North side of house

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTENC
0.0	3.5						Black Top Soil
3.5	13.0	5.0	6.5				Gray-Brown, very damp, silty clay
		10.0	11.5				Brown some gray, moist, sandy clay with some organic material
13.0	26.0	15.0	16.5				light gray, Brown very damp, silty clay, some fine sand seams
		20.0	21.5				Same as above
		25.0	26.5				Same as above
26.0		30.0	31.5				gray, damp, medium grained sand, strong gasoline sm.
		35.0	36.5				Same as above
							Note H_2O at 34 feet
		45.0	46.5				No Return
							TD 44.5 - ft
							45.5 ft. 2" PVC pipe installed bottom 20 feet slotted
							Stick up 1.0 ft.
							Gravel Backfill 20.0 to 44.5 feet
							Bentonite Backfill 18.0-20.0 feet
							Borehole Cuttings backfilled 0.0 to 18.0 feet
							~~ft to H_2O from top of casing after PVC pipe installation~~

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 4 CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/12/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 45.5', 2" PVC Pipe

SURFACE ELEVATION 430.0

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Black TOP SOIL		
5	1	SS		Grayish-Brown Silty CLAY		
10	2	SS		Brown & Gray Sandy CLAY w/Organic Matter		
15	3	SS		Light Gray & Brown Silty CLAY, Some Fine Sand Seams		
20	4	SS				
25	5	SS		Gray Medium SAND		
30	6	SS	Strong Gasoline Odor			
35	7			T. O. B. @ 44.5'		

SHEAR STRENGTH, TSF — Δ SV — $\circ$ DP/2 — $\circ$ CU/2 — 0 0.5 1.0 1.5 2.0 2.

WATER CONTENT, % — 0 20 40 60 80 10

GROUND WATER DEPTH AT COMPLETION 34.0' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 5 DATE April 19, 1978 8:30 A ELEV.

Madison Co.
Hartford

Personnel
M. Manfork
D. Tolan
D. Wiatics

Location of Boring
SE corner of intersection of Westline and Old St. Louis Road

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTENC
1	3						Brown, very damp, silty clay
3		5°	1 5				Brown, damp, fine grained sand
		10°	11 5				Same as above
		20°	21 5				Same as above
							Note: H2O at 27 feet
		40°	41 5				No Return
							41 0 ft 2" PVC installed - bottom 20 ft slotted
							Stick up = 1 0 ft
							Sand from borehole backfilled around PVC pipe 2 to 40 feet
							Powdered Bentonite and natural clay Backfill around top two feet of PVC
							11:40 AM at 45 ft to H2O from Top of Casing

BEI 025521

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 5 CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/19/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 41.9', 2" PVC Pipe

SURFACE ELEVATION 429.4

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (0 0.5 1.0 1.5 2.0 2.5) / WATER CONTENT, % (0 20 40 60 80 100)
				Brown Silty CLAY			
				Brown Fine SAND			
5	1	SS					
10	2	SS					
15							
20	3	SS					
25							
30							
35				T. O. B @ 40.0'			

GROUND WATER DEPTH AT COMPLETION 27.0' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 6 DATE April 11, 1995 1:15pm ELEV.

Madison County
Hartford

Personnel
M. Nienkerk
D. Tolan
D. Wieties

Location of Boring
111 East Forest

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTENC
0'	3'						Black top soil
3'	?	5'	6'				Brown, moist, silty clay
?	20'	15'	16'				Gray-Brown, damp, fine grained sand
20'	31'	20'	21'				Greenish-gray, damp, silt-faint gasoline smell
		25'	26'				Same as above - Strong gasoline smell
31'		30'	31'				gray, very damp, fine grained sand-Strong gasoline smell
							Note: H_2O at 32 feet
							TD - 45 feet
							47' feet 2" PVC pipe installed bottom 20 feet slotted
							Sand backfill from borehole 5 to 45 feet
							Bentonite pellets 4 to 5 feet
							Natural filter material 1 to 4 feet
							Powdered Bentonite + Soil 0 to 1 feet
							33' ft to H_2O from top of casing 4:45P

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 6 CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/19/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 47.1', 2" PVC Pipe

SURFACE ELEVATION 430.8

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Black TOPSOIL		
5	1	SS		Brown Silty CLAY		
10				Grayish-Brown Fine SAND		
15	2	SS				
20	3	SS	Gasoline Odor	Greenish-Gray SILT		
25	4	SS	Strong Gasoline Odor			
30	5	SS	Strong Gasoline Odor			
				Gray Fine SAND		
35				T. O. B. @ 45'		

SHEAR STRENGTH, TSF: BV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2.5)

WATER CONTENT, % (0, 20, 40, 60, 80, 100)

GROUND WATER DEPTH AT COMPLETION 32.0' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 7 DATE April 20, 1978 - 8:15 A. ELEV.

Madison County
Hartford

Personnel
M. Menkerk
D. Tolan
D. Wieties

Location of Boring
SW Corner of old Tannery Property

SAMPLE NO.	SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSIS
	0.0	2.0						Black, high organic content, top soil
1	2.0	9.0	5.0	6.5				Gray and brown mottled, moist, silty clay
2	9.0	20.5	10.0	11.5				Brown, very damp, fine grained sandy
3			15.0	16.5				Brown, moist, silt loam
								Note: H_2O at 18 feet (perched water
4	20.5	25.5	20.0	21.5				Gray, very damp, silt loam
5	25.5	27.0	25.0	26.5				Gray & Brown mottled, very damp, sil
6	27.0	35.5	30.0					Gray, moist, silty clay, with pieces of wood &
7	35.5	39.0	35.0	36.5				Gray, wet, medium grained sand, & faint
8	39.0		40.0	41.5				Gray, very damp, silty clay, with piece wood &
9			45.0	46.0				Gray, wet, sand & gravel
10			50.0	51.0				No Return
11			55.0	56.0				No Return

TD 55 feet

2" PVC pipe installed to depth of 53 feet
Slotted interval 18 to 53 ft.
Stick up 0.7 feet
Gravel Pack 16 to 53 ft.
Bentonite Pellets 14 to 16 ft.
Borehole cuttings 2 to 14 ft.
Bentonite Powder 0 to 2 ft.

33.65 ft to H_2O from top of Casing

BEI 025523

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 7 CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/20/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 53.7', 2" PVC Pipe

SURFACE ELEVATION 430.2

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Black TOPSOIL, Highly Organic		
				Mottled Gray & Brown Silty CLAY		
5	1	SS				
10	2	SS		Brown Fine Sandy LOAM		
				Brown Silty LOAM		
15	3	SS				
20	4	SS		-Gray From 20.5' To 25.5'		
25	5	SS		Mottled Gray & Brown Silty CLAY		
				Gray Silty CLAY w/Wood & Shells		
30	6	~~SS~~	No Rec.			
35	7			Cont'd		

SHEAR STRENGTH, TSF — SV △ — OP/2 ○ — OU/2 ○ — 0 0.5 1.0 1.5 2.0 2.5

WATER CONTENT, % — 0 20 40 60 80 100

GROUND WATER DEPTH AT COMPLETION 33.7' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 7 Cont'd CONTRACT 453-78

DRILLED BY I. E. P. A. DATE DRILLED 4/20/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DRILLING METHOD PIEZOMETER 53.7, 2" PVC Pipe

SURFACE ELEVATION 395.2

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (0 0.5 1.0 1.5 2.0 2.5) / WATER CONTENT, % (0 20 40 60 80 100)
	7	SS	Hydro-Carbon Odor	Gray Medium SAND			
40	8	SS		Gray Silty CLAY w/Wood & Shells			
45	9	SS		Gray SAND & GRAVEL			
50	10	SS	No Rec.				
55	11	SS	No Rec.	T. O. B.			
60							

GROUND WATER DEPTH AT COMPLETION 33.7' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 8 DATE April 29 1978 2:50 pm ELEV.

Madison County
Hartford

Personnel
M. Menkek
D. Tolan
D. Wietiez

Location of Boring
NW Corner of school property - intersectio of Route 3 and Rand.

SAMPLE NO	SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSI
	0.0	4.2						Black top soil
1	4.2	15.2	5.0	6.5				Brown & Gray, mottled, very damp, silty cla
2			10.0	11.5				Same as above
3	15.0	24.0	15.0	16.5				Brown, moist, silt, some shell pie
4			20.0	21.5				Same as above
5	24.2	29.2	25.0	26.5				Gray & Brown, mottled, very damp, si
6	29.2		30.2	31.5				Brown, moist, fine-medium ground si
7			35.2	36.5				No Return
8			45.0	46.5				No Return
								2" PVC pipe installed to 42 ft. d bottom 20 feet slotted
								Slotted interval 22 - 42 feet
								Stick-up 2.5 feet
								Sand Pack 15 to 42 feet
								Bentonite & Soil Backfill 0 to 15
								32.5 ft to H.O from top of casing 6

BEI 025524

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 8 CONTRACT 453-78

JOHN MATHES & Associates

LOGGED BY

PIEZOMETER 44', 2" PVC Pipe

DATE DRILLED 4/20/78

DRILLING METHOD

DRILLED BY I. E. P. A.

PROJECT Hydro Carbon Recov. Invest.

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 429.6)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (SV △, QP/2 □, QU/2 ○; 0, 0.5, 1.0, 1.5, 2.0, 2.5) / WATER CONTENT, % (PL, ●, PF; 0, 20, 40, 60, 80, 100)
				Black TOPSOIL			
5	1	SS		Mottled Brown & Gray Silty CLAY			
10	2	SS					
15	3	SS					
				Brown Silt w/Shell Fragments			
20	4	SS					
25	5	SS		Mottled Gray & Brown Silty CLAY			
30	6	SS		Brown Fine To Medium SAND			
35	7		No Rec.	T. O. B. @ 45'			

GROUND WATER DEPTH AT COMPLETION 32' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 9 DATE April 21, 1988 8:30 A ELEV.

Madison County
Hartford

Personnel
M. Nienkerk
D. Tolan
D. Wieties

Location of Boring
177 E. Hawthorne - Back yard

SOIL HORIZON FROM ELEV.	TO ELEV.	SAMPLE LIMITS TOP	BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTE
0	3						Black top soil
3	7	5	6				Brown moist silt loam
7	12	10	11				Gray, moist, clay, with organic matter
12	18	15	16				Gray & Brown mottled, moist, silt loam, with organic mat
18		20	21				Brown, damp fine grained sand
		25	26				Same as above
		30	31				Brown moist, medium grained sand with some organic material
							Note: H_2O at 32 feet
		35	36				No Return
							TD 45 feet
							Installed 2" PVC pipe to 45 ft depth - Bottom 30 feet slotted Stick-up 1 ft
							Hole Bridged shut at ≈ 12 feet
							Placed 1/2 lb of Bentonite Pellets at 12 foot depth — Backfilled rest of hole with borehole cuttings.
							Powdered Bentonite placed at top 1 ft of hole
							23.45 ft to H_2O from Top of Casing 11:9

BEI 025525

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 9 CONTRACT 453-78

DRILLED BY I. E. P. A. LOGGED BY

PROJECT Hydro Carbon Recov. Invest. DATE DRILLED 4/21/76

PIEZOMETER 46', 2" PVC Pipe DRILLING METHOD

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 430.1)	BLOWS	DRY UNIT WEIGHT PCF	SHEAR STRENGTH, TSF (0 – 0.5 – 1.0 – 1.5 – 2.0 – 2.5) / WATER CONTENT, % (PL + – 0 – 20 – 40 – 60 – 80 – 100 – + LL)
				Black TOPSOIL			
5	1	SS		Brown Silty LOAM			
10	2	SS		Gray CLAY w/Organic Matter			
15	3	SS		Mottled Gray & Brown Silty LOAM w/Org. Mat.			
20	4	SS		Brown Fine SAND			
25	5	SS					
30	6	SS		Brown Medium SAND w/ Organic Matter			
35	7	SS	No Rec.	T. O. B. @ 45'			

GROUND WATER DEPTH AT COMPLETION - 23.5' AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

Illinois Environmental Protection Agency

BORING NO. 10 DATE April 21, 1988 - 1:40 PM ELEV.

Madison County
Hartford

Personnel
M. Nienkerk
D. Tolon
D. Wieties

Location of Boring
West end of center grass area Hawthorne Park (Community Park)

SOIL HORIZON FROM ELEV.	SOIL HORIZON TO ELEV.	SAMPLE LIMITS TOP	SAMPLE LIMITS BOTTOM	NUMBER OF BLOWS		MOISTURE CONTENT	COLOR MOISTURE COMPACTNESS CONSISTE
0°	2°						Black top soil
2°	9°	5°	6°				Greenish-gray & olive, mottled, very damp, silty clay, (faint hydrocarbon smell?)
9°	16°	10°	11°				Greenish-gray, mottled, very damp, sil
16°	21°	15°	16°				Light gray & Brown, spotted, very damp, silty clay with piece of organic material
21°	23°	20°	21.5				Greenish-gray, moist, silt, (faint hydrocarbon sm
23°	28°	25°	26.5				Gray & Olive, mottled, very damp, silty clay, w organic material (faint hydrocarbon smell
°	34°	30°	31.5				Brown, damp, fine grained sand (hydrocarbon smell)
							Note: H_2O at 34 feet
34°		35°	36.5				Brown, wet, course grained sand
		45°	46°				No Return
							TD 45
							Stick up 0° feet
							Installed 2" PVC pipe to 45 foot depth
							Bottom 20 feet slotted
							sand
							Gravel Pack 24 to 45 feet
							Bentonite Pellets 22 to 24 feet
							Borehole cuttings 2 to 22 feet
							25.05 feet to H_2O 5:50 PM

BEI 025526

RECORD OF SUBSURFACE EXPLORATION

BORING E. P. A. 10 CONTRACT 453-78

DRILLED BY L. E. P. A. DATE DRILLED 4/21/78 LOGGED BY

PROJECT Hydro Carbon Recov. Invest DRILLING METHOD PIEZOMETER 45', 2" PVC Pipe

SURFACE ELEVATION 429.2

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Black TOPSOIL		
				Mottled Greenish-Gray & Olive Silty CLAY		
5	1	SS	Faint Hydrocarbon Odor			
10	2	SS		Mottled Greenish-Gray SILT		
15	3	SS				
				Light Gray & Brown Spotted, Silty CLAY w/Organic Matter		
20	4	SS	Faint Hydrocarbon Odor			
				Greenish-Gray SILT		
				Mottled Gray & Olive Silty CLAY w/Organic Matter		
25	5	SS	Faint Hydrocarbon Odor			
				Brown Fine SAND		
30	6	SS	Hydrocarbon Odor			
				Brown Coarse SAND		
35	7	SS		T. O. B. @ 45'		

SHEAR STRENGTH, TSF: SV △ QP/2 □ QU/2 ○ — 0, 0.5, 1.0, 1.5, 2.0, 2.5

WATER CONTENT, % — 0, 20, 40, 60, 80, 100

GROUND WATER DEPTH AT COMPLETION 25.1 AFTER _____ HRS. _____ AFTER _____ HRS. _____

SCALE 1" = 5'

JOHN MATHES & Associates

PWS (WSW) WELLS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

618/346-5120
FAX: 618/346-5155

October 20, 2003

RECEIVED
OCT 2 3 2003
PREMCOR REFINING GROUP
Environmental Department

The Premcor Refining Group, Inc.
Attn: Tom Mroz, Environmental Health and Safety Engineer
Alsip Distribution Center
3600 West 131st Street
Alsip, Illinois 60803-1535

Re: 1190505040 – Madison County
Hartford Free Hydrocarbon Plume
Compliance File

Dear Mr. Mroz:

I am sending you a copy of the Illinois Department of Public Health Well Construction Reports for the Village of Hartford public water supply wells. I thought that you and Monte Nienkerk might find this information useful in developing the Conceptual Site Model for the Village of Hartford.

Please contact Gina Search or myself at 618/346-5120, if you have any questions regarding this document.

Sincerely,

Chris N. Cahnovsky, Regional Manager
Field Operations Section
Bureau of Land

CNC:jlb/premcorcvrltr102003cnc
Enclosure

Ill. Department of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

IN ORDER TO PROPERLY INSTRUCT THE REQUESTED INFORMATION, ORIGINAL TO BE SENT TO DEPARTMENT OF PUBLIC HEALTH, ROOM 416, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL / WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored ✓. Hole Diam. 36 in. Depth 106 ft.
   Curb material ____. Buried Slab: Yes ____ No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled X. Finished in Drift X. In Rock ____.
   Tubular ____. Gravel Packed X.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Cement	-4'	+2'

2. Distance to Nearest:
   Building 200 Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) 100+
   Septic Tank ____ Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Is water from this well to be used for human consumption?
   Yes X No ____
4. Date well completed 5/1/71
5. Permanent Pump Installed? Yes X No ____
   Manufacturer LAYNE & BOWLER Type Turbine
   Capacity 400 gpm. Depth of setting 60 ft.
6. Well Top Sealed? Yes ✓ No ____
7. Pitless Adaptor Installed? Yes ____ No ✓
8. Well Disinfected? Yes ✓ No ____
9. Water Sample Submitted? Yes ✓ No ____

REMARKS:

IDPH 4.065
10/68

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner City of Hartford Well No. #3
    Address Hartford, Illinois
    Driller LAYNE & BOWLER License No. 92-169
11. Permit No. KF10514 Date 4-7-71
12. Water from Alluvial (Formation) 13. County Madison
    at depth 0 to 106 ft.
14. Screen: Diam. 16 in.
    Length: 20 ft. Slot 3/32
    Sec. 4.2h
    Twp. 4N
    Rge. 4W
    Elev. —

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
16	Steel	+2	-88

SHOW LOCATION IN SECTION PLAT
~~150'S 1040'W~~
NE/C
500'N, 1250'E, 1E

16. Size Hole below casing: 36 in.
17. Static level 25.38 ft. below casing top which is 2' ft. above ground level. Pumping level 31.62 ft. when pumping at 420 gpm for 2 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Brown Clay	15'	15'
Sandy blue Clay	18	33
Coarse gray sandy gravel	27	60
gravel & boulders	8	68
Med brown sand	22	90
Coarse sand & gravel	16	106

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED [illegible] DATE 5/10/71

Department of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

IN ACCORDANCE WITH INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored X. Hole Diam. ____ in. Depth 106 ft.
   Curb material ____. Buried Slab: Yes ____ No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled X. Finished in Drift X. In Rock ____.
   Tubular ____. Gravel Packed X.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Concrete	0	-10'

2. Distance to Nearest:
   Building 100 Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) ____
   Septic Tank ____ Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Is water from this well to be used for human consumption?
   Yes X No ____
4. Date well completed 8/22/77
5. Permanent Pump Installed? Yes X No ____
   Manufacturer Layne & Bowler Type Turbine
   Capacity 600 gpm. Depth of setting 60 ft.
6. Well Top Sealed? Yes X No ____
7. Pitless Adaptor Installed? Yes ____ No X
8. Well Disinfected? Yes X No ____
9. Water Sample Submitted? Yes X No ____

REMARKS:

IDPH 4.065
10/68

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner City of Hartford Well No. 4
    Address HARTFORD, ILLINOIS
    Driller Layne Western License No. 102-204
11. Permit No. 61388 Date 5/31/77
12. Water from alluvial (Formation) 13. County Madison
    at depth 71 to 106 ft.
    Sec. 4 Twp. 4N Rge. 9W Elev. ____
14. Screen: Diam. 18 in. #6
    Length: 35 ft. Slot ____
15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
18	Steel .375	+2	-71

SHOW LOCATION IN SECTION PLAT
(City of Hartford)

16. Size Hole below casing: 18 in.
17. Static level 24.81 ft. below casing top which is 2 ft. above ground level. Pumping level 30 ft. when pumping at 620 gpm for 4 hours.
    950'S, 1040'W, NE/c

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Clay	12	12
Sandy Gray clay	23	35
Coarse Sand & Gravel, boulders	35	70
Coarse Sand	36	106
Rock		

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED [signature] DATE 10/31/77

BOARD OF
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WILLIAM L. EVERITT

Illinois State Water Survey

WATER RESOURCES BUILDING • MAIL: BOX 232, URBANA, ILLINOIS 61801 • AREA CODE 217
608 E. SPRINGFIELD, CHAMPAIGN PHONE 333-2210

WILLIAM C. ACKERMANN, CHIEF

June 1, 1971

WELL PRODUCTION TEST
CITY OF HARTFORD, WELL NO. 3
MADISON COUNTY
By

W. H. Baker, (SWS) and
Layne-Western Co. Inc.

Owner:	City of Hartford, Illinois
Location:	500'S, 1250'W, of NE/cor Sec. 4, T. 4N., R. 9W.
Date Completed:	5-5-71 actually drilled 1970
Date of Test:	5-17-71
Length of Test:	2 hours
Aquifer:	Sand and gravel

WELL DATA

Well No:	3
Driller:	Layne-Western Co., Inc. Kirkwood, Mo.
Depth:	107'
Hole Record:	36" 0-107'
Casing Record:	36" 0-15; 16" +2-87'
Screen Record:	16" Layne Shutter, Stainless steel set 87'-107' Gravel packed
Pump and Power:	Layne Turbine - 3 stage - dia. of bowls 10" - length of bowls 3' - depth top of bowls 60'; Gasoline engine - Direct drive
Ground Elevation of Well:	+ 430 LSD Topo
Measuring Point:	Pump Base - 2.0' above ground level
Measuring Equipment:	Layne - 6" x 4" orifice; electric dropline steel tape
Water Sample:	5-17-71 at 2:25 p.m.
Temperature of Water:	57°F. Odor: none
Static Level:	25.38'

MEASUREMENTS

PUMPED WELL NO. 3

Date 1971	Hour	Time (min)	Depth to water (ft)	Draw-down (ft)	Pump. rate (gpm)	Remarks
5-17	Took trend readings from 8:40 to 10:30 AM. Engine would not start. Left site and returned at 12:30 PM. Engine repaired and ready to test well.					
	8:40A to 10:30		25.37			
	12:40P		25.38			
	12:45	0	25.38	0		Start pumping
	12:46	1	31.44	6.06		
	12:47	2	31.47	6.09		
	12:48	3	31.47	6.09		
	12:49	4	31.47	6.09		Rate adjustments necessary throughout test
	12:50	5	31.50	6.12	401	
	12:51	6	31.54	6.16		
	12:52	7	31.55	6.17		
	12:53	8	31.59	6.21		
	12:54	9	31.45	6.07		
	12:55	10	31.50	6.12		
	12:57	12	31.54	6.16		
	1:00	15	31.55	6.17	401	
	1:05	20	31.58	6.20		
	1:10	25	31.65	6.27		
	1:15	30	31.57	6.19		
	1:25	40	31.62	6.24	401	
	1:35	50	31.65	6.27		
	1:45	60	31.65	6.27		
	1:55	70	31.67	6.29	401	
	2:05	80	31.68	6.30		
	2:15	90	31.67	6.29		engine hesitated
	2:25	100	31.65	6.27		sample temp. 57.0°F
	2:45	120	31.62	6.24		stop pumping
	2:46	1	25.79			recovery
	2:47	2	25.75			
	2:48	3	25.72			
	2:49	4	25.69			
	2:50	5	25.68			
	2:51	6	25.67			
	2:52	7	25.66			
	2:53	8	25.65			
	2:54	9	25.64			
	2:55	10	25.63			
	2:57	12	25.61			
	3:00	15	25.61			
	3:05	20	25.58			
	3:10	25	25.56			

Date 1971	Hour	Time (min)	Depth to water (ft)	Draw-down (ft)	Pump. rate (gpm)	Remarks
5-17	3:15P	30	25.55			end recovery
			STEP TEST			
	3:15	0	25.55			start pumping
	3:17	2	28.02		145	
	3:19	4	28.00			
	3:21	6	28.00			
	3:23	8	28.00			
	3:25	10	28.01			increase rate
	3:27	12	29.54		270	
	3:29	14	29.52			
	3:31	16	29.54			
	3:33	18	29.55			
	3:35	20	29.55			increase rate
	3:37	22	31.64		400	
	3:39	24	31.54			
	3:41	26	31.55			
	3:43	28	31.56			
	3:45	30	31.56			Stop pumping

DRILLER'S LOG
WELL NO. 3

Formation	From	To
Brown clay	0	15
Sandy blue clay	15	33
Coarse gray sand and gravel	33	60
Gravel and boulders	60	68
Medium brown sand	68	90
Coarse sand and gravel	90	106

STATE OF ILLINOIS
Department of Registration and Education
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Illinois State Water Survey

WATER RESOURCES BUILDING • MAIL: BOX 232, URBANA, ILLINOIS 61801 • AREA CODE 217
605 E. SPRINGFIELD, CHAMPAIGN PHONE 333-2210

WILLIAM C. ACKERMANN, Chief

correction per APK 9/87

WELL PRODUCTION TEST
VILLAGE OF HARTFORD, WELL NO. 4
MADISON COUNTY

By

Jeff T. Emmons

Owner:	Village of Hartford
Location:	1500'N & 600'W of SE corner Section ~~33~~ 4, T. ~~5N~~ 4N., R. 9W.
Date Completed:	August 1977
Date of Test:	August 26, 1977
Length of Test:	3 hours
Aquifer:	Sand & Gravel

WELL DATA

PUMPED WELL

Well No:	4
Driller:	Layne-Western
Drill Cuttings:	Sent to SGS
Depth:	106'
Hole Record:	42", 0'-106'
Casing Record:	Outer casing: 36", 0-13'; Inner casing: 18", +1/2-71'
Screen Record:	18" stainless steel shutter, No. 6 slot, 71-106'; gravel pack: W. B. 50, 10-106'
Pump and Power:	Layne-Western turbine; No. stages 3; Dia. bowls 10"; length bowls 5'; Power: Cummings Diesel Engine
Ground Elevation at Well:	+430 topo
Measuring Point:	1/2' above ground surface
Measuring Equipment:	Orifice tube, Elec. dropline, steel tape
Sample:	8/26-77 at 12:13 PM
Temperature of Water:	62°F
Nonpumping Level:	24.81'

STATE OF ILLINOIS
Department of Registration and Education
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Illinois State Water Survey

WATER RESOURCES BUILDING • MAIL: BOX 232, URBANA, ILLINOIS 61801 • AREA CODE 217
605 E. SPRINGFIELD, CHAMPAIGN PHONE 333-2210

WILLIAM C. ACKERMANN, Chief

September 8, 1977

Flagg, Scheibal, Sherbut & Assoc., Inc.
116 St. Louis Street
Edwardsville, IL 62025

Gentlemen:

We are enclosing a copy of data collected by Mr. J. T. Emmons of the State Water Survey during the well production test conducted August 26, 1977, on the Village of Hartford Well No. 4, located 1500'N & 600'W of the SE corner of Section ~~33~~ 4.2g, T. ~~5N~~ 4N., R. 9W., Madison County, Illinois.

The specific capacity (yield per foot of drawdown) of the well for a pumping period of 180 minutes and a pumping rate of 620 gallons per minute (gpm) was 115.4 gpm/ft. Based on available information the long-term specific capacity of this well is estimated to be 85 gpm/ft. The well should yield the desired 600 gpm supply on a sustained basis with the pump set at a depth of about 50 feet below land surface.

The chemical analysis of water collected from the well during the production test will be mailed to you as soon as it is completed.

Very truly yours,
ILLINOIS STATE WATER SURVEY

Adrian P. Visocky
Associate Hydrologist
Phone: (217) 333-4960

APV:bh
Enclosure
cc: Environmental Protection Agency (2)
Layne-Western
Jeffrey T. Emmons
Jim Spann

Village of Hartford MEASUREMENTS Well No. 4

Date 1977	Hour	Time (min)	Alt. gage (ft)	Depth to water (ft)	Draw-down (ft)	Piez. tube (in)	Pump rate (gpm)	Remarks
8-26	8:50A			24.81				
	9:01			24.85				
	9:10			24.81				
	9:12			24.81				
	9:14			24.81				
	9:15	0		24.81	0		620	Pump on
	9:16	1		29.35	4.54		620	
	9:17	2		29.58	4.77		620	
	9:18	3		29.63	4.82		620	
	9:19	4		29.68	4.87		620	
	9:20	5		29.70	4.89		620	
	9:21	6		29.71	4.90		620	
	9:22	7		29.65	4.84		620	
	9:23	8		29.72	4.91		620	
	9:24	9		29.76	4.95		620	
	9:25	10		29.68	4.87		620	
	9:27	12		29.78	4.97		620	
	9:29	14		29.79	4.98		620	
	9:31	16		29.80	4.99		620	
	9:33	18		29.81	5.00		620	
	9:35	20		29.83	5.02		620	
	9:40	25		29.86	5.05		620	
	9:45	30		29.87	5.06		620	
	9:55	40		29.91	5.10		620	
	10.05	50		29.94	5.13		620	
	10:15	60		29.97	5.16		620	
	10:25	70		30.00	5.19		620	
	10:35	80		30.02	5.21		620	
	10:45	90		30.04	5.23		620	
	10:55	100		30.06	5.25		620	
	11:15	120		30.10	5.29		620	
	11:35	140		30.15	5.34		620	
	11:55	160		30.17	5.36		620	
	12:15P	180		30.18	5.37			Pump off
	12:16	1		25.43				Recovery
	12:17	2		25.30				
	12:18	3		25.24				
	12:19	4		25.21				
	12:20	5		25.21				
	12:21	6		25.20				
	12:22	7		25.17				
	12:23	8		25.17				
	12:14	9		25.15				
	12:25	10		25.15				
	12:26	11		25.14				
	12:27	12		25.13				
	12:29	14		25.11				
	12:31	16		25.11				
	12:33	18		25.07				
	12:35	20		25.10				

Village of Hartford MEASUREMENTS Well No. 4

Date 1977	Hour	Time (min)	Alt. gage (ft)	Depth to water (ft)	Draw-down (ft)	Piez. tube (in)	Pump rate (gpm)	Remarks
8-26	12:40	25		25.09				Pump on
	12:45	30		25.10			300	Step 1
	12:46	1		27.64			300	
	12:47	2		27.52			300	
	12:48	3		27.53			300	
	12:49	4		27.55			300	
	12:50	5		27.55			300	
	12:51	6		27.54			300	
	12:52	7		27.54			300	
	12:53	8		27.55			300	
	12:54	9		27.54			300	
	12:55	10		27.55			300	
	12:56	11		27.55			300	
	12:57	12		27.55			300	
	12:58	13		27.55			300	
	12:59	14		27.56			300	
	1:00	15		27.56			300	Increased rate
	1:01	1		28.70			450	Step 2
	1:02	2		28.77			450	
	1:03	3		28.79			450	
	1:04	4		28.80			450	
	1:05	5		28.80			450	
	1:06	6		28.79			450	
	1:07	7		28.79			450	
	1:08	8		28.80			450	
	1:09	9		28.80			450	
	1:10	10		28.80			450	
	1:11	11		28.81			450	
	1:12	12		28.80			450	
	1:13	13		28.80			450	
	1:14	14		28.81			450	
	1:15	15		28.81			450	Increased rate
	1:16	1		30.04			605	Step 3
	1:17	2		30.11			605	
	1:18	3		30.10			605	
	1:19	4		30.12			605	
	1:20	5		30.12			605	
	1:21	6		30.11			605	
	1:22	7		30.12			605	
	1:23	8		30.13			605	
	1:24	9		30.13			605	
	1:25	10		30.13			605	
	1:26	11		30.14			605	
	1:27	12		30.14			605	
	1:28	13		30.15			605	
	1:29	14		30.14			605	
	1:30	15		30.15			605	Pump off End of test

DRILLER'S LOG
WELL NO. 4

Formation	From	To
Clay	0	12
Sandy Grey Clay	12	35
Coarse Sand & Gravel, Boulders	35	70
Coarse Sand	70	106
Rock	106	

Clayton GROUP SERVICES

VCB / BHPE WELLS

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-1

HARTFORD HYDROCARBON REMEDIATION PROJECT

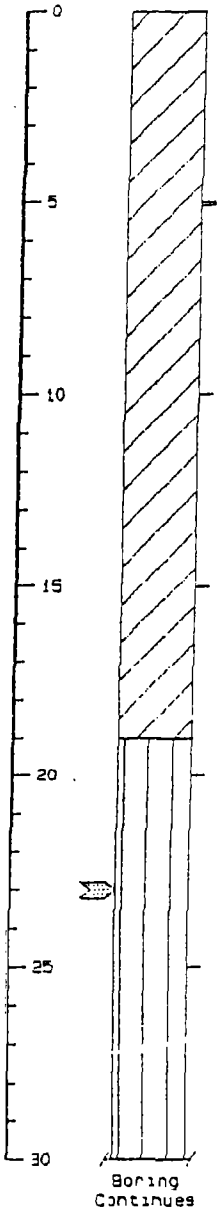
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 09/06/91 LOGGED BY: Garcia

PROJECT NUMBER: 122489

GROUNDWATER: Encountered at - 23.0 Feet



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS ON SAMPLE
		CL	Dark Brown Silty CLAY			
5						0/0/0
10						0/0/0
15						0/0.2/1.0
20		ML	Gray Sandy SILT			0/0/0.1
25						0/1.0/0.4

BEI 024225

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-1

HARTFORD HYDROCARBON REMEDIATION PROJECT

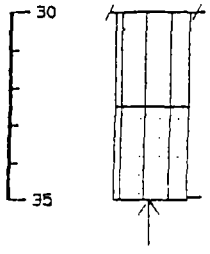
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 09/06/91 LOGGED BY: Garcia

PROJECT NUMBER: 122489

GROUNDWATER: Encountered at - 23.0 Feet

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS ON SAMPLE
30						0/2.0/0.2
		SM	Gray Silty SAND			
35			Total Depth 35.0'			0/70.0/3.0

Remark: 1 Borehole logged from surface to 35.0' by auger cuttings.

BEI 024226

BURLINGTON ENVIRONMENTAL INC.

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-2

HARTFORD HYDROCARBON REMEDIATION PROJECT

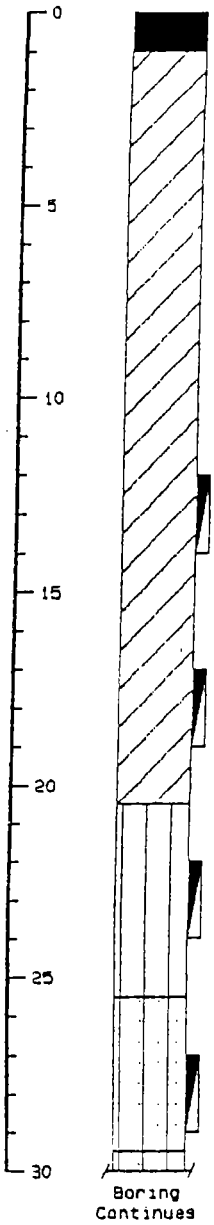
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/04/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 32.8 Feet



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		CL	Gray-Brown Silty CLAY Trace Sand			
						1/20/-
						0/5/-
				8/24	1-2-3-4	
						0/3/-
				8/24	1-2-2-3	
						0/15/-
		ML	Gray-Brown Clayey SILT Trace Sand	14/24	0-1-2-3	
						4/20/-
		SM	Gray Silty SAND	13/24	2-4-8-10	
		SM	Brown Fine SAND w/Silt			

BEI 024227

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-2

HARTFORD HYDROCARBON REMEDIATION PROJECT

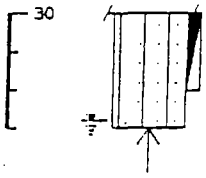
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/04/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 32.8 Feet

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SM	Brown Fine SAND w/Silt Total Depth 33.0'	14/24	2-6-9-13	22/120/-

Remark: 1. Borehole logged from surface to 12.0' by auger cuttings.

BEI 024228

MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

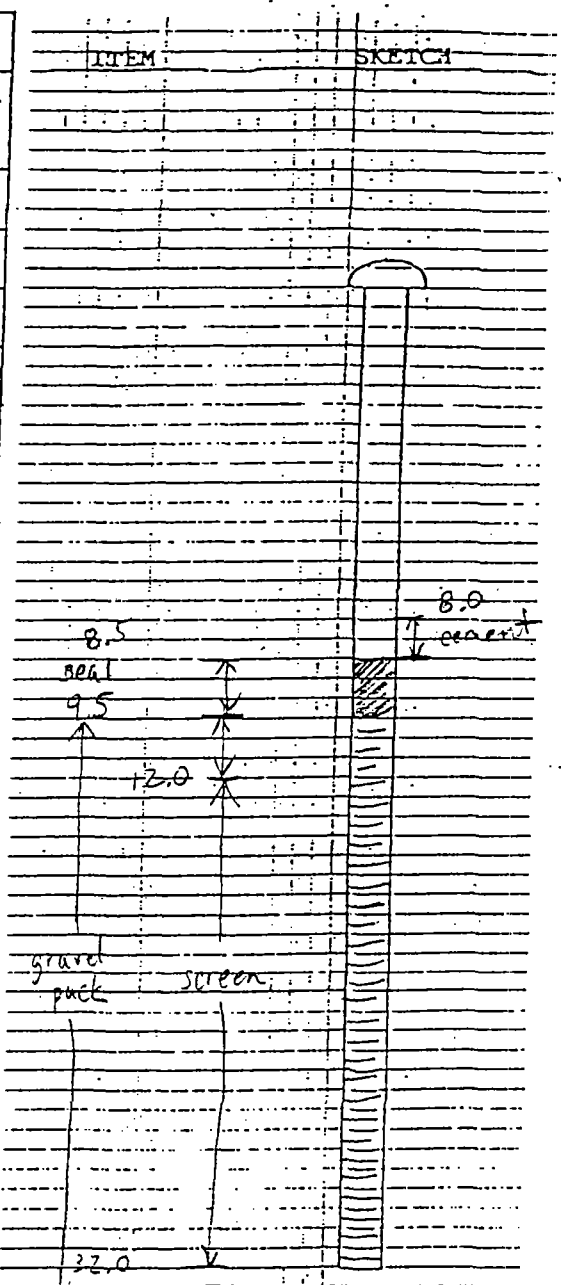
DATE/TIME STARTED 12-4-91 / 15:15 COMPLETED 12-5-91 / 09:30
PROJECT NO. 122489 PROJECT NAME Clark Oil
BORING/WELL NO. V.C.B. - 2 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Breeding, Cook + Julian GEOLOGIST Clay F.

DEPTHS IN REFERENCE TO GROUND SURFACE

ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		8.0		
BOTTOM OF GROUT		8.5		
TOP OF WELL RISER		7.5		
TOP OF SCREEN		22.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		8.5		
BOTTOM OF PELTONITE SEAL		9.5		
TOP OF GRAVEL PACK		9.5		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		32.8		
TOTAL DEPTH OF BOREHOLE		33.5		

WELL DIAGRAM

ITEM SKETCH



NOTE: NOT TO SCALE

COMMENTS

BEI 027085

SERIAL NO. WI _____
PAGE __ OF __

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL _____ LOCKING CAP: YES NO
DIAMETER (IN): _____ PADLOCK NO. _____

PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL S.S. Screen, Steel Riser
DIAMETER (IN): 8"

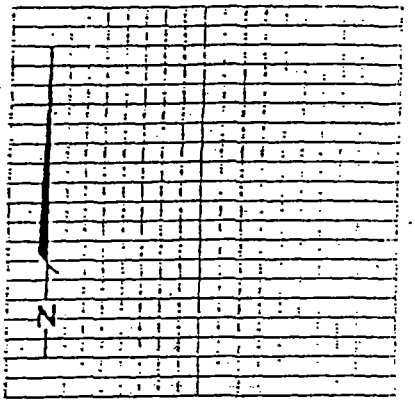
MONITORING WELL MATERIALS/LENGTH
WELL RISER: Steel
WELL SCREEN: 20' S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL: _____
NUMBER: _____

LEGEND:

O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 pds)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY: _____
MIX: _____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX: _____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:

QUANTITY: _____ QUANTITY: _____
TYPE: _____ TYPE: _____
DEPTH INTERVAL OF LOSS _____ DEPTH INTERVAL OF LOSS _____

COMMENTS: _____

BEI 027086

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-3

HARTFORD HYDROCARBON REMEDIATION PROJECT

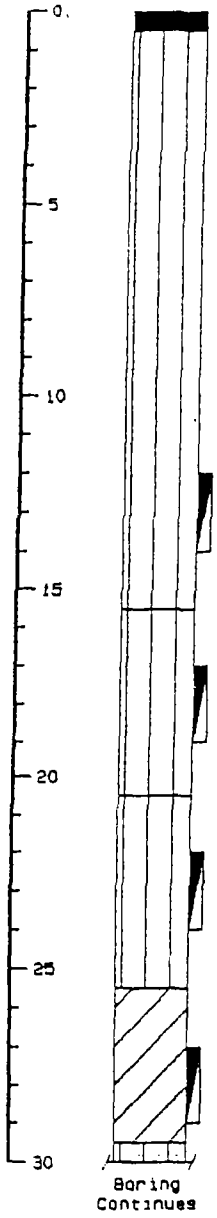
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/27/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		ML	Gray-Brown Clayey SILT Trace Sand			
						0/3/-
				10/24	1-2-1-2	2/10/-
						2/10/-
		ML	Gray-Brown Sandy SILT Trace Gravel	6/24	1-2-3-4	
						0/10/-
		ML	Gray-Brown Clayey SILT Trace Sand	13/24	0-1-1-3	2/20/-
						4/150/-
		CL	Brown Silty CLAY Trace Sand	16/18	0-0-3-10	
		SP-SM	Brown Fine-Medium SAND Trace Silt			

BEI 024229

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-3

HARTFORD HYDROCARBON REMEDIATION PROJECT

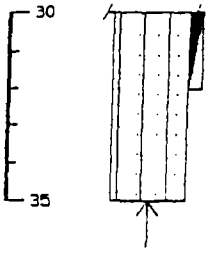
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/27/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SP-SM	Brown Fine-Medium SAND Trace Silt	11/24	1-5-8-11	0/15/-
35			Total Depth 35.0'			

Remarks: 1. Borehole logged from surface to 12.0' by auger cuttings.
2. Total length of screen & casing assembly - 23.7'.

BEI 024230

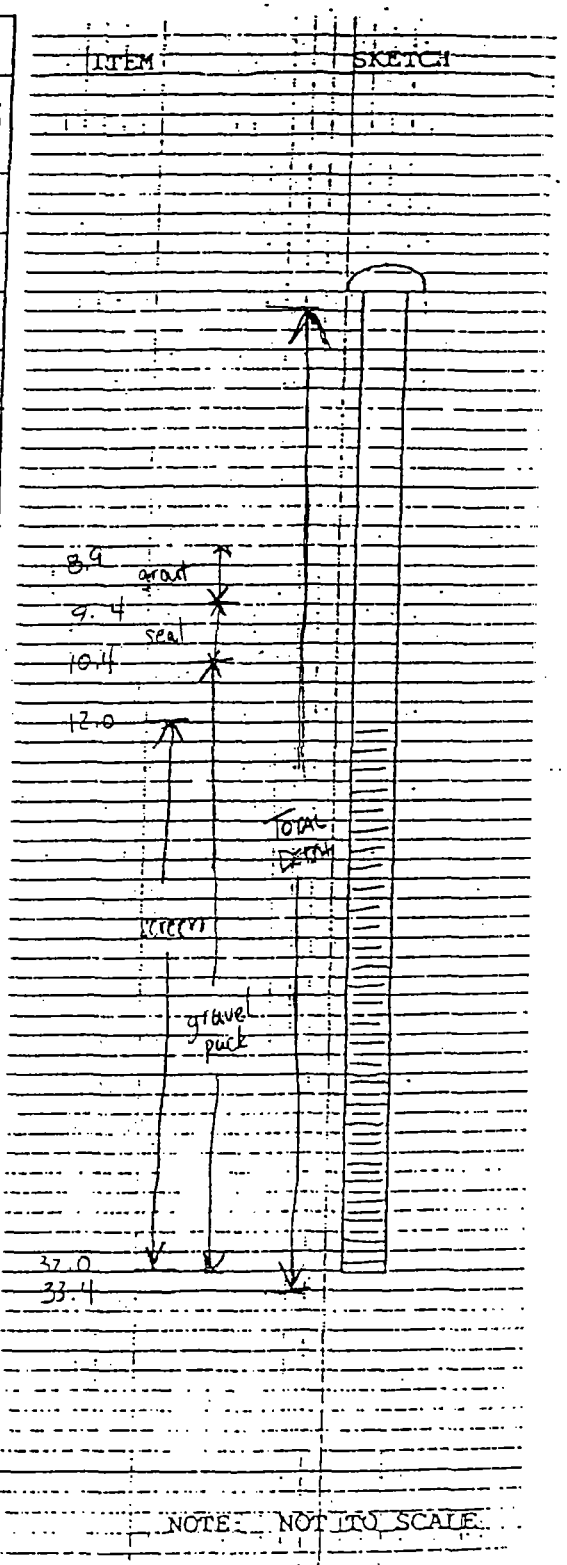
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 11-27-91/12:15 COMPLETED 11-27-91 / 15:00
PROJECT NO. 122489 PROJECT NAME Clark Oil
BORING/WELL NO. V.C B-3 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Breeding, Crook + Julius GEOLOGIST Clay 7

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		8.9		
BOTTOM OF GROUT		9.4		
TOP OF WELL RISER		8.4		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		9.4		
BOTTOM OF PELTONITE SEAL		10.4		
TOP OF GRAVEL PACK		10.4		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		–		
TOTAL DEPTH OF BOREHOLE		33.4		

WELL DIAGRAM



COMMENTS

BEI 027087

SERIAL NO. WI _____
PAGE __ OF __

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL _____ LOCKING CAP: YES NO
DIAMETER (IN): _____ PADLOCK NO. _____

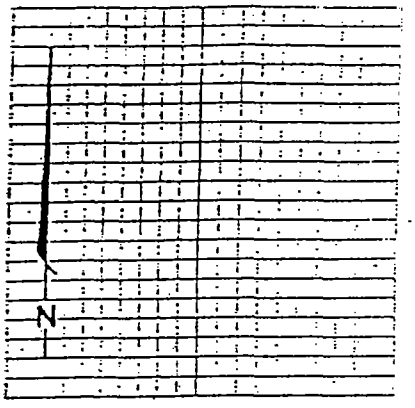
PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL S.S. Screen, Steel Riser
DIAMETER (IN): 8"

MONITORING WELL MATERIALS/LENGTH
WELL RISER: Steel
WELL SCREEN: 20' S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL: _____
NUMBER: _____

LEGEND:
O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bgs.)
TYPE/SIZE 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 lbs.)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY: _____
MIX: _____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX: _____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:
QUANTITY: _____ QUANTITY: _____
TYPE: _____ TYPE: _____
DEPTH INTERVAL OF LOSS _____ DEPTH INTERVAL OF LOSS _____

COMMENTS: _____

BEI 027088

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-4

HARTFORD HYDROCARBON REMEDIATION PROJECT

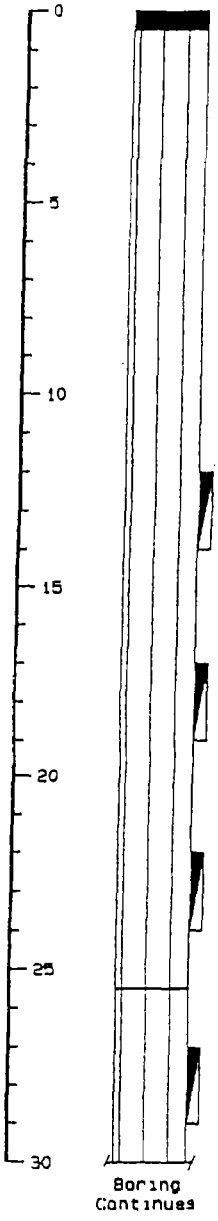
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/02/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		ML	Gray-Brown Clayey SILT Trace Sand			
10						0/0/-
				10/24	0-1-2-1	
15						0/10/-
				12/24	0-1-2-4	
20						
				15/24	0-1-2-1	5/27/-
25						0/0/-
		ML	Brown Sandy SILT			
				22/24	0-1-1-11	

BEI 024231

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-4

HARTFORD HYDROCARBON REMEDIATION PROJECT

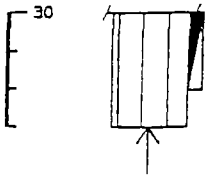
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/02/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		ML	Brown Sandy SILT	17/24	1-4-9-12	
			Total Depth 33.0'			

Remarks: 1. Borehole logged from surface to 12.0' by auger cuttings.
2. Total length of screen & casing assembly - 25.4'.

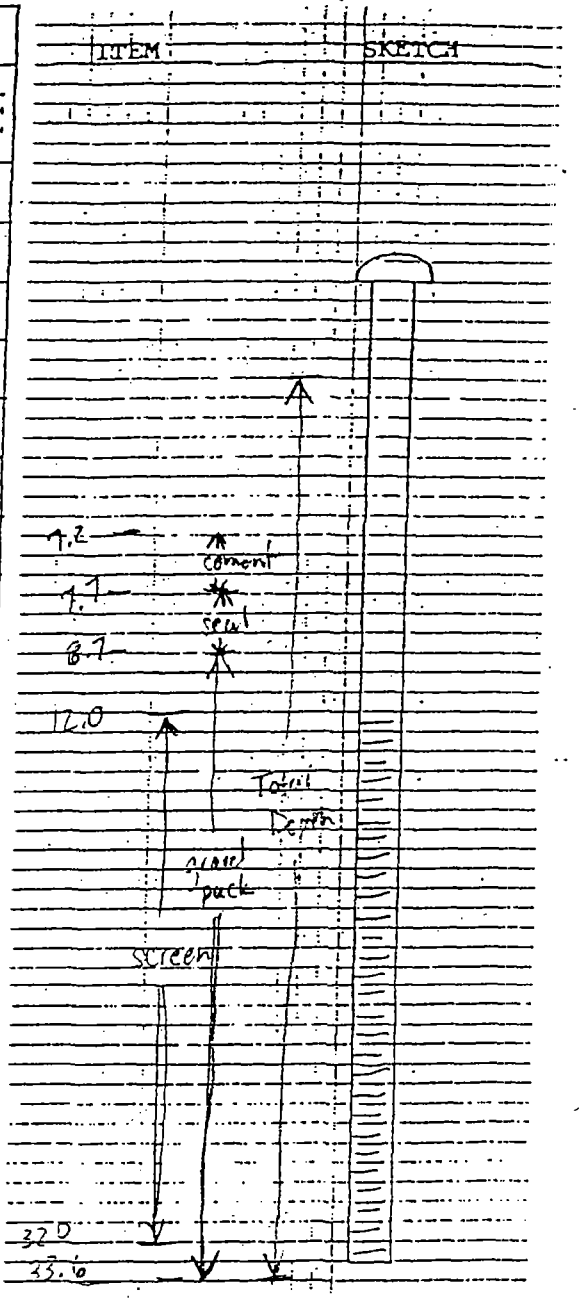
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-2-91/13:00 COMPLETED 12-2-91/15:30
PROJECT NO. 122429 PROJECT NAME Clark Oil
BORING/WELL NO. V.C.B-4 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Breuding, Clark - Julius GEOLOGIST Clay 7

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		1.2		
BOTTOM OF GROUT		1.7		
TOP OF WELL RISER		6.7		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		7.7		
BOTTOM OF PELTONITE SEAL		8.7		
TOP OF GRAVEL PACK		8.7		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		–		
TOTAL DEPTH OF BOREHOLE		33.6		

WELL DIAGRAM



NOTE: NOT TO SCALE

COMMENTS

BEI 027089

SERIAL NO. WI_____
PAGE__OF__

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL_____ LOCKING CAP: YES NO
DIAMETER (IN):_____ PADLOCK NO._____

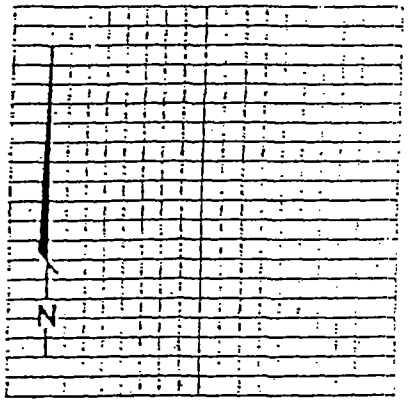
PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL S.S. + Steel
DIAMETER (IN): 8"

MONITORING WELL MATERIALS/LENGTH
WELL RISER: 8" Steel
WELL SCREEN: 8" S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL:_____
NUMBER:_____

LEGEND:
O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 pds)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY:_____
MIX:_____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX:_____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:
QUANTITY:_____ QUANTITY:_____
TYPE:_____ TYPE:_____
DEPTH INTERVAL OF LOSS_____ DEPTH INTERVAL OF LOSS_____

COMMENTS:_____

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-5

HARTFORD HYDROCARBON REMEDIATION PROJECT

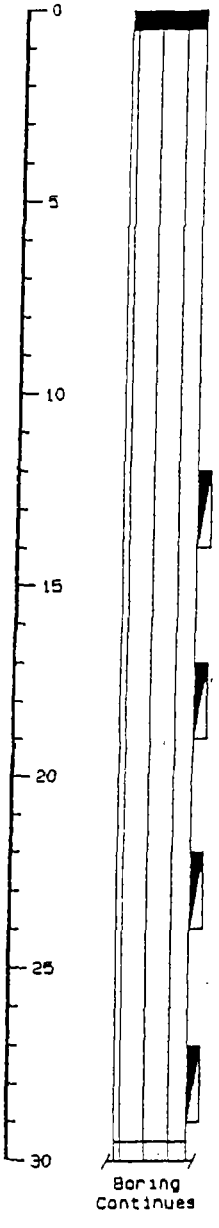
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/03/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		ML	Gray-Brown Clayey SILT Trace Sand			
5						0/0/-
10						0/3/-
				6/24	3-5-7-8	
15						0/2/-
				9/24	2-5-7-9	
20						2/30/-
			-w/Sand below 21.0	9/24	3-10-12-11	
25						0/2/-
				10/24	2-5-7-8	-/-/20
		SM	Gray Silty SAND			

BEI 024233

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-5

HARTFORD HYDROCARBON REMEDIATION PROJECT

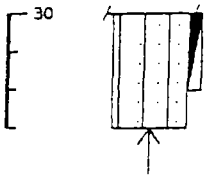
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/03/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SM	Gray Silty SAND	16/24	4-7-10-10	20/110/-
			Total Depth 33.0'			

Remarks: 1. Borehole logged from surface to 12.0' by auger cuttings.

2. Total length of screen & casing assembly - 25.7'

BEI 024234

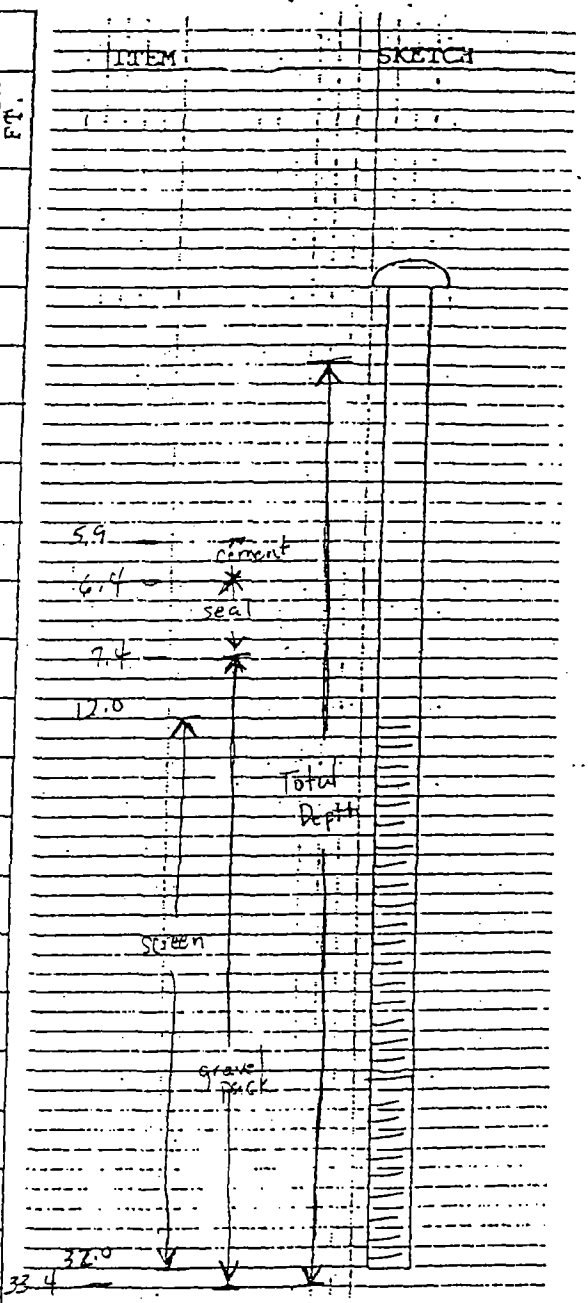
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-3-91 / 11:00 COMPLETED 12-3-91 / 13:30
PROJECT NO. 122489 PROJECT NAME Clark Oil - Phase I V.C.S.
BORING/WELL NO. V.C.B. - 5 MAJOR TASK 1.54 SUBTASK 77
INSTALLATION CREW Bredding, Crank + Julius GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		5.9		
BOTTOM OF GROUT		6.4		
TOP OF WELL RISER		5.4		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		6.4		
BOTTOM OF PELTONITE SEAL		7.4		
TOP OF GRAVEL PACK		7.4		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		-		
TOTAL DEPTH OF BOREHOLE		33.4		

WELL DIAGRAM



COMMENTS

BEI 027091

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-6

HARTFORD HYDROCARBON REMEDIATION PROJECT

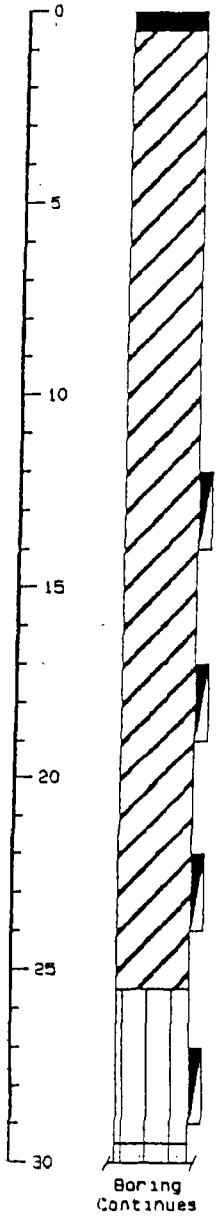
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/09/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		CH	Gray-Brown CLAY w/Silt Trace Sand			
5						0/0/-
10						0/0/-
				11/24	1-2-3-4	
15						0/0/-
				12/24	0-2-3-3	
20						0/3/-
				10/24	0-1-2-1	
25						0/3/-
		ML	Gray Clayey SILT w/Sand	9/24	1-3-4-4	0/0/-
30		SM	Gray Silty SAND			

BEI 024285

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VC8-6

HARTFORD HYDROCARBON REMEDIATION PROJECT

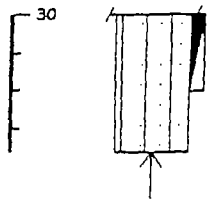
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/09/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SM	Gray Silty SAND	14/24	1-5-10-9	8/110/-
			Total Depth 33.6'			

Remarks: 1. Borehole logged from surface to 12.0' by auger cuttings.

2. Total length of screen & casing assembly - 24.9'.

BEI 024236

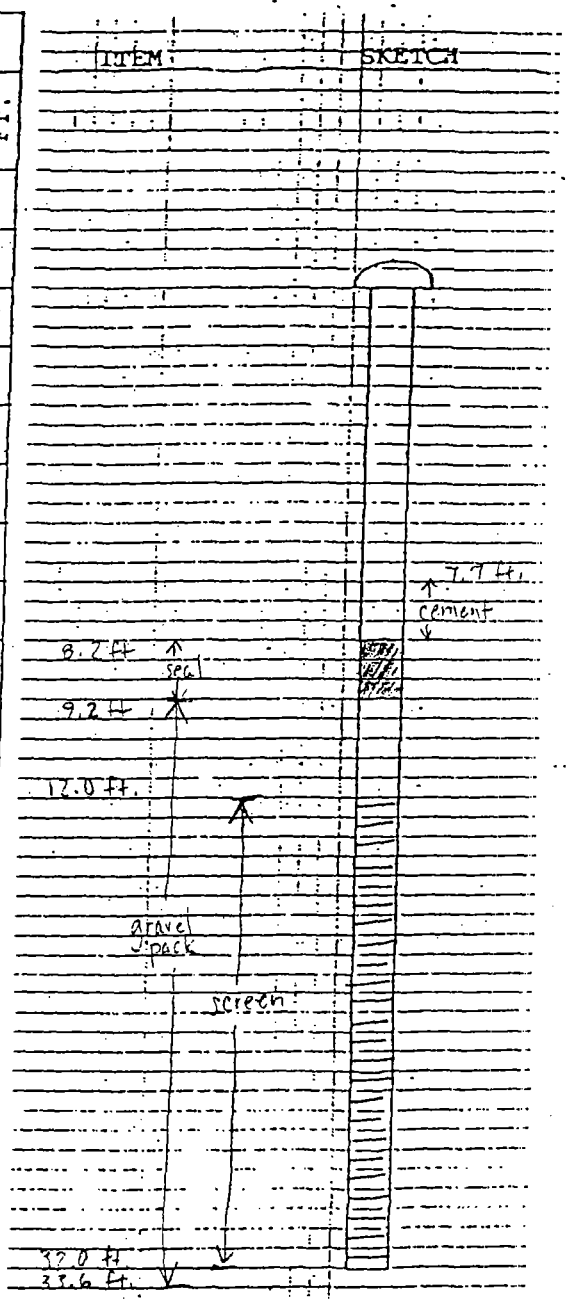
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-9-91/12:15 COMPLETED 12-9-91/14:00
PROJECT NO. 122489 PROJECT NAME Clark Oil - Phase I V.C.S.
BORING/WELL NO. V.C.B.-6 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Bruckner Crew + Hanni GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		1.7		
BOTTOM OF GROUT		8.2		
TOP OF WELL RISER		7.2		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		8.2		
BOTTOM OF PELTONITE SEAL		9.2		
TOP OF GRAVEL PACK		9.2		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		dry*		
TOTAL DEPTH OF BOREHOLE		33.6		

WELL DIAGRAM



NOTE: NOT TO SCALE

COMMENTS *Groundwater was not encountered during drilling activities.

BEI 027093

SERIAL NO. WI_____
PAGE__OF__

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL_____ LOCKING CAP: YES NO
DIAMETER (IN):_____ PADLOCK NO._____

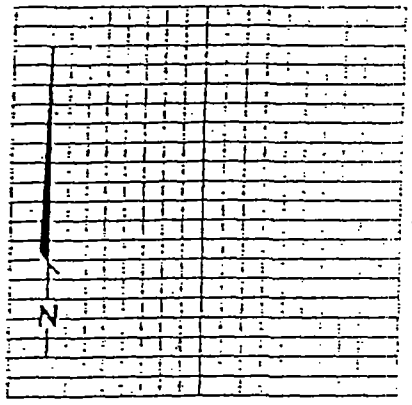
PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL S.S. screen, steel casing
DIAMETER (IN): 8"

MONITORING WELL MATERIALS/LENGTH
WELL RISER: steel
WELL SCREEN: 20 S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL:_____
NUMBER:_____

LEGEND:
O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100lbs.)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY:_____
MIX:_____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX:_____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:
QUANTITY:_____ QUANTITY:_____
TYPE:_____ TYPE:_____
DEPTH INTERVAL OF LOSS_____ DEPTH INTERVAL OF LOSS_____

COMMENTS:_____

BEI 027094

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-7

HARTFORD HYDROCARBON REMEDIATION PROJECT

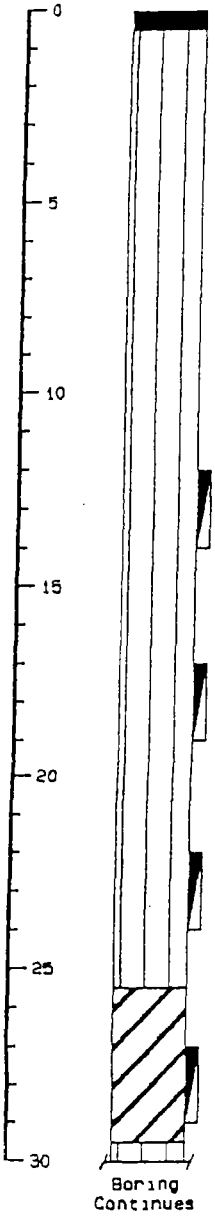
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/09-10/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		ML	Gray-Brown Clayey SILT Trace Sand			
5						0/20/-
10						0/0/-
				10.5/24	0-1-2-1	
15						15/30/-
				7/24	2-2-3-3	
20						5/35/-
				10/24	0-1-1-1	
25						70/200/-
		CH	Gray-Brown CLAY w/Silt Trace Sand	4/24	0-2-2-2	
30		ML	Gray-Brown Sandy SILT Trace Gravel			

BEI 024237

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VC8-7

HARTFORD HYDROCARBON REMEDIATION PROJECT

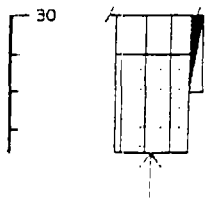
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/09-10/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS ON SAMPLE
30		SM	Brown Silty SAND Total Depth 33.6'	12/24	1-3-8-9	65/160/-

Remarks:
1. Borehole logged from surface to 12.0' by auger cuttings.
2. Total length of screen & casing assembly - 26.5'.
3. Encountered strong petroleum hydrocarbon odors at 25.0'.

BURLINGTON ENVIRONMENTAL INC.

BEI 024238

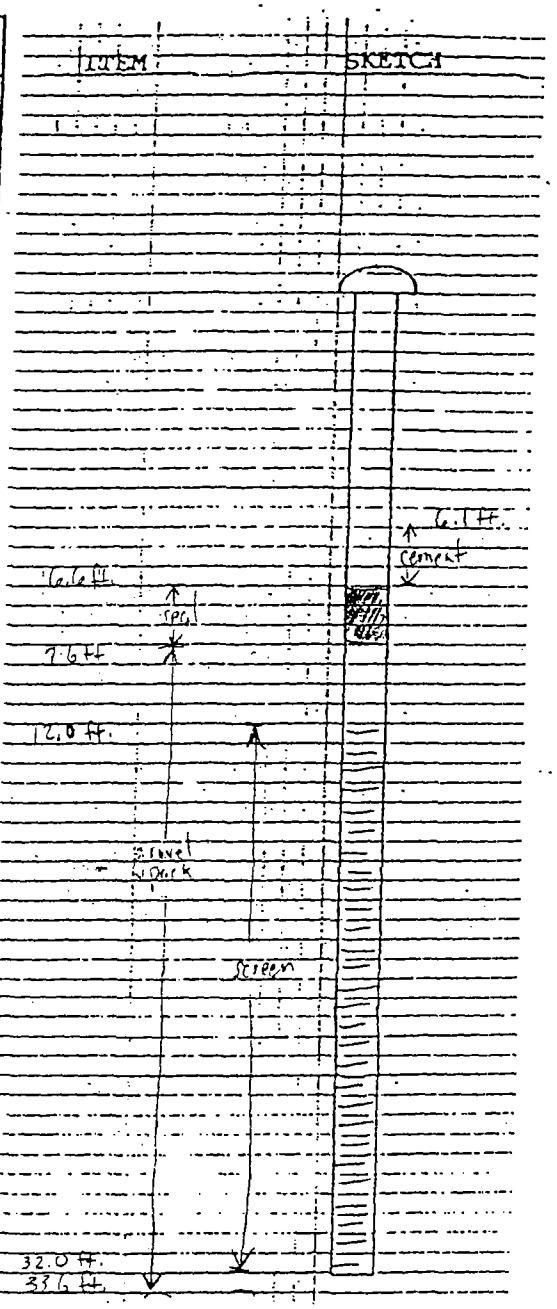
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-10-91/10:00 COMPLETED 12-10-91/12:00
PROJECT NO. 122489 PROJECT NAME Clark Oil - Phase I V.C.S.
BORING/WELL NO. V.C.B. - 7 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Bruding Crank + Hoffman GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		6.1		
BOTTOM OF GROUT		6.6		
TOP OF WELL RISER		5.6		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		6.6		
BOTTOM OF PELTONITE SEAL		7.6		
TOP OF GRAVEL PACK		7.6		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		dry*		
TOTAL DEPTH OF BOREHOLE		33.6		

WELL DIAGRAM



NOTE: NOT TO SCALE

COMMENTS * Groundwater was not encountered during drilling activities

BEI 027095

SERIAL NO. WI_____
PAGE__OF__

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL _____ LOCKING CAP: YES NO
DIAMETER (IN): _____ PADLOCK NO. _____

PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL S.S. Screen steel casing
DIAMETER (IN): 2"

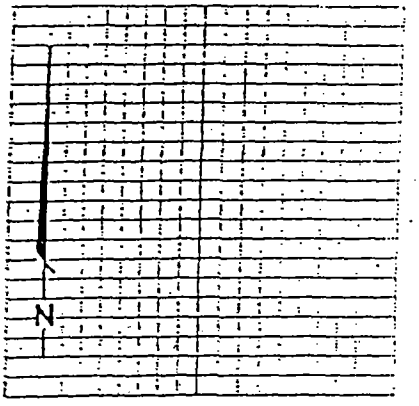
MONITORING WELL MATERIALS/LENGTH
WELL RISER: steel
WELL SCREEN: 20' S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL: _____
NUMBER: _____

LEGEND:

O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 lbs)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY: _____
MIX: _____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX: _____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:

QUANTITY: _____ QUANTITY: _____
TYPE: _____ TYPE: _____
DEPTH INTERVAL OF LOSS _____ DEPTH INTERVAL OF LOSS _____

COMMENTS: _____

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VC8-8

HARTFORD HYDROCARBON REMEDIATION PROJECT

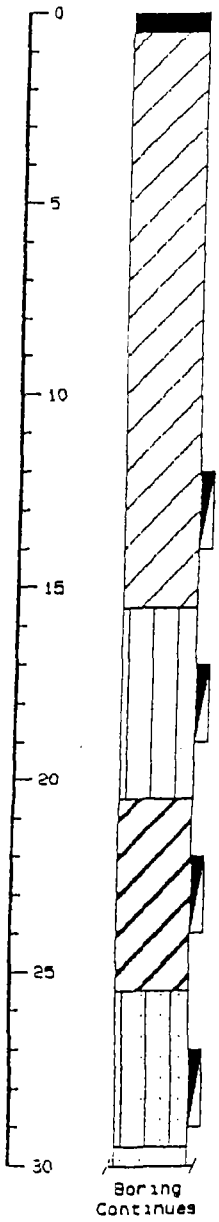
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/06/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 33.0 Feet



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		CL	Gray-Brown Silty CLAY Trace Sand			
5						0/15/-
10						0/0/-
				10/24	0-1-1-1	
15		ML	Gray-Brown Clayey SILT Trace Sand			1/15/-
				15/24	0-1-4-3	
20		CH	Gray-Brown CLAY w/Silt Trace Sand			25/120/-
				14/24	0-1-3-3	
25		SM	Brown Silty SAND			40/150/-
				10/24	1-6-6-11	
30		SP	Brown Fine SAND Trace Silt			70/150/-

BEI 024239

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-8

HARTFORD HYDROCARBON REMEDIATION PROJECT

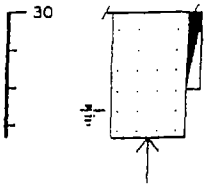
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/06/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 33.0 Feet

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SP	Brown Fine SAND Trace Silt Total Depth 33.3'	15/24	1-6-8-9	31/110/-

Remarks: 1. Borehole logged from surface to 12.0' by auger cuttings.

2. Total length of screen & casing assembly - 26.3'.

3. Liquid-phase hydrocarbon (gasoline) in well.

BEI 024240

BURLINGTON ENVIRONMENTAL INC.

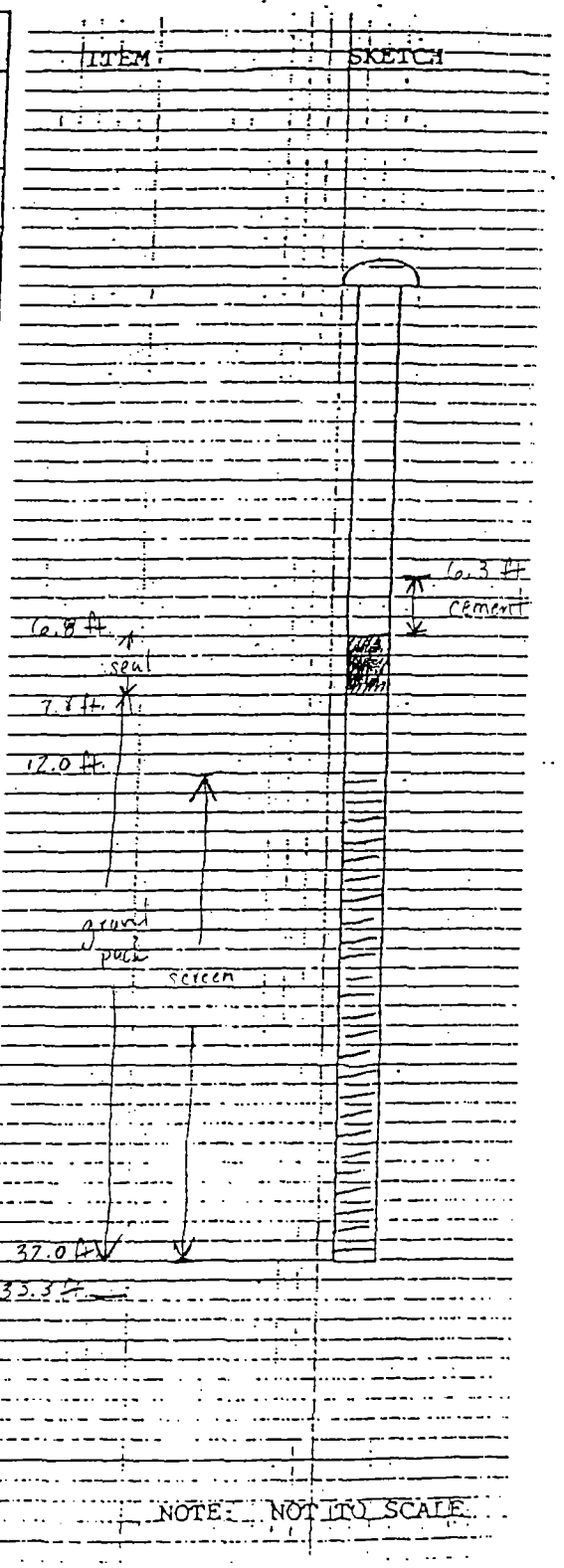
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-6-91/14:30 COMPLETED 12-6-91/15:15
PROJECT NO. 122489 PROJECT NAME Clark Oil - Phase I V.C.S.
BORING/WELL NO. V.C.B.-8 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Bruening Crook + Julius GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		6.3		
BOTTOM OF GROUT		6.8		
TOP OF WELL RISER		5.8		
TOP OF SCREEN		12.0		
BOTTOM OF SCREEN		32.0		
TOP OF PELTONITE SEAL		6.8		
BOTTOM OF PELTONITE SEAL		7.8		
TOP OF GRAVEL PACK		7.8		
BOTTOM OF GRAVEL PACK		32.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		33.0		
TOTAL DEPTH OF BOREHOLE		33.3		

WELL DIAGRAM



COMMENTS

BEI 027097

SERIAL NO. WI_____
PAGE__OF__

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL: _____ LOCKING CAP: YES NO
DIAMETER (IN): _____ PADLOCK NO. _____

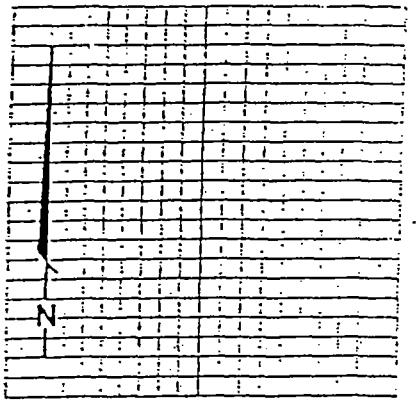
PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL: S.S Screen Steel Riser
DIAMETER (IN): 8"

MONITORING WELL MATERIALS/LENGTH
WELL RISER: Steel
WELL SCREEN: 20 ft. S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES (NO)
MATERIAL: _____
NUMBER: _____

LEGEND:
O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE: 10-20

PELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 lbs.)
SIZE: Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY: _____
MIX: _____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX: _____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:
QUANTITY: _____ QUANTITY: _____
TYPE: _____ TYPE: _____
DEPTH INTERVAL OF LOSS _____ DEPTH INTERVAL OF LOSS _____

COMMENTS: _____

BEI 027098

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-9

HARTFORD HYDROCARBON REMEDIATION PROJECT

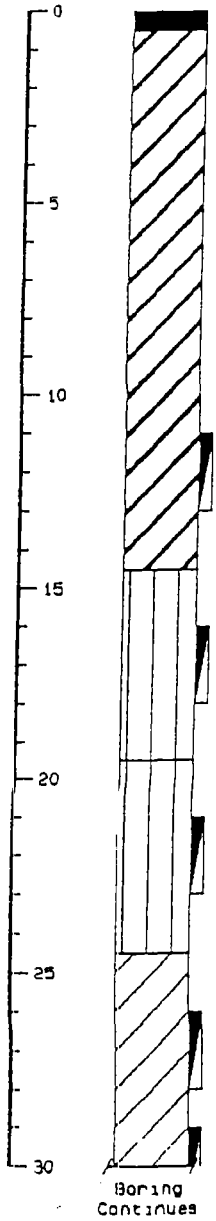
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/10/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		CH	Dark Gray-Brown CLAY w/Silt Trace SAND			
5						0/0/-
10				6.5/24	1-2-3-4	0/0/-
15		ML	Gray-Brown Sandy SILT	9/24	1-2-4-3	0/1/-
20		ML	Gray-Brown Clayey SILT Trace Sand	11/24	0-1-1-2	0/3/-
25		CL	Gray-Brown Silty CLAY Trace Sand	16/24	0-0-0-0	0/3/-
				15/24	0-0-3-1	

BEI 024241

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-9

HARTFORD HYDROCARBON REMEDIATION PROJECT

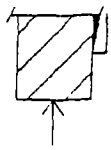
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/10/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		CL	Gray-Brown Silty CLAY Trace Sand Total Depth 32.2'			0/20/-

Remarks: 1. Borehole logged from surface to 11.0' by auger cuttings.

2. Total length of screen & casing assembly - 22.4'.

BEI 024242

BURLINGTON ENVIRONMENTAL INC.

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VC8-10

HARTFORD HYDROCARBON REMEDIATION PROJECT

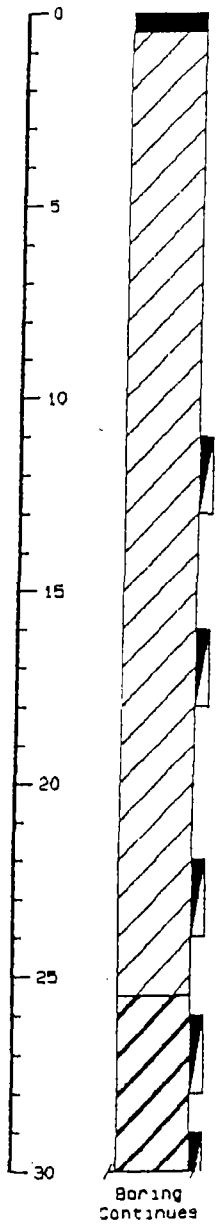
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/11/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT.			
		CL	Gray-Brown Silty CLAY Trace Sand			
5						0/0/-
10				12/24	0-4-4-4	0/1/-
15				11/24	0-3-4-5	0/0/-
20				12/24	0-2-2-1	50/150/-
25		CH	Gray-Brown CLAY w/Silt Trace Sand	14/24	0-1-3-1	0/70/-
30				14/24	0-1-1-1	0/40/-

BEI 024243

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-10

HARTFORD HYDROCARBON REMEDIATION PROJECT

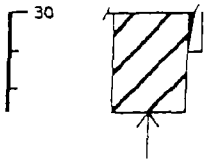
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/11/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		CH	Gray-Brown CLAY w/Silt Trace Sand Total Depth 32.6'			

Remarks: 1. Borehole logged from surface to 11.0' by auger cuttings.

2. Total length of screen & casing assembly - 23.0'.

BEI 024244

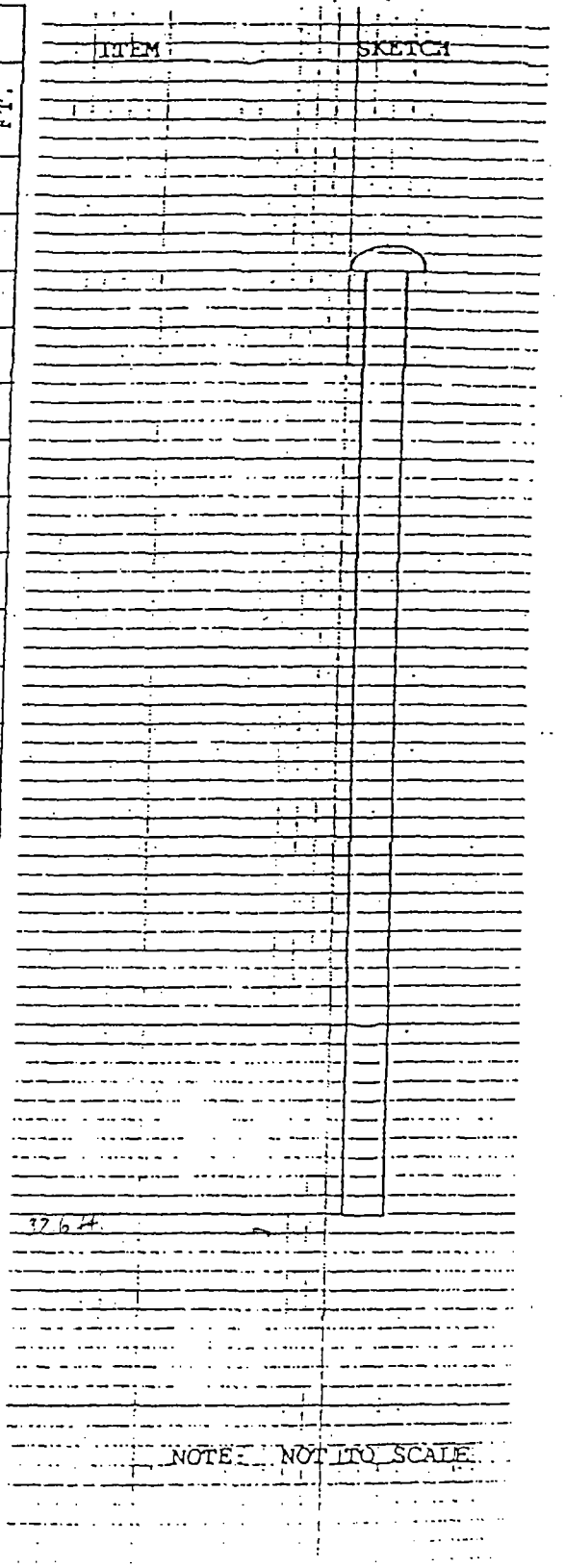
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-11-91/10:45 COMPLETED 12-11-91/13:45
PROJECT NO. 122489 PROJECT NAME Clark Oil - Phase I V.C.S.
BORING/WELL NO. V.C.B.-10 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Breeding, Crank & Hoffman GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		8.6		
BOTTOM OF GROUT		9.1		
TOP OF WELL RISER		8.1		
TOP OF SCREEN		11.0		
BOTTOM OF SCREEN		31.0		
TOP OF PELTONITE SEAL		9.1		
BOTTOM OF PELTONITE SEAL		10.1		
TOP OF GRAVEL PACK		10.1		
BOTTOM OF GRAVEL PACK		31.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		dry*		
TOTAL DEPTH OF BOREHOLE		32.6		

WELL DIAGRAM



COMMENTS * Groundwater was not encountered during

BEI 027099

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-11

HARTFORD HYDROCARBON REMEDIATION PROJECT

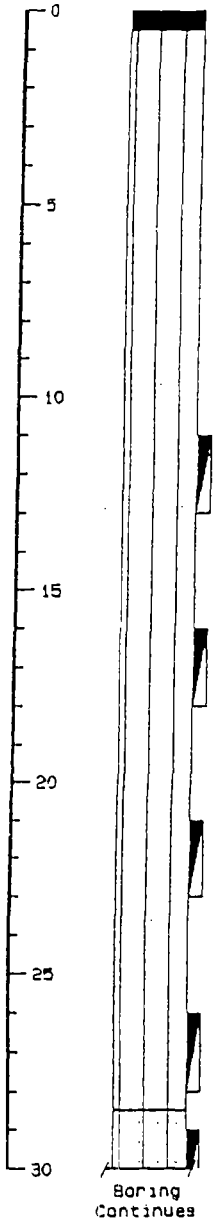
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/03/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 32.1 Feet



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		ML	Gray-Brown Clayey SILT Trace Sand			
5						0/25/-
10				10/24	1-2-1-2	0/12/-
15				12/24-4	1-2-3-4	0/10/-
20				11/24	0-2-2-2	0/22/-
25				13/24	0-3-4-4	30/150/-
		SP-SM	Brown Fine SAND Trace Silt	16/24	3-7-9-10	30/150/-

BEI 024245

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-11

HARTFORD HYDROCARBON REMEDIATION PROJECT

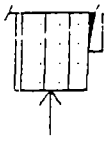
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/03/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - 32.1 Feet

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS ON SAMPLE
30		SP-SM	Brown Fine SAND Trace Silt Total Depth 32.0'			

Remarks: 1. Borehole logged from surface to 11.0' by auger cuttings.

2. Total length of screen & casing assembly - 27.9'.

3. Borehole overdrilled, water level at 32.1'.

BEI 024246

BURLINGTON ENVIRONMENTAL INC.

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-12

HARTFORD HYDROCARBON REMEDIATION PROJECT

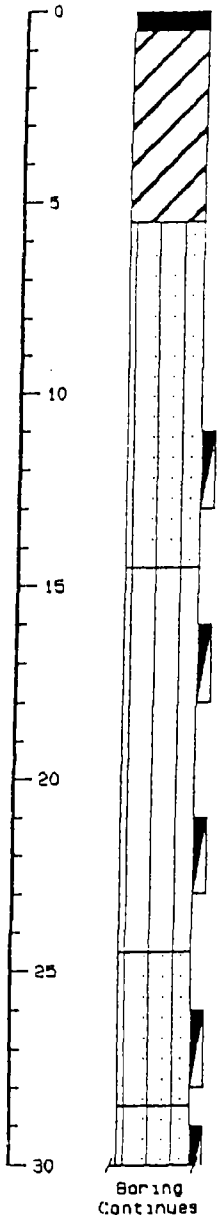
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/05/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
			ASPHALT			
		CH	Dark Gray-Brown CLAY w/Silt			
5		SM	Gray-Brown Silty SAND			0/5/-
10				11/24	1-3-3-2	0/2/-
15		ML	Gray-Brown Clayey SILT w/Sand	13/24	2-3-3-4	2/25/-
20			-Trace Sand below 19.5'	10/24	1-1-1-3	0/3/-
25		SM	Gray Silty SAND	14/24	2-7-10-9	0/0/-
		SP-SM	Brown Fine-Medium SAND Trace Silt	16/24	2-7-14-9	20/130/-

BEI 024247

RECORD OF SUBSURFACE EXPLORATION

VC BOREHOLE: VCB-12

HARTFORD HYDROCARBON REMEDIATION PROJECT

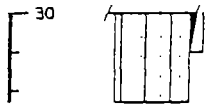
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 12/05/91 LOGGED BY: Frankenreiter

PROJECT NUMBER: 122489

GROUNDWATER: At Completion - Dry

DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	RECOVERY RATIO in/in	BLOWS PER 6 in.	HNU READINGS BZ/BH/SAMPLE
30		SP-SM	Brown Fine-Medium SAND Trace Silt Total Depth 32.3'			

Remarks: 1. Borehole logged from surface to 11.0' by auger cuttings.

2. Total length of screen & casing assembly - 22.8'.

BEI 024248

BURLINGTON ENVIRONMENTAL INC.

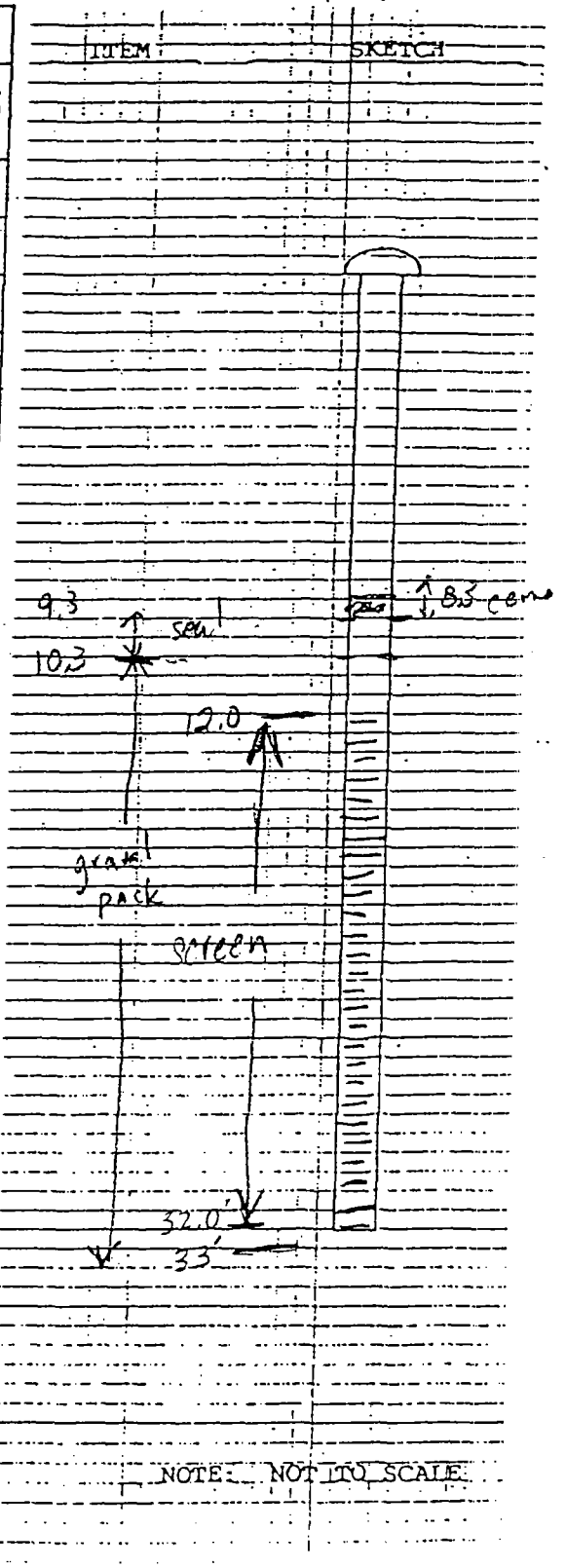
MONITORING WELL INSTALLATION

SERIAL NO. WI_____
PAGE__OF__

DATE/TIME STARTED 12-5-91/12:15 COMPLETED 12-5-91/15:00
PROJECT NO. 122489 PROJECT NAME Clark Oil
BORING/WELL NO. V.C.B-12 MAJOR TASK 6154 SUBTASK 77
INSTALLATION CREW Breeding, Cook, + Julian GEOLOGIST Clay 7.

DEPTHS IN REFERENCE TO GROUND SURFACE				
ITEM	±	DEPTH FT.	±	DEPTH FT.
TOP OF PROTECTIVE CASING				
BOTTOM OF PROTECTIVE CASING				
TOP OF PERMANENT BOREHOLE CASING				
BOTTOM OF PERMANENT BOREHOLE CASING				
TOP OF CONCRETE				
BOTTOM OF CONCRETE				
TOP OF GROUT		8.8		
BOTTOM OF GROUT		9.3		
TOP OF WELL RISER		8.3		
TOP OF SCREEN		11.0		
BOTTOM OF SCREEN		31.0		
TOP OF PELTONITE SEAL		9.3		
BOTTOM OF PELTONITE SEAL		10.3		
TOP OF GRAVEL PACK		10.3		
BOTTOM OF GRAVEL PACK		31.0		
TOP OF NATURAL CAVE-IN				
BOTTOM OF NATURAL CAVE-IN				
TOP OF GROUNDWATER		30.1		
TOTAL DEPTH OF BOREHOLE		32.3		

WELL DIAGRAM



COMMENTS

BEI 027101

SERIAL NO. WI_____
PAGE__OF__

CONSTRUCTION MATERIALS

WELL PROTECTOR INSTALLED: YES (NO)
MATERIAL _____ LOCKING CAP: YES NO
DIAMETER (IN): _____ PADLOCK NO. _____

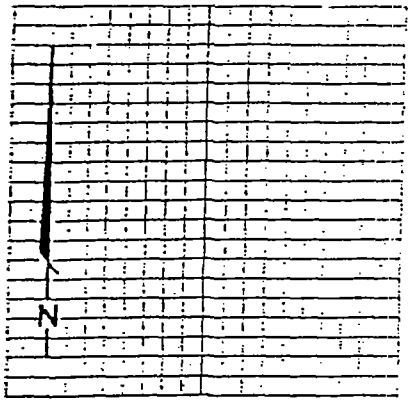
PERMANENT BOREHOLE CASING INSTALLED: (YES) NO
MATERIAL 8" S.S. & 8' Steel Pipe
DIAMETER (IN): 8 inch

MONITORING WELL MATERIALS/LENGTH
WELL RISER: Steel
WELL SCREEN: 20' S.S.
WELL SCREEN SLOT SIZE: 20

BUMPER POSTS INSTALLED: YES NO
MATERIAL: _____
NUMBER: _____

LEGEND:
O MONITORING WELL
● BUMPER POSTS

ORIENTATION:



GRAVEL PACK INSTALLED: (YES) NO
QUANTITY: 1 pallet (30 bags)
TYPE/SIZE 10-20

BELTONITE SEAL INSTALLED: (YES) NO
QUANTITY: 1 bag (100 lbs)
SIZE Granular

CONCRETE BACKFILL UTILIZED: YES (NO)
QUANTITY: _____
MIX: _____

GROUT BACKFILL UTILIZED: (YES) NO
QUANTITY: 5 gal.
MIX: _____

FLUID INTRODUCTION

TOTAL FLUIDS INTRODUCED DURING WELL CONSTRUCTION:
QUANTITY: _____ QUANTITY: _____
TYPE: _____ TYPE: _____
DEPTH INTERVAL OF LOSS _____ DEPTH INTERVAL OF LOSS _____

COMMENTS: _____

Legend:

Symbol	Description:	Symbol:	Description:
	ASPHALT		CL - Silty/Sandy CLAY
	ML - Clayey SILT		SM - SILT/SAND Mixture
	CH - CLAY w/Silt		SP - Poorly Graded SAND
	Standard 1 3/8 Inch Dia. Split-Barrel Sample.		Depth of water at the time of drilling
	Termination of Boring		

Notes:

HNU Readings in Needle Deflection Units

BZ - Breathing Zone

BH - Borehole

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-1

HARTFORD HYDROCARBON REMEDIATION PROJECT

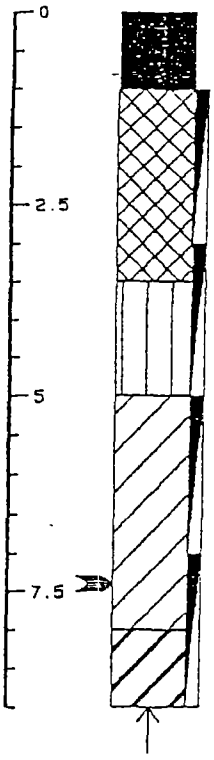
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 7.4 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand	20	8-11-8-9
			-Trace Cinders below 2.0'	14	4-8-6-6
		ML	Gray-Brown Sandy SILT	19	
		CL	Dark Gray-Brown Silty CLAY Trace Sand	24	5-4-4-6
				20	3-4-6-9
		CH	Dark Gray-Brown CLAY w/Silt	24	

Remark: 1. No Odor or HNU Readings.

BEI 037659

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-2

HARTFORD HYDROCARBON REMEDIATION PROJECT

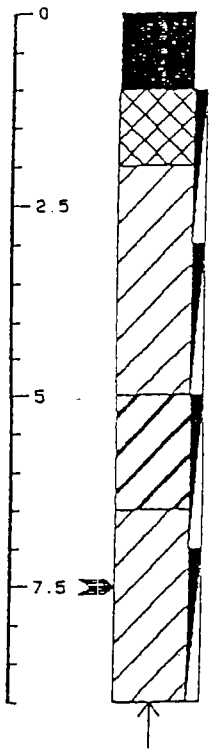
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 7.5 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY & GRAVEL	13	8-5-8-5
		CL	Dark Gray-Brown Silty CLAY w/Sand	24	3-4-4-5
				26	
		CH	Dark Gray-Brown CLAY w/Silt Trace Sand	27	2-3-5-6
		CL	Dark Gray-Brown Silty CLAY Trace Sand, Gravel	27	3-3-4-4
			-w/Sand below 8.0'	27	

Remark: 1. No Odor or HNU Readings.

BEI 037660

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-3

HARTFORD HYDROCARBON REMEDIATION PROJECT

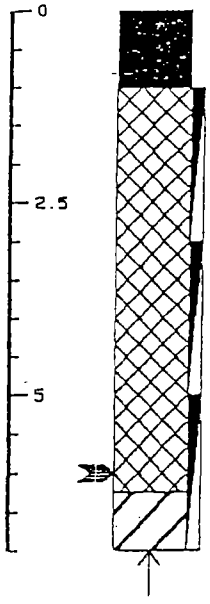
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 6.0 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT; Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY Trace Sand, Possible FILL	18	9-9-11-14
				22	2-3-5-5
				26	3-4-8-11
				21	
		CH	Dark Gray-Brown CLAY w/Silt	26	

Remark: 1. No Odor or HNU Readings.

BEI 037661

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-4

HARTFORD HYDROCARBON REMEDIATION PROJECT

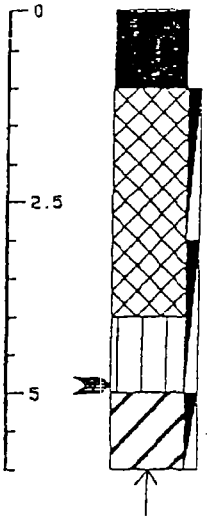
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 4.9 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand, FILL	19	5-6-6-8
				17	3-4-4-6
		ML	Gray-Brown Sandy SILT	16	
		CH	Dark Gray-Brown CLAY w/Silt	36	

Remark: 1. No Odor or HNU Readings.

BEI 037662

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-5

HARTFORD HYDROCARBON REMEDIATION PROJECT

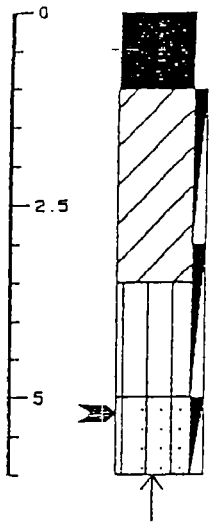
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.2 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand	14	7-6-8-7
				10	3-3-3-3
		ML	Gray-Brown Sandy SILT Trace Clay	13	
		SM	Gray-Brown Silty SAND	10	4-5

Remark: 1. No Odor or HNU Readings.

BEI 037665

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-6

HARTFORD HYDROCARBON REMEDIATION PROJECT

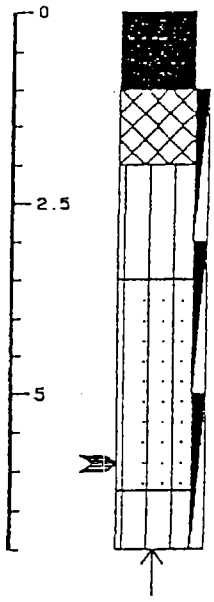
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.9 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand. FILL	21	8-5-5-5
		ML	Brown Sandy SILT Trace Clay	17	3-2-4-5
		SM	Gray-Brown Silty SAND	10	2-2-2-4
				22	
		ML	Brown Sandy SILT	28	

Remarks: 1. No Odor or HNU Readings.

BEI 037666

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-7

HARTFORD HYDROCARBON REMEDIATION PROJECT

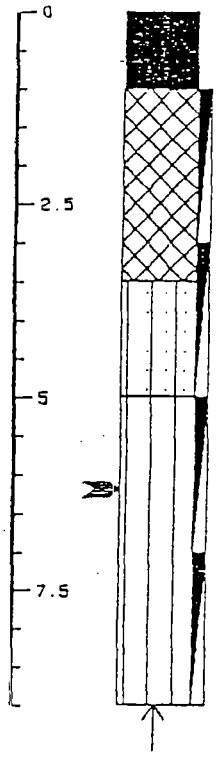
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 6.2 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand Trace Gravel, FILL	16	7-8-9-9
			-Trace Brick Fragments, Cinders below 2.0'	20	3-4-3-5
		SM	Brown Silty SAND	13	
		ML	Gray-Brown Sandy SILT	11	3-3-3-3
				20	2-2-3-4

Remark: 1. No Odor or HNU Readings.

BEI 037663

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-8

HARTFORD HYDROCARBON REMEDIATION PROJECT

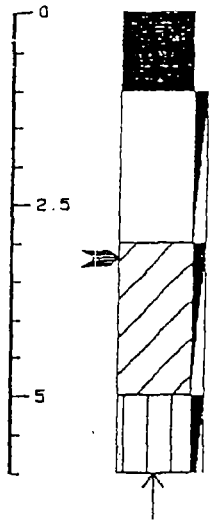
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Barker

DATE DRILLED: 11/04/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 3.2 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT; Oil and Chip Overlaying Road Base		
			No recovery.		9-6-3-7
		CL	Brown Silty CLAY w/Sand		2-4-5-7
		ML	Gray-Brown Sandy SILT	17	3-4-5-8

Remark: 1. No Odor or HNU Readings.

BEI 037664

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-9

HARTFORD HYDROCARBON REMEDIATION PROJECT

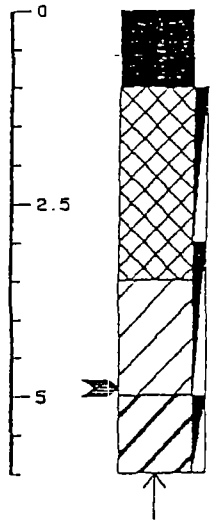
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 4.9 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand Trace Gravel. FILL	12	10-11-9-12
				24	3-4-5-7
		CL	Gray-Brown Silty CLAY Trace Sand	25	
		CH	Dark Gray-Brown CLAY w/Silt	29	6-9

Reamrk: 1. No Odor or HNU Readings.

BEI 037667

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-10

HARTFORD HYDROCARBON REMEDIATION PROJECT

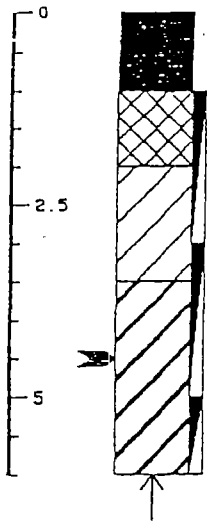
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 4.5 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Gravel. FILL	23	3-5-5-6
		CL	Dark Gray-Brown Silty CLAY Trace Sand	26	2-5-7-11
		CH	Dark Gray-Brown CLAY w/Silt	31	
				29	3-6

Remark: 1. No Odor or HNU Readings.

BEI 037668

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-11

HARTFORD HYDROCARBON REMEDIATION PROJECT

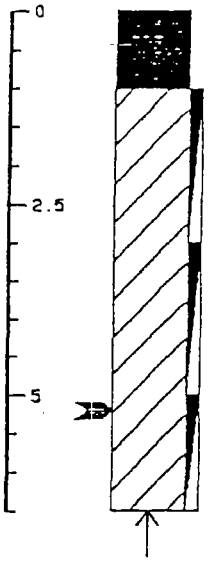
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.2 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY Trace Sand	26	4-5-8-11
					3-6-9-11
				25	
			-Gray-Brown, Siltier below 5.0'	26	2-5-6

Remark: 1. No Odor or HNU Readings.

BEI 037669

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-12

HARTFORD HYDROCARBON REMEDIATION PROJECT

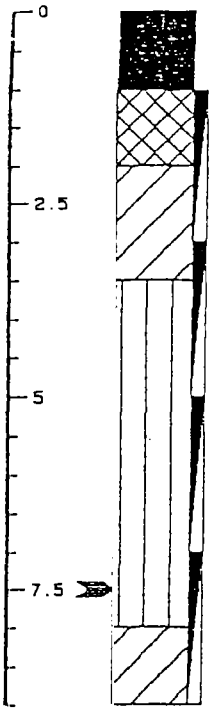
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 7.5 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Asphalt Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand. FILL		4-5-6-6
		CL	Brown Silty CLAY w/Sand	18	2-3-2-3
		ML	Brown SILT w/Sand	14	
				26	2-4-6-7
				24	2-1-4-4
		CL	Dark Gray-Brown Silty CLAY w/Sand	35	

BEI 037670

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-13

HARTFORD HYDROCARBON REMEDIATION PROJECT

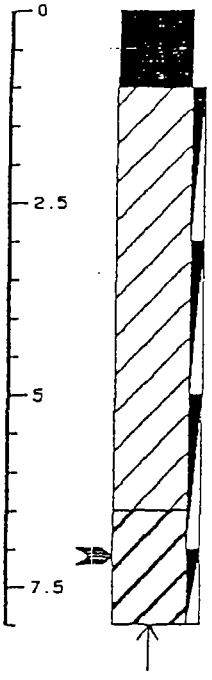
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 7.1 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Asphalt Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY Trace Sand	22	4-7-8-9
				27	2-3-5-5
			-Siltier, w/Sand 3.5 - 5.0'	24	
			-Gray-Brown below 5.0'	26	3-4-4-5
		CH	Dark Gray-Brown CLAY w/Silt	34	2-3

Remark: 1. No Odor or HNU Readings.

BEI 037671

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-14

HARTFORD HYDROCARBON REMEDIATION PROJECT

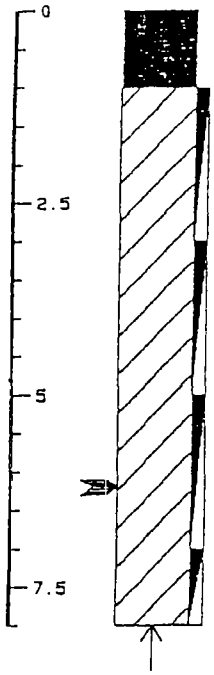
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 6.2 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Asphalt Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand	25	3-5-8-10
				27	2-6-8-10
				28	3-3-3-3
				26	
			-Gray-Brown, More Plastic below 6.5'	31	1-3

Remark: 1. No Odor or HNU Readings.

BEI 037672

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-15

HARTFORD HYDROCARBON REMEDIATION PROJECT

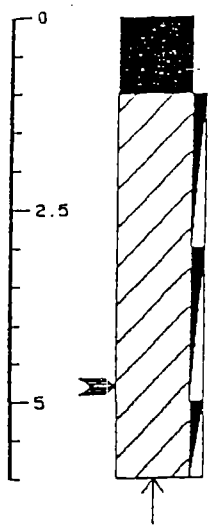
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 4.8 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT; Asphalt Overlaying Road Base		
		CL	Very Dark Gray-Brown Silty CLAY Trace Sand	26	5-8-9-14
			-Dark Gray-Brown 2.0 - 3.5'	27	5-8-12-14
				23	
			-Gray-Brown, w/Sand below 5.0'	26	3-4

Remark: 1. Slight Odor, No Measurable HNU Readings.

BEI 037673

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-16

HARTFORD HYDROCARBON REMEDIATION PROJECT

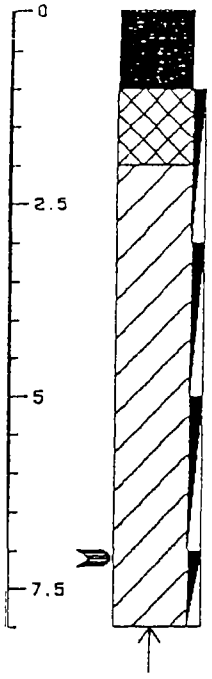
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 7.1 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand Trace Gravel. FILL	28	5-5-11-13
		CL	Gray-Brown Silty CLAY w/Sand	23	
					3-3-2-2
				22	
			-Gray. Trace Sand below 5.0'		3-4-3-6
				32	
				33	2-2

Remark: 1. Odor in Hole. 1 Needle Deflection Unit on Sample 5.0-7.0'.

BEI 037674

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-17

HARTFORD HYDROCARBON REMEDIATION PROJECT

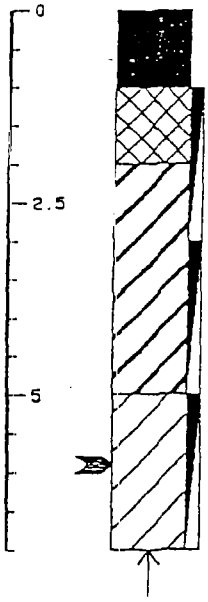
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.9 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT; Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand Trace Gravel, FILL	14	6-9-14-20
		CH	Dark Gray-Brown CLAY w/Silt	29	4-9-11-11
			-Siltier below 3.5'	22	
		CL	Gray-Brown Silty CLAY Trace Sand	26	3-4-5-6.
				28	

Remark: 1. Odor, No HNU Readings.

BEI 037675

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-18

HARTFORD HYDROCARBON REMEDIATION PROJECT

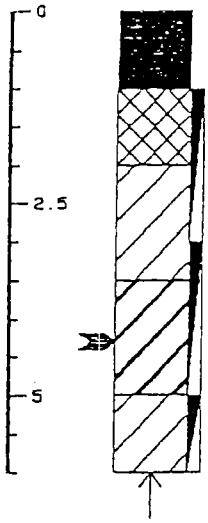
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 4.3 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Very Dark Gray-Brown Silty CLAY w/Sand Trace Sand, Possible FILL	27	3-5-9-13
		CL	Gray-Brown Silty CLAY Trace Sand	29	3-7-9-11
		CH	Dark Gray-Brown CLAY w/Silt Trace Sand	28	
		CL	Gray-Brown Silty CLAY Trace Sand	27	3-5

Remark: 1. Odor, No HNU Readings.

BEI 037676

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-19

HARTFORD HYDROCARBON REMEDIATION PROJECT

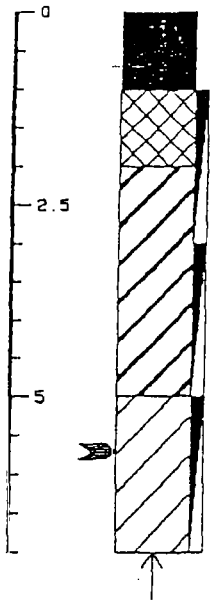
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.7 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT: Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand, Gravel, FILL	19	4-4-8-10
		CH	Dark Gray-Brown CLAY w/Silt	33	4-8-13-16
			-Siltier below 3.5'	25	
		CL	Gray-Brown Silty CLAY Trace Sand	26	2-5-6-8
				28	

Remark: 1. Odor below 5.0', No HNU Readings.

BEI 037677

RECORD OF SUBSURFACE EXPLORATION

TEST BOREHOLE: BHPE-20

HARTFORD HYDROCARBON REMEDIATION PROJECT

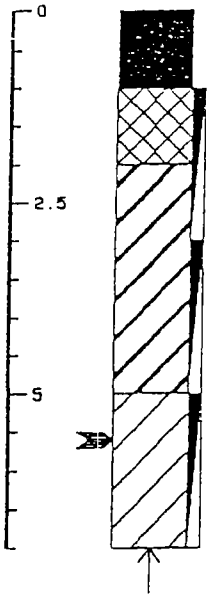
PHASE I - VAPOR CONTROL SYSTEM

DRILLING METHOD: Hollow Auger DRILLED BY: Crank

DATE DRILLED: 11/12/91 LOGGED BY: Jacobi

PROJECT NUMBER: 122489

GROUNDWATER: During Drilling - Dry BOTTOM OF PIPELINE AT 5.6 FEET



DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	MOISTURE CONTENT %	BLOW COUNTS PER 6 in.
			PAVEMENT; Oil and Chip Overlaying Road Base		
		CL	Dark Gray-Brown Silty CLAY w/Sand, Cinders, FILL	15	4-4-7-11
		CH	Dark Gray-Brown CLAY w/Silt Trace Sand	30	2-4-10-13
				30	
		CL	Dark Gray-Brown Silty CLAY Trace Sand	27	2-4-5-8
			-More Plastic below 6.5'	28	

Remark: 1. No Odor or HNU Readings.

BEI 037678

JOHN MATHES & ASSOCIATES, INC.

Legend:

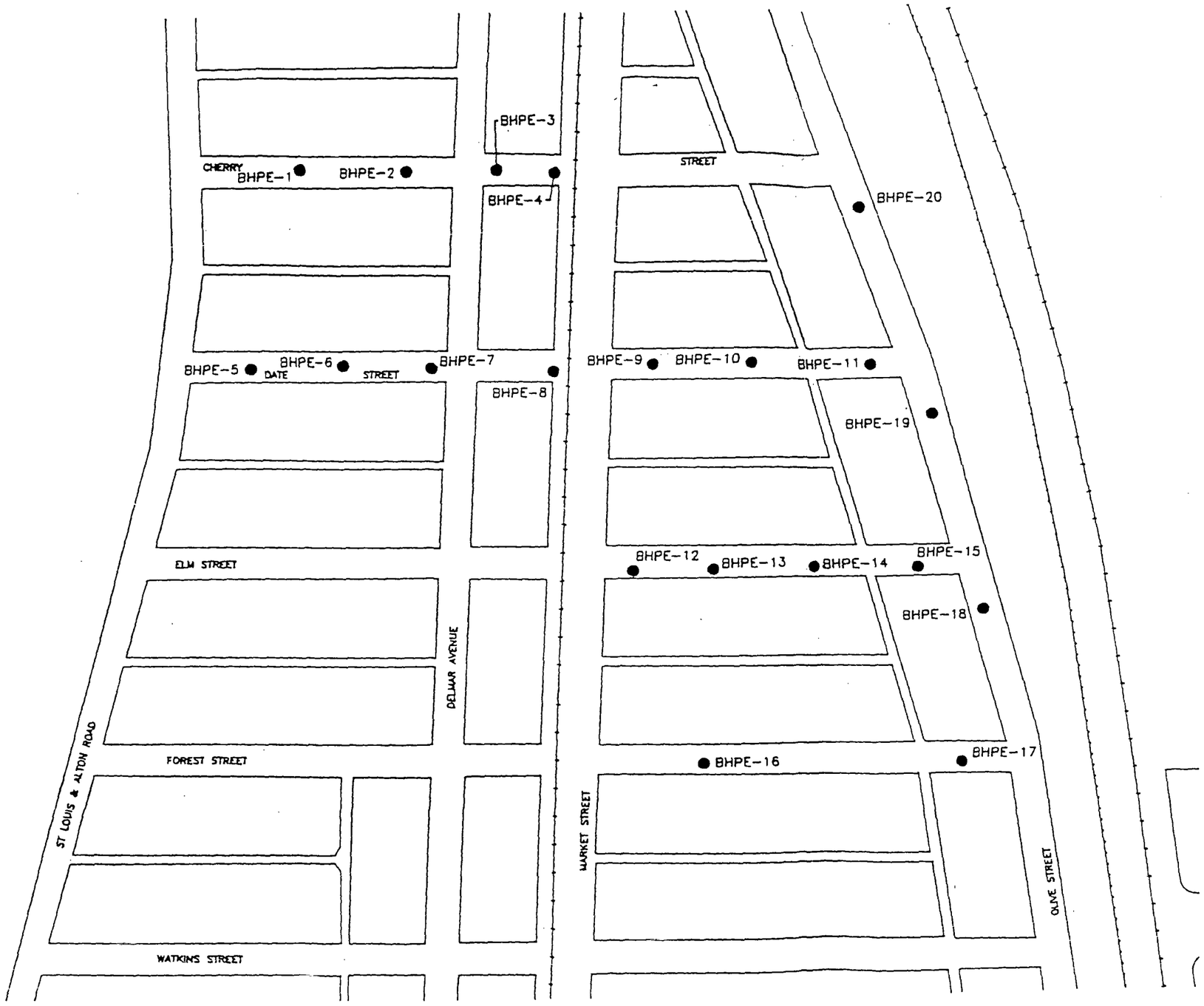
Symbol:	Description:	Symbol:	Description:
	PAVEMENT		ML - Sandy SILT
	CL - Silty CLAY		CH - CLAY w/Silt
	SM - Silty SAND		FILL
	Standard 1 3/8 Inch Dia. Split-Barrel Sample.		Proposed Depth to Bottom of Pipeline
	Termination of Boring		

Notes:

BEI 037679

Project No. 122489

JOHN MATHES & ASSOCIATES, INC.



EXPLANATION

● BHPE-1 APPROXIMATE TEST BOREHOLE LOCATION AND NUMBER

BEI 022101

0 200 400
SCALE IN FEET

N

John Mathes & Associates, Inc.

TEST BOREHOLE SAMPLING LOCATIONS

CLARK OIL
HARTFORD, ILLINOIS
122489

FIGURE 1

PROJECT MANAGER
DOCUMENT MANAGER
CHECKED BY
DRAWN BY
REV. DATE 12/20/91

Clayton
GROUP SERVICES

MONITORING PROBES INSTALLED JULY 2003

Clayton GROUP SERVICES

BORING NO: MP-5D	WELL NO: MP-5D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.35'- 27.35'	CHECKED BY: D. Lamsma	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0830	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/17.35'	DEV. METHODS: NA	FINISH TIME (hours): 0925	

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Gravel				2/2	HPU	M	--	0	0	
2	**FILL 0.3'-2.8'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	0	0	
4	**CLAYEY SILT (ML) 2.8'-4.3'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	0	0	
6	**SILTY CLAY (CL) 4.3'-11.8'** Grey, moist, trace fine to medium sand				2/2	HPU	M	--	0	0	
8					2/2	HPU	M	--	0	35.7	
10	Grades brown with rust mottles and some fine to medium sand at 9.1 feet				2/2	HPU	M	--	10.6	50.5	
12	**CLAYEY SILT (ML) 11.8'-14.2'** Brown, moist, some fine sand				1/2	HPU	M	--	10.7	51.2	
14	**SILTY CLAY (CL) 14.2'-16.4'** Brown, rust mottles, moist, trace fine sand				2/2	HPU	M	--	15.5	11.4	
16	**CLAYEY SILT (ML) 16.4'-18.1'** Grey, moist, with fine sand, petroleum-like odor				2/2	HPU	M	--	25.1	30.4	
18	**SILTY SAND (SM) 18.1'-24.4'** Grey, moist, fine sand, petroleum-like odor				2/2	HPU	M	--	32.8	100	
20											

Boring/Well No.: MP-5D

Clayton GROUP SERVICES

BORING NO: MP-5D	WELL NO: MP-5D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					1/2	HPU	M	--	20.9	77.4	
24					2/2	HPU	M	--	30.1	20.9	
26 (8)	**SAND (SW) 24.4'-27.2'** Grey, saturated, fine to medium sand, some silt				2/2	HPU	S	--	21.3	76.0	
28	**SILTY SAND (SM) 27.2'-32.0'** Grey, saturated, fine sand				2/2	HPU	S	--	1.2	0	
30					2/2	HPU	S	--	0	3.7	
32 (10)					1/2	HPU	S	--	0	2.1	
34	End of Boring at 32.0 feet										
36											
38											
40 (12)											

Clayton
GROUP SERVICES

BORING NO: MP-5S	WELL NO: MP-5S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0950
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1005

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.3'** Gravel										
	FILL 0.3'-2.8' Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	--	--	
2	**CLAYEY SILT (ML) 2.8'-4.3'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
4	**SILTY CLAY (CL) 4.3'-10.0'** Grey, moist, trace fine to medium sand				2/2	HPU	M	--	--	--	
6 / 2					2/2	HPU	M	--	--	--	
8					2/2	HPU	M	--	--	--	
10	End of Boring at 10.0 feet										
12 / 4											
14											
16											
18 / 6											
20											

Boring/Well No.: MP-5S

Clayton
GROUP SERVICES

BORING NO: MP-6D	WELL NO: MP-6D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.35'-27.35'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1035	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/17.35'	DEV. METHODS: NA	FINISH TIME (hours): 1230	

DEPTH (ft)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**FILL 0.0'-0.2'** Gravel				2/2	HPU	M	--	0	0	
2	**FILL 0.2'-2.6'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	0	0	
4	**CLAYEY SILT (ML) 2.6'-4.1'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	0	0	
6	**SILTY CLAY (CL) 4.1'-16.3'** Grey, moist, trace fine to medium sand				2/2	HPU	M	--	0	0	
8	Grades brown with rust mottles and some fine sand at 8.2 feet				2/2	HPU	M	--	4.1	9.0	
10					2/2	HPU	M	--	9.3	71.7	
12					2/2	HPU	M	--	5.7	19.8	
14					2/2	HPU	M	--	14.1	42.8	
16	**CLAYEY SILT (ML) 16.3'-17.4'** Brown, moist, trace fine sand				1/2	HPU	M	--	24.2	86.1	
18	**SILTY SAND (SM) 17.4'-23.6'** Grey, saturated, fine sand, petroleum-like odor				1/2	HPU	S	--	17.8	74.3	
20											

Boring/Well No.: MP-6D

Clayton
GROUP SERVICES

BORING NO: MP-6D	WELL NO: MP-6D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
	Grades black with petroleum-like odor from 20.5 to 23.2 feet				2/2	HPU	S	--	46.5	155	
22					2/2	HPU	S	--	0	0.4	
24	**CLAYEY SILT (ML) 23.6'-24.2'** Brown, saturated, some fine sand, petroleum-like odor										
	SAND (SW) 24.2'-26.7' Black, saturated, fine to medium sand, some silt, petroleum-like odor				2/2	HPU	S	--	122	25.4	
26 8											
	SILTY SAND (SM) 26.7'-28.0' Brown, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	4.3	0	
28	End of Boring at 28.0 feet										
30											
32 10											
34											
36											
38											
12 40											

Clayton GROUP SERVICES

BORING NO: MP-6S	WELL NO: MP-6S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1240
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1250

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.2'** Gravel				2/2	HPU	M	--	--	--	
2	**FILL 0.2'-2.6'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 2.6'-4.1'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
6	**SILTY CLAY (CL) 4.1'-10.0'** Grey, moist, trace fine to medium sand				2/2	HPU	M	--	--	--	
8	Grades brown with rust mottles and some fine sand at 8.2 feet				2/2	HPU	M	--	--	--	
10	End of Boring at 10.0 feet										
12											
14											
16											
18											
20											

Boring/Well No.: MP-6S

Clayton
GROUP SERVICES

BORING NO: MP-7D	WELL NO: MP-7D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 16.65'-26.65'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1305	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/16.65'	DEV. METHODS: NA	FINISH TIME (hours): 1410	

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.2'** Gravel				1/2	HPU	M	--	--	--	No PID readings due to dead battery
2	**FILL 0.2'-2.4'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 2.4'-4.2'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
6 (2 m)	**SILTY CLAY (CL) 4.2'-12.1'** Grey, moist, some fine to medium sand				2/2	HPU	M	--	--	--	
8					2/2	HPU	M	--	--	--	
10	Grades brown with rust mottles and some fine sand at 9.1 feet				2/2	HPU	M	--	--	--	
12 (4 m)	**CLAYEY SILT (ML) 12.1'-14.5'** Brown, moist, some fine sand, petroleum-like odor				1/2	HPU	M	--	--	--	
14	**SILTY CLAY (CL) 14.5'-17.9'** Brown, rust mottles, moist, trace fine sand, petroleum-like odor				2/2	HPU	M	--	--	--	
16					2/2	HPU	M	--	--	--	
18 (6 m)	**SILTY SAND (SM) 17.9'-24.4'** Grey, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	--	--	
20											

Boring/Well No.: MP-7D

Clayton
GROUP SERVICES

BORING NO: MP-7D	WELL NO: MP-7D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					2/2	HPU	S	--	--	--	
24					2/2	HPU	S	--	--	--	
	SAND (SW) 24.4'-26.8' Black, saturated, fine to medium sand, some silt				1/2	HPU	S	--	--	--	
26 – 8	**SILTY SAND (SM) 26.8'-28'** Brown, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	--	--	
28	End of Boring at 28.0 feet										
30											
32 – 10											
34											
36											
38 – 12											
40											

Boring/Well No.: MP-7D

Clayton
GROUP SERVICES

BORING NO: MP-7S	WELL NO: MP-7S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1420
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1435

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.2'** Gravel				1/2	HPU	M	--	--	--	
2	**FILL 0.2'-2.4'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 2.4'-4.2'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
6 / 2	**SILTY CLAY (CL) 4.2'-10.0'** Grey, moist, some fine to medium sand				2/2	HPU	M	--	--	--	
8	Grades brown with rust mottles and some fine sand at 9.1 feet				2/2	HPU	M	--	--	--	
10	End of boring at 10.0 feet										
12 / 4											
14											
16											
18											
20 / 6											

Boring/Well No.: MP-7S

Clayton
GROUP SERVICES

BORING NO: MP-8D	WELL NO: MP-8D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.35'-27.35'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1450
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.35'	DEV. METHODS: NA	FINISH TIME (hours): 1555

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.3'** Gravel										No PID scans due to dead battery
	FILL 0.3'-3.8' Silty clay, moist, dusky, some fine to medium sand, trace roots				1/2	HPU	M	--	--	0	
2					2/2	HPU	M	--	--	0	
4	**CLAYEY SILT (ML) 3.8'-4.3'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	0	
6 / 2	**SILTY CLAY (CL) 4.3'-15.4'** Grey, moist, trace fine sand				2/2	HPU	M	--	--	41.8	
8	Grades brown with rust mottles and some fine sand at 9.3 feet				2/2	HPU	M	--	--	62.9	
10					2/2	HPU	M	--	--	101	
12 / 4					1/2	HPU	M	--	--	43.1	
14					1/2	HPU	M	--	--	46.8	
16	**CLAYEY SILT (ML) 15.4'-16.0'** Brown, moist, some fine sand, petroleum-like odor				2/2	HPU	M	--	--	27.1	
18	**SILTY CLAY (CL) 16.0'-18.2'** Brown, rust mottles, moist, trace fine sand, petroleum-like odor										
20 / 6	**SILTY SAND (SM) 18.2'-26.3'** Grey, saturated, fine sand, petroleum-like odor				1/2	HPU	S	--	--	61.2	

Boring/Well No.: MP-8D

Clayton
GROUP SERVICES

BORING NO: MP-8D	WELL NO: MP-8D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					2/2	HPU	S	--	--	1110	
24					1/2	HPU	S	--	--	1141	
26					2/2	HPU	S	--	--	1562	
8	**CLAYEY SILT (ML) 26.3'-28'** Grey, saturated, with fine sand, petroleum-like odor				2/2	HPU	S	--	--	1411	
28	End of Boring at 28.0 feet										
30											
32											
10											
34											
36											
38											
12											
40											

Boring/Well No.: MP-8D

Clayton
GROUP SERVICES

BORING NO: MP-8S	WELL NO: MP-8S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/23/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1615	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/23/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1630	

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Gravel										
	FILL 0.3'-3.8' Silty clay, moist, dusky, some fine to medium sand, trace roots				1/2	HPU	M	--	--	--	
2					2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 3.8'-4.3'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
6	**SILTY CLAY (CL) 4.3'-10.0'** *Grey, moist, trace fine sand*				2/2	HPU	M	--	--	--	
8	Grades brown with rust mottles and some fine sand at 9.3 feet				2/2	HPU	M	--	--	--	
10	End of boring at 10.0 feet										
12											
14											
16											
18											
20											

Boring/Well No.: MP-8S

Clayton
GROUP SERVICES

BORING NO: MP-9D	WELL NO: MP-9D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.6'-27.6'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0720
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.6'	DEV. METHODS: NA	FINISH TIME (hours): 0820

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Gravel				2/2	HPU	M	--	0	0	
2	**FILL 0.3'-3.2'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	0	0	
4	**CLAYEY SILT (ML) 3.2'-3.8'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	0	0	
	SILTY CLAY (CL) 3.8'-15.5' Grey, moist, trace fine sand										
6 / 2					2/2	HPU	M	--	0	0.8	
8	Grades brown with rust mottles and some fine sand at 9.6 feet				2/2	HPU	M	--	0	10.6	
10	Petroleum-like odorstarts at 11.0 feet				2/2	HPU	M	--	10.6	21.3	
12 / 4					1/2	HPU	M	--	11.8	16.2	
14					2/2	HPU	M	--	11.2	31.2	
16	**CLAYEY SILT (ML) 15.5'-16.2'** Brown, moist, some fine sand, petroleum-like odor				1/2	HPU	M	--	7.8	61.4	
18	**SILTY CLAY (CL) 16.2'-18.1'** Brown, rust mottles, moist, trace fine sand, petroleum-like odor				2/2	HPU	M/W	--	4.9	41.8	
20 / 6											

Boring/Well No.: MP-9D

Clayton
GROUP SERVICES

BORING NO: MP-9D	WELL NO: MP-9D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
	SILTY SAND (SM) 18.1'-20.6' Grey, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	47.2	86.5	
22	**CLAYEY SILT (ML) 20.6'-21.9'** Grey, saturated, with fine sand, petroleum-like odor										
	SILTY SAND (SM) 21.9'-27.8' Grey, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	116	247	
24											
					2/2	HPU	S	--	463	1280	
26											
8					2/2	HPU	S	--	342	1571	
28	**SILTY CLAY (CL) 27.8'-28'** Grey, saturated, with fine sand, petroleum-like odor										
	End of Boring at 28.0 feet										
30											
32											
10											
34											
36											
38											
12											
40											

Boring/Well No.: MP-9D

Clayton
GROUP SERVICES

BORING NO: MP-9S	WELL NO: MP-9S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-1 Vicinity/E. Birch Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0655
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 0705

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Gravel				2/2	HPU	M	--	--	--	
2	**FILL 0.3'-3.2'** Silty clay, moist, dusky, some fine to medium sand, trace roots				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 3.2'-3.8'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
6	**SILTY CLAY (CL) 3.8'-10.0'** Grey, moist, trace fine sand				2/2	HPU	M	--	--	--	
8	Grades brown with rust mottles and some fine sand at 9.6 feet				2/2	HPU	M	--	--	--	
10	End of Boring at 10.0 feet										
12											
14											
16											
18											
20											

Boring/Well No.: MP-9S

Clayton
GROUP SERVICES

BORING NO: MP-10D	WELL NO: MP-10D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.85'-27.85'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0950
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.85'	DEV. METHODS: NA	FINISH TIME (hours): 1050

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0 / 0	FILL 0.0'-0.2' Asphalt										
	SILTY SAND (SM) 0.2'-7.2' Brown, moist, fine sand				2/2	HPU	M	--	15.2	21.9	
2					2/2	HPU	M	--	14.9	12.7	
4					2/2	HPU	M	--	10.2	40.2	
6 / 2					2/2	HPU	M/W	--	21.8	37.8	
	CLAYEY SILT (ML) 7.2'-11.8' Brown, wet, with fine sand				1/2	HPU	W	--	0	0	
8					2/2	HPU	W	--	0	0	
10											
12	SILTY CLAY (CL) 11.8'-23.0' Brown, rust mottles, moist, trace fine to medium sand				1/2	HPU	M	--	0	1.8	
4					2/2	HPU	M	--	0	0	
14											
16					2/2	HPU	M	--	0	0	
18					2/2	HPU	M	--	0	0	
20 / 6											

Boring/Well No.: MP-10D

Clayton
GROUP SERVICES

BORING NO: MP-10D	WELL NO: MP-10D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					2/2	HPU	M	--	0	0	
24	**CLAYEY SILT (ML) 23.0'-28.0'** Brown, moist, some fine sand, rust mottles Grades saturated at 24.0 feet				2/2	HPU	M	--	0	1.7	
26 – 8					1/2	HPU	S	--	0	2.9	
28	Grades grey with fine sand at 27.3 feet				2/2	HPU	S	--	0	4.7	
30	End of Boring at 28.0 feet										
32 – 10											
34											
36											
38 – 12											
40											

Clayton
GROUP SERVICES

BORING NO: MP-10S	WELL NO: MP-10S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1110
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1120

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	FILL 0.0'-0.2' Asphalt										
	SILTY SAND (SM) 0.2'-7.2' Brown, moist, fine sand				2/2	HPU	M	--	--	--	
2					2/2	HPU	M	--	--	--	
4					2/2	HPU	M	--	--	--	
6					2/2	HPU	M/W	--	--	--	
8	CLAYEY SILT (ML) 7.2'-10.0' Brown, wet, with fine sand				2/2	HPU	W	--	--	--	
10	End of Boring at 10.0 feet										
12											
14											
16											
18											
20											

Boring/Well No.: MP-10S

Clayton
GROUP SERVICES

BORING NO: MP-11D	WELL NO: MP-11D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.85'-27.85'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1245
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.85'	DEV. METHODS: NA	FINISH TIME (hours): 1340

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.6'** Concrete				1.5/2	HPU	M	--	0	0	
	FILL 0.6'-3.7' Clayey silt, moist, black, some fine sand				1/2	HPU	M	--	0	12.2	
4	**SILTY CLAY (CL) 3.7'-5.8'** Brown, moist, trace fine to medium sand				1/2	HPU	M	--	0	2.4	
6 / 2	**CLAYEY SILT (ML) 5.8'-6.9'** Brown, moist, with fine sand				2/2	HPU	M	--	0	0	
	SILTY SAND (SM) 6.9'-9.5' Brown, moist, fine sand				2/2	HPU	M	--	0	0	
10	**SILTY CLAY (CL) 9.5'-23.5'** *Light brown, rust mottles, moist,* some fine to medium sand				2/2	HPU	M	--	0	0	
12 / 4					2/2	HPU	M	--	0	0	
14					2/2	HPU	M	--	0	2.6	
16					1/2	HPU	M	--	0	0	
18 / 6 / 20					2/2	HPU	M	--	0	0	

Clayton GROUP SERVICES

BORING NO: MP-11D	WELL NO: MP-11D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					2/2	HPU	M	--	0	0	
					2/2	HPU	0	--	0	M	
24	CLAYEY SILT (ML) 23.5'-28' brown, moist, with some fine sand Grades saturated at 24.0 feet				1/2	HPU	S	--	0	2.4	
26 – 8					2/2	HPU	S	--	0	4.1	
28	End of Boring at 28.0 feet										
30											
32 – 10											
34											
36											
38											
40 – 12											

Boring/Well No.: MP-11D

Clayton
GROUP SERVICES

BORING NO: MP-11S	WELL NO: MP-11S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1400
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1410

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**FILL 0.0'-0.6'** Concrete										
	FILL 0.6'-3.7' Clayey silt, moist, black, some fine sand				1/2	HPU	M	--	--	--	
2					1.5/2	HPU	M	--	--	--	
4	**SILTY CLAY (CL) 3.7'-5.8'** Brown, moist, trace fine to medium sand				2/2	HPU	M	--	--	--	
6	**CLAYEY SILT (ML) 5.8'-6.9'** Brown, moist, with fine sand				1/2	HPU	M	--	--	--	
2	**SILTY SAND (SM) 6.9'-9.5'** Brown, moist, fine sand				2/2	HPU	M	--	--	--	
8											
10	**SILTY CLAY (CL) 9.5'-10.0'** Light brown, rust mottles, moist, some fine to medium sand										
	End of Boring at 10.0 feet										
12											
4											
14											
16											
18											
6											
20											

Boring/Well No.: MP-11S

Clayton
GROUP SERVICES

BORING NO: MP-12D	WELL NO: MP-12D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.85'-27.85'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1530
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.85'	DEV. METHODS: NA	FINISH TIME (hours): 1700

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.6'** Concrete										
	FILL 0.6'-3.8' Clayey silt, moist, black, some fine sand				1/2	HPU	M	--	0	0	
2					1.5/2	HPU	M	--	0	0	
4	**CLAYEY SILT (ML) 3.8'-5.2'** Brown, moist, some fine sand				1.5/2	HPU	M	--	0	0	
6 / 2	**SILTY SAND (SM) 5.2'-9.8'** Brown, moist, fine sand				2/2	HPU	M	--	0	0	
8					2/2	HPU	M	--	0	0	
10	**CLAYEY SILT (ML) 9.8'-10.7'** Brown, moist, some fine sand				1.5/2	HPU	M	--	0	0	
	SILTY CLAY (CL) 10.7'-24.6' Light brown, rust mottles, moist, some fine to medium sand										
12 / 4					2/2	HPU	M	--	0	0	
14					2/2	HPU	M	--	0	1.1	
16	Grades dusky from 16.2 to 17.1 feet				1.5/2	HPU	M	--	0	0	
18					1/2	HPU	M	--	0	0	
20 / 6											

Boring/Well No.: MP-12D

Clayton GROUP SERVICES

BORING NO: MP-12D	WELL NO: MP-12D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					2/2	HPU	M	--	0	0	
24					1/2	HPU	M	--	0	4.2	
26	**CLAYEY SILT (ML) 24.6'-26.2'** Brown, saturated, with some fine sand				1/2	HPU	S	--	0	2.4	
8	**SILTY CLAY (CL) 26.2'-27.8'** Brown, saturated, rust mottles, some fine to medium sand				2/2	HPU	S	--	0	4.6	
28	**SILTY SAND (SM) 27.8'-28.0'** Grey, saturated, fine to medium sand										
30	End of Boring at 28.0 feet										
32											
10											
34											
36											
38											
12											
40											

Clayton
GROUP SERVICES

BORING NO: MP-12S	WELL NO: MP-12S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-6 Vicinity/W. Date Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/24/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1715
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/24/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1730

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.6'** Concrete										
	FILL 0.6'-3.8' Clayey silt, moist, black, some fine sand				1.5/2	HPU	M	--	--	--	
2					1/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 3.8'-5.2'** Brown, moist, some fine sand				2/2	HPU	M	--	--	--	
	SILTY SAND (SM) 5.2'-9.8' Brown, moist, fine sand										
6 / 2					1.5/2	HPU	M	--	--	--	
8					2/2	HPU	M	--	--	--	
10	**CLAYEY SILT (ML) 9.8'-10.0'** Brown, moist, some fine sand										
	End of Boring at 10.0 feet										
12 / 4											
14											
16											
18											
20 / 6											

Boring/Well No.: MP-12S

Clayton
GROUP SERVICES

BORING NO: MP-13D	WELL NO: MP-13D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.85'-27.85'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0755
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.85'	DEV. METHODS: NA	FINISH TIME (hours): 0850

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.4'** Asphalt				1/2	HPU	M	--	0	0.7	
2	**FILL 0.4'-2.1'** Silty clay, moist, black, some fine to medium sand				2/2	HPU	M	--	0	1.4	
4	**CLAYEY SILT (ML) 2.1'-7.6'** Brown, moist, with fine to medium sand Grades with fine sand at 4.5'				2/2	HPU	M	--	0	12.1	
6 (2 m)					2/2	HPU	M	--	0	11.8	
8	**SILTY CLAY (CL) 7.6'-13.5'** Brown, moist, rust mottles some fine sand				2/2	HPU	M	--	13.8	12.6	
10					2/2	HPU	M	--	31.9	247	
12 (4 m)					1/2	HPU	M	--	151	14.6	
14	**SILTY SAND (SM) 13.5'-22.5'** Light brown, moist, fine sand				2/2	HPU	M	--	6.2	142	
16					2/2	HPU	M	--	3.8	67.3	
18	Petroleum-like odor starts at 18.0 feet				2/2	HPU	M	--	28.8	115	
20 (6 m)											

Boring/Well No.: MP-13D

Clayton GROUP SERVICES

BORING NO: MP-13D	WELL NO: MP-13D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
	Grades black with petroleum-like odor from 20.5 to 23.2 feet				1/2	HPU	M	--	2000	2000	
22	**CLAYEY SILT (ML) 22.5'-23.2'** Brown, moist, some fine sand, petroleum-like odor				2/2	HPU	M	--	2000	2000	
24	**SILTY SAND (SM) 23.2'-28.0'** Brown, moist, fine sand, petroleum-like odor				1/2	HPU	S	--	2000	2000	
26	Grades black in color and saturated at 23.8 feet Grades grey at 25.2 feet				2/2	HPU	S	--	2000	2000	
28	End of Boring at 28.0 feet										
30											
32											
34											
36											
38											
40											

8 10 12

Clayton
GROUP SERVICES

BORING NO: MP-13S	WELL NO: MP-13S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0905	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 0915	

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.4'** Asphalt				1/2	HPU	M	--	--	--	
	FILL 0.4'-2.1' Silty clay, moist, black, some fine to medium sand										
2	**CLAYEY SILT (ML) 2.1'-7.6'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
4	Grades with fine sand at 4.5'				2/2	HPU	M	--	--	--	
6 / 2					2/2	HPU	M	--	--	--	
8	**SILTY CLAY (CL) 7.6'-10.0'** Brown, moist, rust mottles some fine sand				2/2	HPU	M	--	--	--	
10	End of Boring at 10.0 feet										
12 / 4											
14											
16											
18											
20 / 6											

Boring/Well No.: MP-13S

Clayton
GROUP SERVICES

BORING NO: MP-14D	WELL NO: MP-14D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.35'-27.35'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 0945
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.35'	DEV. METHODS: NA	FINISH TIME (hours): 1045

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Asphalt				2/2	HPU	M	--	0	0.6	
2	**FILL 0.3'-2.3'** Silty clay, moist, black, some fine to medium sand				2/2	HPU	M	--	0	0	
4	**CLAYEY SILT (ML) 2.3'-9.3'** Brown, moist, with fine to medium sand				1/2	HPU	M	--	0	4.9	
6 (2 m)					2/2	HPU	W	--	3.2	31.2	
8					1/2	HPU	W	--	--	--	
10	**SILTY CLAY (CL) 9.3'-14.2'** Brown, moist, rust mottles some fine sand				2/2	HPU	M	--	--	--	
12 (4 m)					1/2	HPU	M	--	0	14.7	
14	**SILTY SAND (SM) 14.2'-19.8'** Light brown, moist, fine sand				2/2	HPU	M	--	0	67.6	
16					2/2	HPU	M	--	0	32.6	
18					2/2	HPU	M	--	1.4	0	
20 (6 m)											

Boring/Well No.: MP-14D

Clayton
GROUP SERVICES

BORING NO: MP-14D	WELL NO: MP-14D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
	SILTY CLAY (CL) 19.8'-23.5' Brown, moist, rust mottles, some fine sand,				2/2	HPU	M	--	0	0	
22					2/2	HPU	--	--	--	M	
24	**SILTY SAND (SM) 23.5'-28.0'** grey, saturated, fine sand, petroleum-like odor				1/2	HPU	S	--	1684	2000	
26 8					2/2	HPU	S	--	1942	1824	
28	End of Boring at 28.0 feet										
30											
32											
10 34											
36											
38											
12 40											

Clayton
GROUP SERVICES

BORING NO: MP-14S	WELL NO: MP-14S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	

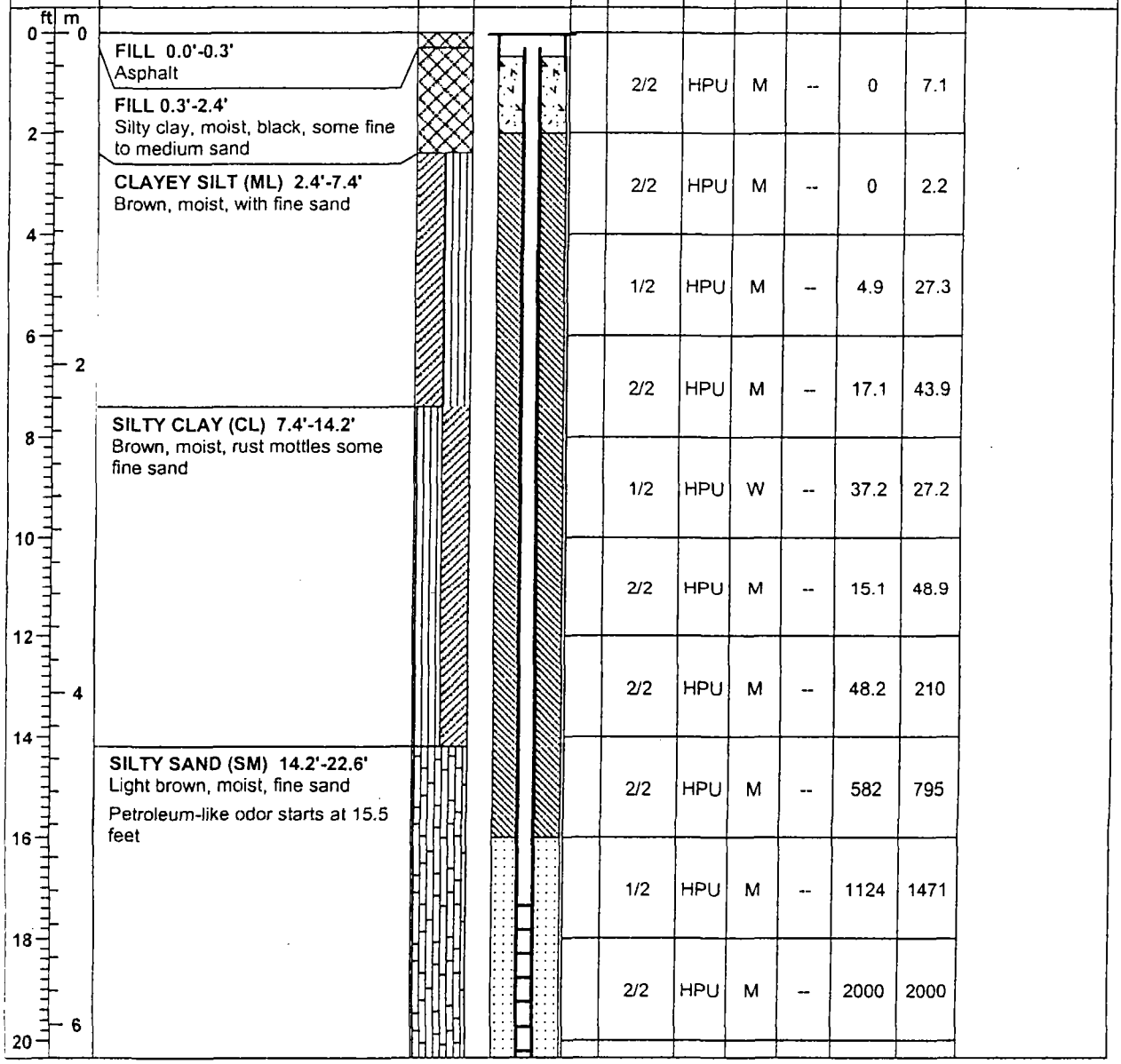
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1105
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1115

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Asphalt				2/2	HPU	M	--	--	--	
2	**FILL 0.3'-2.3'** Silty clay, moist, black, some fine to medium sand				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 2.3'-9.3'** Brown, moist, with fine to medium sand				1/2	HPU	M	--	--	--	
6					2/2	HPU	W	--	--	--	
8					2/2	HPU	W	--	--	--	
10	**SILTY CLAY (CL) 9.3'-10.0'** Brown, wet, rust mottles some fine sand										
12	End of Boring at 10.0 feet										
14											
16											
18											
20											

Boring/Well No.: MP-14S

Clayton
GROUP SERVICES

BORING NO: MP-15D	WELL NO: MP-15D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.35'-27.35'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1128	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/17.35'	DEV. METHODS: NA	FINISH TIME (hours): 1240	



DEPTH (ft)	DESCRIPTION	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Asphalt		2/2	HPU	M	--	0	7.1	
	FILL 0.3'-2.4' Silty clay, moist, black, some fine to medium sand								
2	**CLAYEY SILT (ML) 2.4'-7.4'** Brown, moist, with fine sand		2/2	HPU	M	--	0	2.2	
4			1/2	HPU	M	--	4.9	27.3	
6			2/2	HPU	M	--	17.1	43.9	
8	**SILTY CLAY (CL) 7.4'-14.2'** Brown, moist, rust mottles some fine sand		1/2	HPU	W	--	37.2	27.2	
10			2/2	HPU	M	--	15.1	48.9	
12			2/2	HPU	M	--	48.2	210	
14	**SILTY SAND (SM) 14.2'-22.6'** Light brown, moist, fine sand Petroleum-like odor starts at 15.5 feet		2/2	HPU	M	--	582	795	
16			1/2	HPU	M	--	1124	1471	
18			2/2	HPU	M	--	2000	2000	
20									

Clayton GROUP SERVICES

BORING NO: MP-15D	WELL NO: MP-15D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
					2/2	HPU	M	--	1229	1041	
22	**CLAYEY SILT (ML) 22.6'-23.4'** Brown, moist, some fine sand, petroleum-like odor				2/2	HPU	M	--	2000	2000	
24	**SILTY SAND (SM) 23.4'-28.0'** Grey, moist, fine sand, petroleum-like odor Grades black and saturated with petroleum-like odor from 24.0 to 25.0 feet				1/2	HPU	S	--	2000	2000	
26 – 8					2/2	HPU	S	--	2000	2000	
28	*End of Boring at 28.0 feet*										
30											
32 – 10											
34											
36											
38 – 12											
40											

Boring/Well No.: MP-15D

Clayton
GROUP SERVICES

BORING NO: MP-15S	WELL NO: MP-15S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling	
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC	
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03	
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1250	
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03	
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1300	

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.3'** Asphalt				2/2	HPU	M	--	--	--	
2	**FILL 0.3'-2.4'** Silty clay, moist, black, some fine to medium sand				2/2	HPU	M	--	--	--	
4	**CLAYEY SILT (ML) 2.4'-7.4'** Brown, moist, with fine sand				1/2	HPU	M	--	--	--	
6 / 2					2/2	HPU	M	--	--	--	
8	**SILTY CLAY (CL) 7.4'-10.0'** Brown, moist, rust mottles some fine sand				2/2	HPU	W	--	--	--	
10	End of Boring at 10.0 feet										
12 / 4											
14											
16											
18											
20 / 6											

Boring/Well No.: MP-15S

Clayton
GROUP SERVICES

BORING NO: MP-16D	WELL NO: MP-16D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	
DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank		LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 17.85'-27.85'		CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"		START DATE: 7/25/03
BOREHOLE DIA: 4"	STICKUP: Flushmount		START TIME (hours): 1310
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA		FINISH DATE: 7/25/03
RISER DIA/MTL/LGTH: 1.0"/PVC/17.85'	DEV. METHODS: NA		FINISH TIME (hours): 1405

DEPTH (ft)	DESCRIPTION	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	PID HEADSPACE	REMARKS
0	**FILL 0.0'-0.3'** Asphalt		2/2	HPU	M	--	0	7.9	
2	**FILL 0.3'-2.1'** Silty clay, moist, black, some fine to medium sand		2/2	HPU	M	--	0	5.6	
4	**CLAYEY SILT (ML) 2.1'-8.1'** Brown, moist, with fine to medium sand		1/2	HPU	M	--	0	32.9	
6			2/2	HPU	M	--	0	44.8	
8	**SILTY CLAY (CL) 8.1'-13.8'** Brown, wet, rust mottles some fine sand		2/2	HPU	W	--	0	7.3	
10			2/2	HPU	M	--	14.6	121	
12			1/2	HPU	M	--	37.2	341	
14	**SILTY SAND (SM) 13.8'-22.3'** Light brown, moist, fine sand Petroleum-like odor at 14.0 feet.		2/2	HPU	M	--	349	761	
16			2/2	HPU	M	--	1241	1765	
18			2/2	HPU	M	--	2000	2000	
20									

Boring/Well No.: MP-16D

Clayton
GROUP SERVICES

BORING NO: MP-16D	WELL NO: MP-16D	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
22					1.5/2	HPU	M	--	2000	1761	
	CLAYEY SILT (ML) 22.3'-23.7' Brown, moist, with fine sand, petroleum-like odor				2/2	HPU	M	--	1927	2000	
24	**SILTY SAND (SM) 23.7'-28.0'** Grey, saturated, fine sand, petroleum-like odor				2/2	HPU	S	--	2000	2000	
26 – 8					1/2	HPU	S	--	2000	1691	
28	End of Boring at 28.0 feet										
30											
32 – 10											
34											
36											
38											
12											
40											

Boring/Well No.: MP-16D

Clayton
GROUP SERVICES

BORING NO: MP-16S	WELL NO: MP-16S	PROJECT NO: 15-03095.06-002	PROJECT NAME: Premcor/Hartford, IL
BORING LOCATION: VCB-12 Vicinity/E. Forest Street		COORDINATES: NA	

DRILLING CO: Roberts Environmental Drilling	DRILLER: J. Crank	LOGGED BY: D. Frieling
DRILLING EQUIP: Geo Cat 642B Geoprobe	SCREEN INTERVAL: 5.0'-10.0'	CHECKED BY: KDC
STATIC WATER LEVEL: NA	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 7/25/03
BOREHOLE DIA: 4"	STICKUP: Flushmount	START TIME (hours): 1415
TOP of CASING ELEVATION: NA	G.S. ELEVATION: NA	FINISH DATE: 7/25/03
RISER DIA/MTL/LGTH: 1.0"/PVC/5.0'	DEV. METHODS: NA	FINISH TIME (hours): 1425

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**FILL 0.0'-0.3'** Asphalt				2/2	HPU	M	--	--	--	
	FILL 0.3'-2.1' Silty clay, moist, black, some fine to medium sand										
2	**CLAYEY SILT (ML) 2.1'-8.1'** Brown, moist, with fine to medium sand				2/2	HPU	M	--	--	--	
4					1/2	HPU	M	--	--	--	
6 / 2					2/2	HPU	M	--	--	--	
8	**SILTY CLAY (CL) 8.1'-10.0'** Brown, wet, rust mottles some fine sand				2/2	HPU	W	--	--	--	
10	End of Boring at 10.0 feet										
12 / 4											
14											
16											
18											
20 / 6											

Boring/Well No.: MP-16S

Clayton
GROUP SERVICES

SENTINEL WELLS INSTALLED DECEMBER 2003

Clayton GROUP SERVICES

BORING NO: HMW-25	WELL NO: HMW-25	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group
BORING LOCATION: Hartford, IL		COORDINATES:	
DRILLING CO: Philips Environmental Services Corp.	DRILLER: J. Bignall		LOGGED BY: H. Mendygral
DRILLING EQUIP: Hollow Stem Auger	SCREEN INTERVAL: 24.0 - 39.0 ft bgs		CHECKED BY: H. Mendygral
STATIC WATER LEVEL: 31.5'	SCREEN MTL/SLOT: PVC/0.010"		START DATE: 12/2/03
BOREHOLE DIA: 4"	STICKUP: N/A		START TIME (hours): 0850
TOP of CASING ELEVATION:	G.S. ELEVATION:		FINISH DATE: 12/2/03
RISER DIA/MTL/LGTH: 2"/PVC/23.5'	DEV. METHODS: Grundfos Pump		FINISH TIME (hours): 1125

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**ASPHALT (0.0'-0.5')**										
	FILL (0.5'-2.0') Clayey silt, black, moist, some fine sand			1	2/2	HS	M	--	0	--	
2	**SILTY CLAY (2.0'-8.0') - CL** Gray, trace sand Grades to light brown at 2.5'			2	3/3	HS	M	--	0	--	
4											
6 / 2				3	2/2	HS	M	--	0	--	
8	**SAND (8.0'-11.5') - SP** Light brown, moist, fine grained			4	2/3	HS	M	--	0	--	
10				5	2/2	HS	--	--	M	0	
12	**CLAYEY SILT (11.5'-12.0') - ML** Medium brown, moist, trace sand										
4	**SAND (12.0'-30.0') - SP** Light brown, moist, fine grained, poorly graded			6	3/3	HS	M	--	0	--	
14											
16				7	1/2	HS	M	--	0	--	
18				8	3/3	HS	M	--	0	--	
20 / 6											

Boring/Well No.: HMW-25

Clayton GROUP SERVICES

BORING NO: HMW-25	WELL NO: HMW-25	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
	SAND - SP (cont.) Light brown, moist, fine grained, poorly graded			9	1/2	HS	M	--	0	--	
22				10	1.5/3	HS	M	--	0	--	
24											
26	8			11	1/2	HS	M	--	0	--	
28				12	2/3	HS	VM	--	0	--	
30	**SILTY SAND (30.0'-39.0') - SM** Brown, fine to medium grained Saturated at 31.0'			13	1/2	HS	S	--	0	--	
32				14	1/3	HS	S	--	0	--	
34	10										
36				15	2/2	HS	S	--	0	--	
38				16	2/2	HS	S	--	0	--	
40	12 End of Boring at 39.0'										

Boring/Well No.: HMW-25

Illinois Environmental Protection Agency Well Completion Report

SITE #: _____ COUNTY: Madison WELL #: HMW-25

SITE NAME: Village of Hartford, Illinois BOREHOLE #: _____

STATE PLANE COORDINATE: X _____ Y _____ (or) LATITUDE: _____ LONGITUDE: _____

SURVEYED BY: _____ ILL REGISTRATION #: _____

DRILLING CONTRACTOR: Philips Environmental Services DRILLER: J. Bignall

CONSULTING FIRM: Clayton Group Services, Inc. GEOLOGIST: H. Mendygral

DRILLING METHOD: Hollow Stem Auger DRILLING FLUIDS (TYPE): None

LOGGED BY: H. Mendygral DATE STARTED: 12/02/03 DATE FINISHED: 12/02/03

REPORT FORM COMPLETED BY: M. Germann DATE: _____

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Concrete

INSTALLATION METHOD: Tremie Pipe

SETTING TIME: _____

TYPE OF BENTONITE SEAL-

GRANULAR, PELLET, SLURRY, CHIPS (CIRCLE ONE)

INSTALLATION METHOD: Poured

SETTING TIME: _____

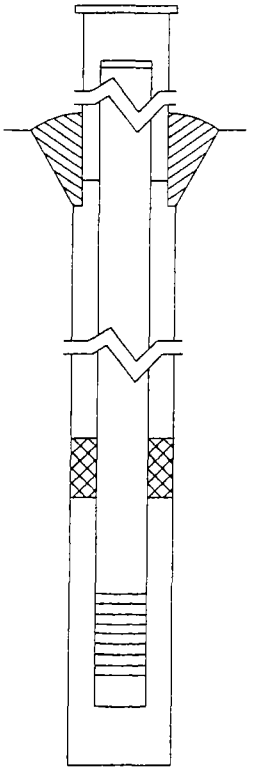
TYPE OF SAND PACK: Industrial Sand

GRAIN SIZE: _____

INSTALLATION METHOD: Poured

TYPE OF BACKFILL MATERIAL: Not Applicable (IF APPLICABLE)

INSTALLATION METHOD: Not Applicable



ELEVATIONS (MSL) *	DEPTHS (BGS) (.01 ft)	
---	0.5	TOP OF PROTECTIVE CASING
		TOP OF RISER PIPE
	0	GROUND SURFACE
	3.00	TOP OF ANNULAR SEALANT
	31.50	STATIC WATER LEVEL (AFTER COMPLETION)
	17.50	TOP OF SEAL
	20.50	TOP OF SANDPACK
	24.00	TOP OF SCREEN
	38.70	BOTTOM OF SCREEN
	39.00	BOTTOM OF WELL
	39.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS

(CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR OTHER:	Steel
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
SCREEN	SS304, SS316, PTFE, PVC OR OTHER:	

CASING MEASUREMENTS

DIAMETER OF BOREHOLE (In.)	4
ID OF RISER PIPE (in)	2
PROTECTIVE CASING LENGTH (ft)	1
RISER PIPE LENGTH (ft)	24
BOTTOM OF SCREEN TO END CAP (ft)	0.3
SCREEN LENGTH (1st SLOT TO LAST SLOT) (ft)	14.7
TOTAL LENGTH OF CASING (ft)	39.00
SCREEN SLOT SIZE **	0.010"

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

Clayton
GROUP SERVICES

BORING NO: HMW-26	WELL NO: HMW-26	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group
BORING LOCATION: 1/3 block W of N. Delmar on W. Watkins / Hartford, IL		COORDINATES:	
DRILLING CO: Philips Environmental Services Corp.	DRILLER: J. Bignall		LOGGED BY: H. Mendygral
DRILLING EQUIP: HSA	SCREEN INTERVAL: 25.0' bgs - 40.0 ' bgs		CHECKED BY: A. Schultz
STATIC WATER LEVEL: 30.0'	SCREEN MTL/SLOT: PVC/0.01"		START DATE: 12/3/03
BOREHOLE DIA: 4"	STICKUP: NA		START TIME (hours): 0900
TOP of CASING ELEVATION:	G.S. ELEVATION:		FINISH DATE: 12/3/03
RISER DIA/MTL/LGTH: 2"/PVC/24.5'	DEV. METHODS: Grundfos Pump		FINISH TIME (hours): 1120

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**ASPHALT (0.0'-0.5')**			1	1/1	HS	M	--	0	--	
2	**FILL (0.5'-.0.8')** Sandy silt, medium brown, moist, some gravel; **ASPHALT (0.8'-0.9')**			2	2.5/2.5	HS	M/VM	--	0	--	
4	**FILL (0.9'-1.5)** Clayey silt, black, some sand; **SAND (1.5'-3.5') - SP** Light brown, very moist, fine to medium grained, trace silt										
6 / 2	**SILTY SAND (3.5'-9.0') - SM** Light to medium brown, fine to medium grained			3	2/5	HS	VM	--	0	--	
8											
10	**SILTY CLAY (9.0'-12.5') - CL** Gray mottled with brown, very moist, soft, trace fine sand			4	4/5	HS	VM/W	--	0/5.7	--	
12 / 4	**SAND (12.5'-13.5') - SP** Light brown, wet, fine grained										
14	**CLAYEY SILT (13.5'-15.0') - ML** Gray mottled with brown, very moist, soft, trace fine sand										
16	**SILTY CLAY (15.0'-17.5') - CL** Gray, very moist, mottled with brown, very soft			5	4.5/5	HS	VM	--	0	--	
18	**SAND (17.5'-23.0') - SP** Light brown, very moist, fine grained										
20 / 6				6	3.5/5	HS	VM	--	0	--	
22											

Boring/Well No.: HMW-26

Clayton GROUP SERVICES

BORING NO: HMW-26	WELL NO: HMW-26	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
24	**SILTY CLAY (23.0'-24.5') - CL** Gray, very moist, very soft, trace sand										
26 (8)	**SAND (24.5'-40.0') - SP** Gray, wet, fine to medium grained sand, some silt			7	4/5	HS	W	--	0	--	
28											
30	Water at 30.05'			8	2.5/5	HS	S	--	0	--	
32 (10)											
34											
36				9	4/5	HS	S	--	0	--	
38											
40 (12)				10	1.5/1.5	HS	S	--	0	--	
42	End of Boring at 40.0'										
44											

Illinois Environmental Protection Agency Well Completion Report

SITE #: _____ COUNTY: Madison WELL #: HMW-26

SITE NAME: Village of Hartford, Illinois BOREHOLE #: _____

STATE PLANE COORDINATE: X _____ Y _____ (or) LATITUDE: _____ LONGITUDE: _____

SURVEYED BY: _____ ILL REGISTRATION #: _____

DRILLING CONTRACTOR: Philips Environmental Services DRILLER: J. Bignall

CONSULTING FIRM: Clayton Group Services, Inc. GEOLOGIST: H. Mendygral

DRILLING METHOD: Hollow Stem Auger DRILLING FLUIDS (TYPE): None

LOGGED BY: H. Mendygral DATE STARTED: 12/03/03 DATE FINISHED: 12/03/03

REPORT FORM COMPLETED BY: M. Germann DATE: _____

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Concrete

INSTALLATION METHOD: Tremie Pipe

SETTING TIME: _____

TYPE OF BENTONITE SEAL-

GRANULAR, PELLET, SLURRY, CHIPS (CIRCLE ONE)

INSTALLATION METHOD: Poured

SETTING TIME: _____

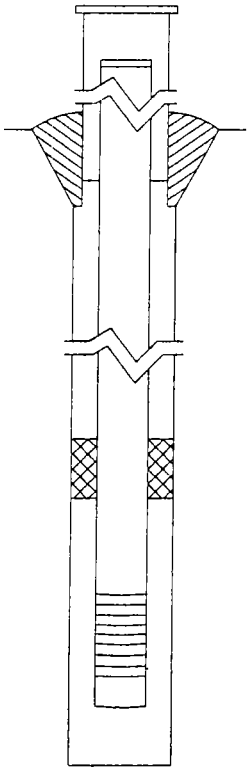
TYPE OF SAND PACK: Industrial Sand

GRAIN SIZE: _____

INSTALLATION METHOD: Poured

TYPE OF BACKFILL MATERIAL: Not Applicable (IF APPLICABLE)

INSTALLATION METHOD: Not Applicable



ELEVATIONS (MSL) *	DEPTHS (BGS) (.01 ft)	
—	0.5	TOP OF PROTECTIVE CASING
		TOP OF RISER PIPE
	0	GROUND SURFACE
	3.00	TOP OF ANNULAR SEALANT
	30.00	STATIC WATER LEVEL (AFTER COMPLETION)
	17.50	TOP OF SEAL
	23.00	TOP OF SANDPACK
	25.00	TOP OF SCREEN
	39.70	BOTTOM OF SCREEN
	40.00	BOTTOM OF WELL
	40.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS

(CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR OTHER:	Steel
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
SCREEN	SS304, SS316, PTFE, PVC OR OTHER:	

CASING MEASUREMENTS

DIAMETER OF BOREHOLE (in.)	4
ID OF RISER PIPE (in)	2
PROTECTIVE CASING LENGTH (ft)	1
RISER PIPE LENGTH (ft)	25
BOTTOM OF SCREEN TO END CAP (ft)	0.3
SCREEN LENGTH (1st SLOT TO LAST SLOT) (ft)	14.7
TOTAL LENGTH OF CASING (ft)	40.00
SCREEN SLOT SIZE **	0.010"

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

Clayton GROUP SERVICES

BORING NO: HMW-27	WELL NO: HMW-27	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group
BORING LOCATION: NE corner of E. Maple St. and N. Market / Harford, IL		COORDINATES:	
DRILLING CO: Philips Environmental Services Corp.	DRILLER: J. Bignall		LOGGED BY: H. Mendygral
DRILLING EQUIP: HSA	SCREEN INTERVAL: 25.0' - 39.7'		CHECKED BY: A. Schultz
STATIC WATER LEVEL: 33.0'	SCREEN MTL/SLOT: 0.01"		START DATE: 12/4/03
BOREHOLE DIA: 4"	STICKUP: NA		START TIME (hours): 0820
TOP of CASING ELEVATION:	G.S. ELEVATION:		FINISH DATE: 12/4/03
RISER DIA/MTL/LGTH: 2"/PVC/24.5'	DEV. METHODS: Grundfos Pump		FINISH TIME (hours): 0955

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**ASPHALT (0.0'-0.5')**										
2	**FILL (0.5'-0.8')** Silt, black,, some clay and fine sand and gravel			1	1.5/3.5	HS	M	--	0	--	
4	**CLAYEY SILT (0.8'-9.0') - ML** Dark brown, soft Grades to trace sand and gravel at 1.5' Grades to light brown at 3.5'			2	4.5/5	HS	M	--	0	--	
6 (2 m)	Light to medium brown, soft, trace fine sand at 5.0'										
8											
10	**SILTY CLAY (9.0'-12.5') - CL** Light to medium brown, trace clay and fine sand			3	4/5	HS	M	--	0	--	
12 (4 m)	**SAND (12.5'-16.5') - SP** Light brown, moist, fine grained			4	4.5/5	HS	M	--	0	--	
14											
16	**SILTY SAND (16.5'-20.0') - SM** Light brown, moist, fine grained										
18											
20 (6 m)	**SILTY CLAY (20.0'-23.0') - CL** Light brown, wet, very soft, some fine sand			5	4.75/5	HS	W/VM	--	0	--	
22											

Boring/Well No.: HMW-27

Clayton GROUP SERVICES

BORING NO: HMW-27	WELL NO: HMW-27	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
24	**SAND (23.0'-33.0') - SP** Light brown, very moist, fine grained										
26 (8)				6	3.5/5	HS	VM	--	0	--	
28											
30				7	3.5/5	HS	VM/S	--	0	--	
32	Saturated at 33.0'										
(10)	**SILTY SAND (33.0'-40.0') - SM** Medium brown, wet, fine to medium grained										
34											
36				8	2.5/5	HS	S	--	0	--	
38											
(12)	End of Boring at 40.0'			9	1.5/1.5	HS	S	--	0	--	
40											
42											
44											

Boring/Well No.: HMW-27

Illinois Environmental Protection Agency Well Completion Report

SITE #: _____ COUNTY: Madison WELL #: HMW-27

SITE NAME: Village of Hartford, Illinois BOREHOLE #: _____

STATE PLANE COORDINATE: X _____ Y _____ (or) LATITUDE: _____ LONGITUDE: _____

SURVEYED BY: _____ ILL REGISTRATION #: _____

DRILLING CONTRACTOR: Philips Environmental Services DRILLER: J. Bignall

CONSULTING FIRM: Clayton Group Services, Inc. GEOLOGIST: H. Mendygral

DRILLING METHOD: Hollow Stem Auger DRILLING FLUIDS (TYPE): None

LOGGED BY: H. Mendygral DATE STARTED: 12/04/03 DATE FINISHED: 12/04/03

REPORT FORM COMPLETED BY: M. Germann DATE: _____

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Concrete

INSTALLATION METHOD: Tremie Pipe

SETTING TIME: _____

TYPE OF BENTONITE SEAL-

GRANULAR, PELLET, SLURRY, CHIPS (CIRCLE ONE)

INSTALLATION METHOD: Poured

SETTING TIME: _____

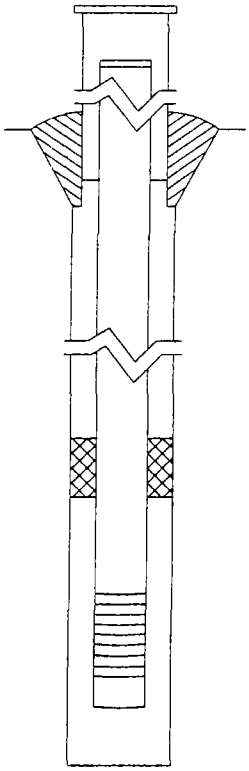
TYPE OF SAND PACK: Industrial Sand

GRAIN SIZE: _____

INSTALLATION METHOD: Poured

TYPE OF BACKFILL MATERIAL: Not Applicable (IF APPLICABLE)

INSTALLATION METHOD: Not Applicable



ELEVATIONS (MSL) *	DEPTHS (BGS) (.01 ft)	
---	0.5	TOP OF PROTECTIVE CASING
		TOP OF RISER PIPE
	0	GROUND SURFACE
	3.00	TOP OF ANNULAR SEALANT
	33.00	STATIC WATER LEVEL (AFTER COMPLETION)
	18.00	TOP OF SEAL
	23.00	TOP OF SANDPACK
	25.00	TOP OF SCREEN
	39.70	BOTTOM OF SCREEN
	40.00	BOTTOM OF WELL
	40.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS

(CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR OTHER:	Steel
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
SCREEN	SS304, SS316, PTFE, PVC OR OTHER:	

CASING MEASUREMENTS

DIAMETER OF BOREHOLE (In.)	4
ID OF RISER PIPE (in)	2
PROTECTIVE CASING LENGTH (ft)	1
RISER PIPE LENGTH (ft)	25
BOTTOM OF SCREEN TO END CAP (ft)	0.3
SCREEN LENGTH (1st SLOT TO LAST SLOT) (ft)	14.7
TOTAL LENGTH OF CASING (ft)	40.00
SCREEN SLOT SIZE **	0.010"

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

Clayton GROUP SERVICES

BORING NO: HMW-28	WELL NO: HMW-28	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group
BORING LOCATION: Hartford, IL		COORDINATES:	

DRILLING CO: Philips Environmental Services Corp.	DRILLER: J. Bignall	LOGGED BY: H. Mendygral
DRILLING EQUIP: HSA	SCREEN INTERVAL: 25.0' - 39.7'	CHECKED BY: A. Schultz
STATIC WATER LEVEL: 32.6'	SCREEN MTL/SLOT: PVC/0.01"	START DATE: 12/5/03
BOREHOLE DIA: 4"	STICKUP: NA	START TIME (hours): 1005
TOP of CASING ELEVATION:	G.S. ELEVATION:	FINISH DATE: 12/5/03
RISER DIA/MTL/LGTH: 2"/PVC/24.5	DEV. METHODS:	FINISH TIME (hours): 1315

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0 / 0	**ASPHALT (0.0'-0.5')**										
2	**FILL (0.5'-5.0')** Silt, medium brown, moist, trace sand and gravel			1	2/3.5	HS	M	--	0	--	
4	Grades to light brown at 3.5'			2	4/5	HS	M	--	0	--	
6 / 2	**SILTY CLAY (5.0'-13.5') - CL** Light brown, moist, grades to medium brown, stiff, trace fine sand and gravel										
8				3	4.5/5	HS	M	--	0	--	
10											
12 / 4											
14	**SAND (13.5'-17.0') - SP** Light brown, very moist, trace silt, fine grained			4	4/5	HS	VM/W	--	0	--	
16											
18	**SILTY CLAY (17.0'-19.5') - CL** Light brown, wet, trace fine sand and gravel										
20 / 6	**CLAYEY SILT (19.5' - 20.0') ML** Light brown, very moist, with dark brown mottles, trace fine sand			5	4/5	HS	W/M	--	0	--	
22	**SILTY CLAY (20.0' - 22.0') CL** Light brown, moist, with dark brown mottles, trace fine sand										
24	**SAND (22.0'-40.0') - SP** Light brown, moist, fine grained										

Boring/Well No.: HMW-28

Clayton GROUP SERVICES

BORING NO: HMW-28	WELL NO: HMW-28	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
26				6	3/5	HS	M	--	0	--	
28											
9 30				7	3.5/5	HS	VM/S	--	0	--	
32	Saturated at 32.6'										
34											
36 11				8	3/5	HS	S	--	0	--	
38											
40				9	1/1.5	HS	S	--	0	--	
	End of Boring at 40.0'										
42 13											
44											
46											
48											

Boring/Well No.: HMW-28

Illinois Environmental Protection Agency Well Completion Report

SITE #: _____ COUNTY: Madison WELL #: HMW-28

SITE NAME: Village of Hartford, Illinois BOREHOLE #: _____

STATE PLANE COORDINATE: X _____ Y _____ (or) LATITUDE: _____ LONGITUDE: _____

SURVEYED BY: _____ ILL REGISTRATION #: _____

DRILLING CONTRACTOR: Philips Environmental Services DRILLER: J. Bignall

CONSULTING FIRM: Clayton Group Services, Inc. GEOLOGIST: H. Mendygral

DRILLING METHOD: Hollow Stem Auger DRILLING FLUIDS (TYPE): None

LOGGED BY: H. Mendygral DATE STARTED: 12/05/03 DATE FINISHED: 12/05/03

REPORT FORM COMPLETED BY: M. Germann DATE: _____

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Concrete

INSTALLATION METHOD: Tremie Pipe

SETTING TIME: _____

TYPE OF BENTONITE SEAL-

GRANULAR, PELLET, SLURRY, CHIPS (CIRCLE ONE)

INSTALLATION METHOD: Poured

SETTING TIME: _____

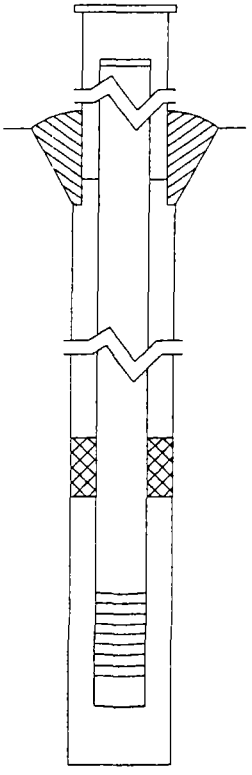
TYPE OF SAND PACK: Industrial Sand

GRAIN SIZE: _____

INSTALLATION METHOD: Poured

TYPE OF BACKFILL MATERIAL: Not Applicable (IF APPLICABLE)

INSTALLATION METHOD: Not Applicable



ELEVATIONS (MSL) *	DEPTHS (BGS)	(.01 ft)
---	0.5	TOP OF PROTECTIVE CASING
		TOP OF RISER PIPE
	0	GROUND SURFACE
	3.00	TOP OF ANNULAR SEALANT
	32.60	STATIC WATER LEVEL (AFTER COMPLETION)
	18.10	TOP OF SEAL
	21.50	TOP OF SANDPACK
	25.00	TOP OF SCREEN
	39.70	BOTTOM OF SCREEN
	40.00	BOTTOM OF WELL
	40.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS

(CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR OTHER: Steel
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, PVC OR OTHER:
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, PVC OR OTHER:
SCREEN	SS304, SS316, PTFE, PVC OR OTHER:

CASING MEASUREMENTS

DIAMETER OF BOREHOLE (in.)	4
ID OF RISER PIPE (in)	2
PROTECTIVE CASING LENGTH (ft)	1
RISER PIPE LENGTH (ft)	25
BOTTOM OF SCREEN TO END CAP (ft)	0.3
SCREEN LENGTH (1st SLOT TO LAST SLOT) (ft)	14.7
TOTAL LENGTH OF CASING (ft)	40.00
SCREEN SLOT SIZE **	0.010"

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

Clayton GROUP SERVICES

BORING NO: HMW-29	WELL NO: HMW-29	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group
BORING LOCATION: Hartford, IL		COORDINATES:	
DRILLING CO: Philips Environmental Services Corp.	DRILLER: J. Bignall		LOGGED BY: H. Mendygral
DRILLING EQUIP: HSA	SCREEN INTERVAL: 25.0' - 39.7'		CHECKED BY: A. Schultz
STATIC WATER LEVEL: 32.0'	SCREEN MTL/SLOT: PVC/0.01"		START DATE: 12/6/03
BOREHOLE DIA: 4"	STICKUP: NA		START TIME (hours): 0840
TOP of CASING ELEVATION:	G.S. ELEVATION:		FINISH DATE: 12/6/03
RISER DIA/MTL/LGTH: 2"/PVC/24.5	DEV. METHODS: Grundfos Pump		FINISH TIME (hours): 1050

DEPTH (ft / m)	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
0	**ASPHALT (0.0'-0.5')**										
2	**FILL (0.5'-0.7')** Silt, medium brown, some fine gravel **ASPHALT (0.7'-0.9')**			1	3.5/3.5	HS	M	--	0	--	
4	**FILL (0.9'-5.0')** Clayey silt, dark brown, some fine gravel and sand Grades to medium brown at 4.0'										
6 / 2	**SILTY CLAY (5.0'-8.5') - CL** Medium brown, moist, with red-brown mottles, stiff, trace fine sand and gravel Wood pieces at 7.0' bgs			2	3.5/8.5	HS	M	--	0	--	
8											
10	**SILTY SAND (8.5'-13.5') - SM** Light brown, moist, fine grained sand			3	8.5/13.5	HS	M	--	0	--	
12 / 4											
14	**SAND (13.5'-17.5') - SP** Light brown,moist, trace silt, fine grained			4	13.5/18.5	HS	M	--	0	--	
16											
18	**SILTY CLAY (17.5'-18.5') - CL** Light brown, moist, trace fine sand										
20 / 6	**SILTY SAND (18.5'-23.0') - SM** Light brown,moist, trace clay, fine grained			5	18.5/23.5	HS	M/W	--	0	--	
22											

Boring/Well No.: HMW-29

Clayton GROUP SERVICES

BORING NO: HMW-29	WELL NO: HMW-29	PROJECT NO: 15-03095.12-002	PROJECT NAME: Premcor-Hartford Work Group

DEPTH	DESCRIPTION	GRAPHIC	WELL	SAMPLES NUMBER	RECOVERY	METHOD	MOISTURE	BLOW CNT (6")	PID SCAN	HEADSPACE	REMARKS
24	**SILTY CLAY (23.0'-24.5') - CL** Light brown, wet, with gray mottles, trace fine sand Grades gray at 23.5'										
26 (8)	**SILTY SAND (24.5'-27.5') - SM** Gray, some clay, wet, fine grained			6	23.5/28.5	HS	W	--	0	--	
28	**SAND (27.5'-40.0') - SP** Gray, saturated, trace silt, fine to medium grained										
30				7	28.5/33.5	HS	S	--	--	--	
32 (10)	Wet at 32.0'										
34											
36				8	3.0/5	HS	S	--	--	--	
38											
40 (12)				9	1.5/1.5	HS	S	--	--	--	
	End of Boring at 40.0'										
42											
44											

Boring/Well No.: HMW-29

Illinois Environmental Protection Agency Well Completion Report

SITE #: _____ COUNTY: Madison WELL #: HMW-29

SITE NAME: Village of Hartford, Illinois BOREHOLE #: _____

STATE PLANE COORDINATE: X _____ Y _____ (or) LATITUDE: _____ LONGITUDE: _____

SURVEYED BY: _____ ILL REGISTRATION #: _____

DRILLING CONTRACTOR: Philips Environmental Services DRILLER: J. Bignall

CONSULTING FIRM: Clayton Group Services, Inc. GEOLOGIST: H. Mendygral

DRILLING METHOD: Hollow Stem Auger DRILLING FLUIDS (TYPE): None

LOGGED BY: H. Mendygral DATE STARTED: 12/06/03 DATE FINISHED: 12/06/03

REPORT FORM COMPLETED BY: M. Germann DATE: _____

ANNULAR SPACE DETAILS

TYPE OF SURFACE SEAL: Concrete

TYPE OF ANNULAR SEALANT: Concrete

INSTALLATION METHOD: Tremie Pipe

SETTING TIME: _____

TYPE OF BENTONITE SEAL-

GRANULAR, PELLET, SLURRY, CHIPS (CIRCLE ONE)

INSTALLATION METHOD: Poured

SETTING TIME: _____

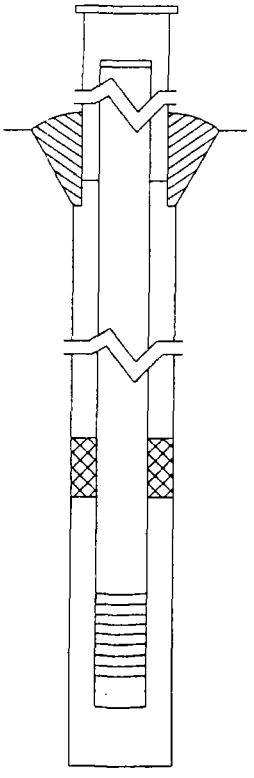
TYPE OF SAND PACK: Industrial Sand

GRAIN SIZE: _____

INSTALLATION METHOD: Poured

TYPE OF BACKFILL MATERIAL: Not Applicable (IF APPLICABLE)

INSTALLATION METHOD: Not Applicable



ELEVATIONS (MSL) *	DEPTHS (BGS) (.01 ft)	
----	0.5	TOP OF PROTECTIVE CASING
		TOP OF RISER PIPE
	0	GROUND SURFACE
	3.00	TOP OF ANNULAR SEALANT
	32.00	STATIC WATER LEVEL (AFTER COMPLETION)
	17.70	TOP OF SEAL
	21.70	TOP OF SANDPACK
	25.00	TOP OF SCREEN
	39.70	BOTTOM OF SCREEN
	40.00	BOTTOM OF WELL
	40.00	BOTTOM OF BOREHOLE

* REFERENCED TO A NATIONAL GEODETIC VERTICAL DATUM

WELL CONSTRUCTION MATERIALS

(CIRCLE ONE)

PROTECTIVE CASING	SS304, SS316, PTFE, PVC OR OTHER:	Steel
RISER PIPE ABOVE W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
RISER PIPE BELOW W.T.	SS304, SS316, PTFE, PVC OR OTHER:	
SCREEN	SS304, SS316, PTFE, PVC OR OTHER:	

CASING MEASUREMENTS

DIAMETER OF BOREHOLE (in.)	4
ID OF RISER PIPE (in)	2
PROTECTIVE CASING LENGTH (ft)	1
RISER PIPE LENGTH (ft)	25
BOTTOM OF SCREEN TO END CAP (ft)	0.3
SCREEN LENGTH (1st SLOT TO LAST SLOT) (ft)	14.7
TOTAL LENGTH OF CASING (ft)	40.00
SCREEN SLOT SIZE **	0.010"

** HAND-SLOTTED WELL SCREENS ARE UNACCEPTABLE

Clayton GROUP SERVICES

APPENDIX C-2

SOIL BORING LOG/WELL COMPLETION REPORTS – OUTSIDE VILLAGE OF HARTFORD

- PREMCOR WELLS
- SHELL WELLS – RAND AVENUE SITE AND TANNERY PROPERTY

Clayton GROUP SERVICES

THE FOLLOWING BORING LOGS ARE UNAVAILABLE AND THEREFORE NOT INCLUDED:

- **P-77**
- **P-78**
- **P-79**
- **P-105**
- **P-106**
- **P-107**
- **RB-30**
- **RB-38**
- **SP-28**
- **SP-37**
- **SP-40**
- **SP-43**

Clayton
GROUP SERVICES

PREMCOR WELLS

SOIL TEST BORING LOG LOG No.: GB-1

HERITAGE REMEDIATION/ENGINEERING, INC.
183 MCDONNELL BOULEVARD
ST. LOUIS, MISSOURI 63042
PHONE 314-521-3600
FAX 314-731-3922

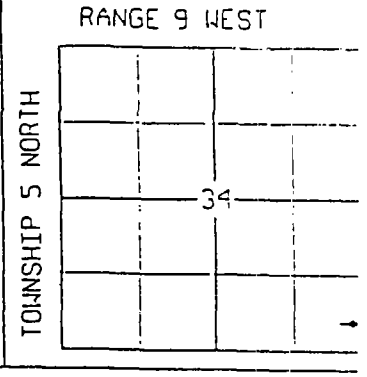
SITE LOCATION: CLARK OIL & REFINING
HARTFORD, ILLINOIS
GUARD BASIN
HR/E JOB No.: 9349091

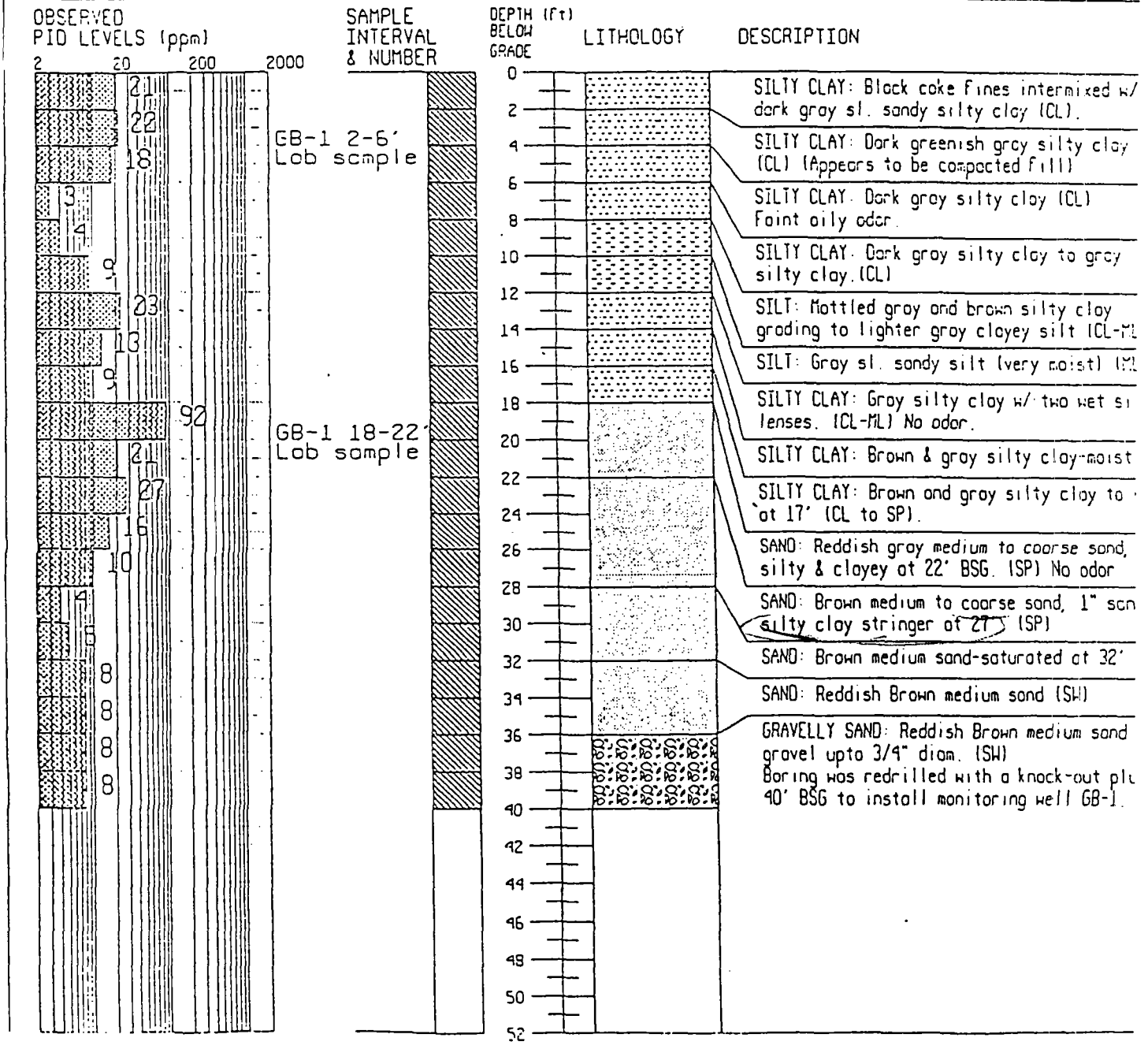
DRILLING Co: LAYNE WESTERN COMPANY
DRILL RIG: ACKER DRILL
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 ft. SPLIT-SPOON
DRILLER: SONNY COX
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: DENNIS GUSEWELLE (CLARK)
START: 0940 1/22/93
END: 1330 1/22/93

COORDINATES:
X: 2103 34
Y: 928 47
Z: 432 26

WEATHER: 35-50F, SUNNY

EST. WATER LEVEL: 398.36





MONITORING WELL LOG

LOG No. : GB-1

HERITAGE REMEDIATION/ENGINEERING, INC.
183 MCDONNELL BLVD.
ST LOUIS, MISSOURI 63042
PHONE 314-521-3600
FAX 314-731-3922

SITE LOCATION: CLARK OIL & REFINING
HARTFORD, ILLINOIS
GUARD BASIN

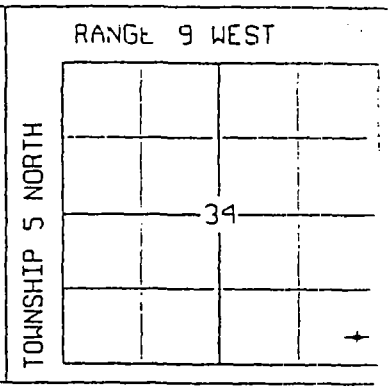
HR/E JOB No.: 9349091

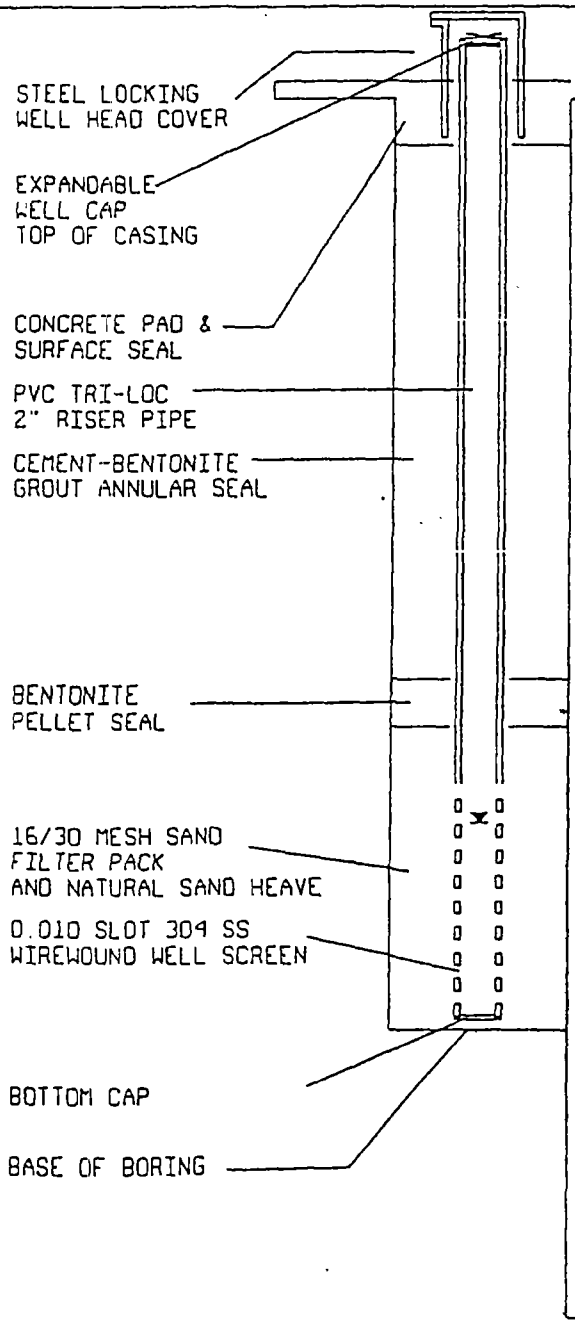
DRILLING Co: LAYNE WESTERN COMPANY
DRILL RIG: ACKER DRILL
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 Ft. SPLIT-SPOON
DRILLER: SONNY COX
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: DENNIS GUSEWELLE (CLARK)
START: 0940:1/22/93
END: 1330:1/22/93

COORDINATES:
X: 2103 34
Y: 928 47
Z: 432.26

WEATHER: 35-50F, SUNNY

WATER LEVEL: 398.36



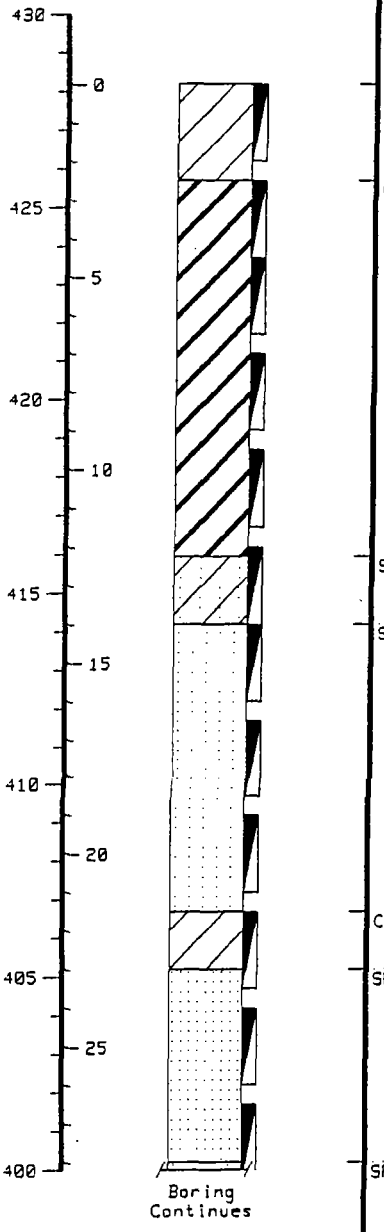


DEPTH (ft) BELOW GRADE	LITHOLOGY	DESCRIPTION
0–2		SILTY CLAY: Black coke fines intermixed w/ dark gray sl. sandy silty clay (CL).
2–4		SILTY CLAY: Dark greenish gray silty clay (CL) (Appears to be compacted fill).
4–6		SILTY CLAY: Dark gray silty clay (CL) Faint oily odor.
6–8		SILTY CLAY: Dark gray silty clay to gray silty clay (CL)
8–10		SILT: Mottled gray and brown silty clay grading to lighter gray clayey silt. (CL-ML)
10–12		SILT: Gray sl. sandy silt (very moist) (ML)
12–14		SILTY CLAY: Gray silty clay w/ two wet silt lenses. (CL-ML) No odor.
14–16		SILTY CLAY: Brown & gray silty clay-moist
16–18		SILTY CLAY: Brown and gray silty clay to sc at 17' (CL to SP).
18–20		SAND: Reddish gray medium to coarse sand, silty & clayey at 22' BSG. (SP) No odor.
20–22		SAND: Brown medium to coarse sand, 1" sand; silty clay stringer at 27'. (SP)
22–24		SAND: Brown medium sand-saturated at 32'.
24–26		SAND: Reddish Brown medium sand (SW)
26–28		GRAVELLY SAND: Reddish Brown medium sand w gravel upto 3/4" diam. (SW) Boring was redrilled with a knock-out plug 40' BSG to install monitoring well GB-1.
28–30		
30–32		
32–34		
34–36		
36–38		
38–40		
40–42		
42–44		
44–46		
46–48		
48–50		
50–52		

RECORD OF SUBSURFACE EXPLORATION

BORING: GB-06

PROJECT: CLARK REFINING & MARKETING, INC. ELEVATION: 428.2 Ft.
HARTFORD REFINERY JOB NUMBER: 10335
DRILLNG METHOD: 4.25 inch H.S.A. DATE DRILLED: 08/05-10/93
DRILLED BY: Clark GROUNDWATER: During Drilling - 26.5 Feet
LOGGED BY: Salch
MONITORING WELL NUMBER: GB-06



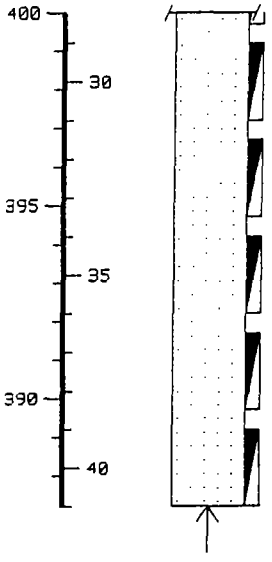
USCS	DESCRIPTION	REMARKS	RECOVERY RATIO in/in	OVM READINGS, PPM BZ/BH/SAMPLE
CL	Dark Brown Silty CLAY with Organics; Dry; Stiff		4/24	0/0/0
CH	Dark Brown CLAY trace Silt, Organics; Medium Stiff; Medium Plasticity	No recovery, description obtained from cuttings.	0/24	0/0/0
			16/24	0/0/0
	-Gray; Medium-High Plasticity below 6.5'		20/24	0/0/0
	-Oxidation Staining at 8.5'		18/24	0/0/0
SC	Gray-Brown Clayey Fine-Medium SAND; Moist to Wet		18/24	0/0/0
SP	Light Brown Medium SAND; Moist; Dense; Two Thin Clay Seams		14/24	0/0/0
	-Fine-Medium Grained below 16.5'		18/24	0/0/0.2
			18/24	0/0/0.2
CL	Gray Sandy CLAY trace Gravel; Soft; Wet; Medium Plasticity		20/24	0/0/0
SW	Light Brown SAND; Moist; Dense		20/24	
		Water at 26.5 feet.	19/24	0/0/0
SP	Gray Fine-Medium SAND; Wet			

Note: Analytical samples taken form 4.5 - 6.5 feet and 26.5 - 28.5 feet.

RECORD OF SUBSURFACE EXPLORATION

BORING: GB-06

PROJECT: CLARK REFINING & MARKETING, INC. ELEVATION: 428.2 Ft.
HARTFORD REFINERY JOB NUMBER: 10335
DRILLNG METHOD: 4.25 inch H.S.A. DATE DRILLED: 08/05-10/93
DRILLED BY: Clark GROUNDWATER: During Drilling - 26.5 Feet
LOGGED BY: Salch
MONITORING WELL NUMBER: GB-06



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	REMARKS	RECOVERY RATIO in/in	OVM READINGS, PPM BZ/BH/SAMPLE
		SP	Gray Fine-Medium SAND; Wet		22/24	0/0/0
			-Olive Parting		14/24	0/0/0
					24/24	0/0/0
				Sample collected for grain size analysis 36.5 - 40.0 feet.	18/24	0/0/0
					18/24	0/0/0
				Termination of boring at 41.0 feet.		

Note: Analytical samples taken form 4.5 - 6.5 feet and 26.5 - 28.5 feet.

BEI 031031

Legend:

Symbol:	Description:	Symbol:	Description:
	CL - Silty CLAY		CH - CLAY
	SP - Poorly Graded SAND		SC - SAND/CLAY Mixture
	SW - Well Graded SAND		Standard 1 3/8 Inch Dia. Split-Barrel Sample. Blows/Inches
	Water measured at time indicated		Depth of water at the time of drilling
	Termination of Boring		

Notes:

H.S.A. - Hollow Stem Auger

HMX and OVM are types of air monitoring equipment

PPM - Parts per Million

Illinois Environmental Protection Agency

Well Completion Report

Site # _____ County: Madison Well # GB-06

Site Name: Clark Oil Refinery - Hartford Il. Grid Coordinate: Northing _____ Easting _____

Drilling Contractor: Burlington Environmental Inc. Date Drilled Start: 8-5-93

Driller: John McMullen Geologist: James M. Salch Date Completed: 8-18-93

Drilling Method: Gus Pech 22R HSA 12 1/4" & 4 1/4" Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Grout

Amount of cement: # of bags 5 lbs. per bag 94

Amount of bentonite: # of bags .5 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Pellet
1 - 5 Gallon Bucket

Amount of bentonite: # of Bags _____ lbs. per bag _____

Type of Sand Pack: 20-40 Silica Sand

Source of Sand: Commercial

Amount of Sand: # of bags 4.5 lbs. per bag 100

Well Construction Materials

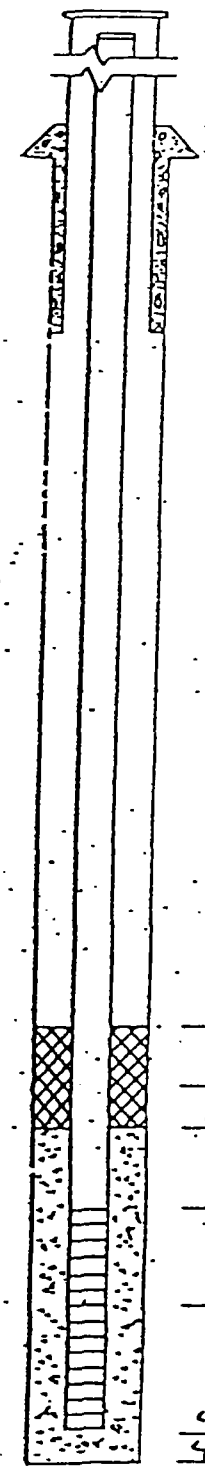
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint	Flush Thread			
Riser pipe above w.t.	304			
Riser pipe below w.t.	304			
Screen	304			
Coupling joint screen to riser	Flush Thread			
Protective casing				Steel

Measurements

to .01 ft. (where applicable)

Riser pipe length	28.33
Protective casing length	5'
Screen length	15'
Bottom of screen to end cap	0.35
Top of screen to first joint	0.10
Total length of casing	15' (10" PVC Permanent Casing)
Screen slot size	.010
% of openings in screen	
Diameter of borehole (in)	16.5" To 15' - 8.5" From 15'-41'
ID of riser pipe (in)	2"

Elevations — .01 ft.



	MSL Top of Protective Ca.
3.08	MSL Top of Riser Pipe
	ft. Casing Stickup
	MSL Ground Surface
0.58	ft. Top of annular sealan
16.8	ft. Top of Seal
5.9	ft. Total Seal Interval
22.7	ft. Top of Sand
25.25	ft. Top of Screen
15.0	ft. Total Screen Interval
40.37	ft. Bottom of Screen
41.0	ft. Bottom of Borehole

BEI 026830

Completed by: James M. Salch Surveyed by: _____ IIL registration # _____

SOIL TEST BORING LOG LOG No. : LP-4

HERITAGE REMEDIATION/ENGINEERING, INC
183 MCDONNELL BOULEVARD
ST LOUIS, MISSOURI 63042
PHONE 314-521-3600
FAX 314-731-3922

SITE LOCATION: CLARK OIL & REFINING
HARTFORD, ILLINOIS
LIME PITS

HR/E JOB No.: 9349091

DRILLING Co: LAYNE WESTERN COMPANY
DRILL RIG: ACKER DRILL
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 Ft SPLIT-SPOON
DRILLER: SONNY COX
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: DENNIS GUSEWELLE (CLARK)
START: 1315 2/3/93
END: 1615 2/3/93

COORDINATES:
X: 2745 90
Y: 2180 11
Z: 429 29

WEATHER: 50F, Sunny

EST. WATER LEVEL: 392.79

RANGE 9 WEST

TOWNSHIP 5 NORTH

34

OBSERVED PID LEVELS (ppm)

2 20 200 2000

25 13 56 26 20 19 14 12 10 13 23 26 33 33 16 21 15 15

SAMPLE INTERVAL & NUMBER

LP-4 4-6' Lab sample

LP-4 24-28' Lab sample

DEPTH (ft) BELOW GRADE

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52

LITHOLOGY

DESCRIPTION

SILTY CLAY: Dark reddish brn. silty clay. Fill with cinders. (CL) No odor.

SILTY CLAY: Greenish gray silty clay to a dark grayish brown silty sand with cinders @ 4'. (CL)

SILTY CLAY: Very dark gray silty clay to mottled brown & gray silty clay at 7' BSG (CL) Musty odor, possible hydrocarbons.

SILT: Mottled brown & gray clayey silt (ML) grading to a silt at 10-12' to a sandy silt from 12-14'. (ML) Musty odor.

SAND: Yellowish red fine to medium sand with a trace of coarse sand. (SW)

SILTY SAND: Yellowish red silty fine to medium sand. (SM)

SAND: Yellowish red medium to coarse sand. (SP) Slight unknown odor.

SAND: Reddish brown medium to coarse sand, reddish gray at 27'. (SP) Sweet unknown odor.

SAND: Reddish gray medium to coarse sand. (SP) Wet at 33.5'.

SAND: No samples were collected as a result of heaving sands.
Boring was redrilled with a knock-out plug to 42' BSG to install monitoring well LP-4.

MONITORING WELL LOG

LOG No. : LP-4

HERITAGE REMEDIATION/ENGINEERING, INC.
183 MCDONNELL BLVD.
ST LOUIS, MISSOURI 63042
PHONE 314-521-3600
FAX: 314-731-3922

SITE LOCATION: CLARK OIL & REFINING
HARTFORD, ILLINOIS
LIME PITS

HR/E JOB No.: 9349091

DRILLING Co: LAYNE WESTERN COMPANY
DRILL RIG: ACKER DRILL
DRILLING METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: 2 Ft. SPLIT-SPOON
DRILLER: SONNY COX
PROJECT GEOLOGIST: KEVIN REINHARD
PROJECT ENGINEER: DENNIS GUSEWELLE (CLARK)
START: 1315:2/3/93
END: 1615:2/3/93

COORDINATES:
X: 2745.90
Y: 2180.11
Z: 429.29

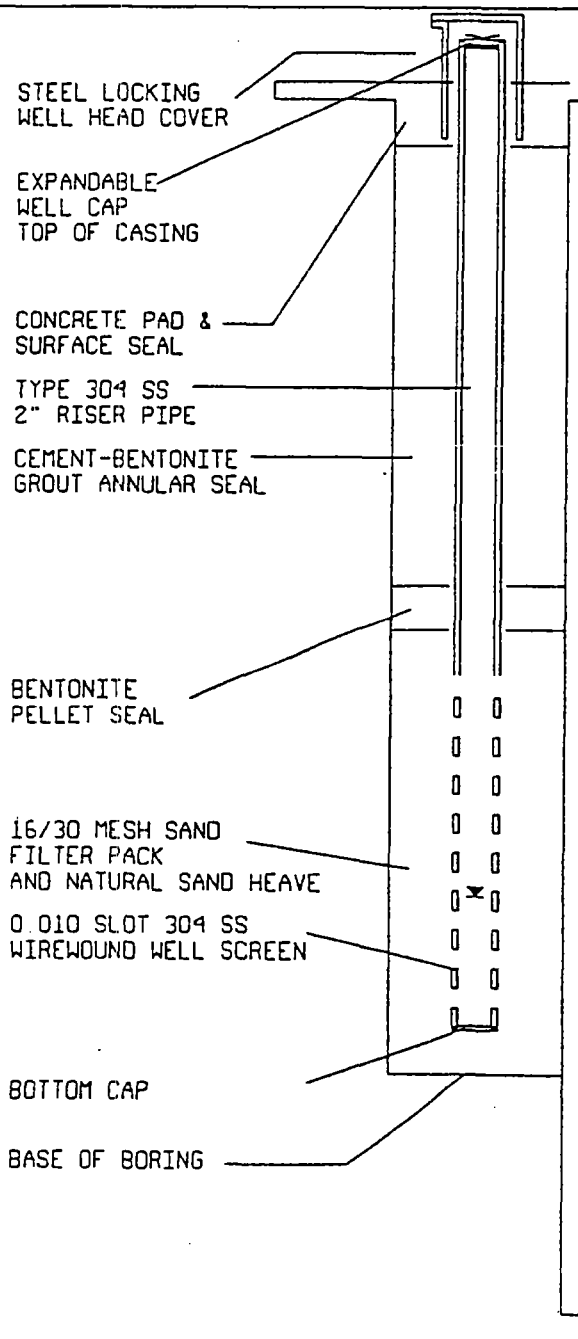
WEATHER: 50F, Sunny

WATER LEVEL: 392.79

RANGE 9 WEST

TOWNSHIP 5 NORTH

34



DEPTH (ft) BELOW GRADE	LITHOLOGY	DESCRIPTION
0–2		SILTY CLAY: Dark reddish brn. silty clay. Fill with cinders. (CL) No odor.
2–4		SILTY CLAY: Greenish gray silty clay to a dark grayish brown silty sand with cinders @ 4'. (CL)
4–8		SILTY CLAY: Very dark gray silty clay to mottled brown & gray silty clay at 7' BSG (CL) Musty odor, possible hydrocarbons.
8–14		SILT: Mottled brown & gray clayey silt (ML grading to a silt at 10-12' to a sandy silt from 12-14'. (ML) Musty odor.
14–16		SAND: Yellowish red fine to medium sand with a trace of coarse sand. (SW)
16–20		SILTY SAND: Yellowish red silty fine to medium sand. (SM)
20–22		SAND: Yellowish red medium to coarse sand (SP) Slight unknown odor.
22–28		SAND: Reddish brown medium to coarse sand, reddish gray at 27'. (SP) Sweet unknown odor.
28–36		SAND: Reddish gray medium to coarse sand. (SP) Wet at 33.5'.
36–40		SAND: No samples were collected as a resul of heaving sands. Boring was redrilled with a knock-out plug to 42' BSG to install monitoring well LP-4. Sand lock caused bottom of we to be installed at 40' BSG.

0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation - Clark Oil BORING BB-10

On Premier Facility

CONTRACT 607-79 DRILLING METHOD Hollow Auger DATE DRILLED 7/16-17/79 PIEZOMETER Yes LOGGED BY Schaefer DRILLED BY Simoncini

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 428.39)	BLOWS	DRY UNIT WEIGHT PCF
				Brown Silty CLAY		
				Gray CLAY w/Oxidized Spots & Stains		
5	1	SS			3-3	
				Intermixed Silty CLAY & Clayey SILT w/Oxidized Stains, Calcareous Concretions & Hydrocarbon Odor		
10	2	SS			2-4	
				Gray CLAY w/Oxidized Spots & Stains, Hydrocarbon Odor		
15	3	SS			1-1	
				Intermixed Clayey SILT & Fine SAND w/Hydrocarbon Odor		
20	4	SS			1-1	
				Gray CLAY w/Hydrocarbon Odor		
				-w/Oxidized Stains @ 24.0'		
25	5	SS	Wet	-w/Black Spots Below 26.5'	1-1	
	6	SS			1-2	
30	7	SS		-w/Oxidized Spots @ 31.5'	2-3	
	8	SS		-w/Traces of Fine Sand @34.0'	1-2	
35	9 A B	SS		CONT'D	2-10	

SHEAR STRENGTH, TSF — SV △ — QP/2 □ — QU/2 ○ — 0 0.5 1.0 1.5 2.0 2.

PL + — WATER • CONTENT % — LL + — 0 20 40 60 80 100

BEI 023495

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ _____ AFTER _____ _____

SCALE 1" = 5'

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation - Clark Oil BORING LB-10 Cont'd

On Premcor Facility

DRILLED BY Simoncini LOGGED BY Schaefer

DATE DRILLED 7/16-17/79 PIEZOMETER Yes

DRILLING METHOD Hollow Auger CONTRACT 607-79

ELEVATION 393.39

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
	9	SS		~~Gr CLAY w/Oxid Spt & Trace Sa~~		
				Gray Fine SAND w/Hydrocarbon Odor		
	10	SS		-w/Traces of Clay @ 36.5'	2-5	
				-Fine to Coarse Below 39.0'		
40	11	SS			15-16	
	12	SS			12-12	
45	13	SS			13-15	
				T.O.B.		
50						

SHEAR STRENGTH, TSF: SV (Δ) — QP/2 (□) — QU/2 (C); 0, 0.5, 1.0, 1.5, 2.0, 2

WATER CONTENT, %: PL (+) — (●) — LL (+); 0, 20, 40, 60, 80, 100

BEI 023496

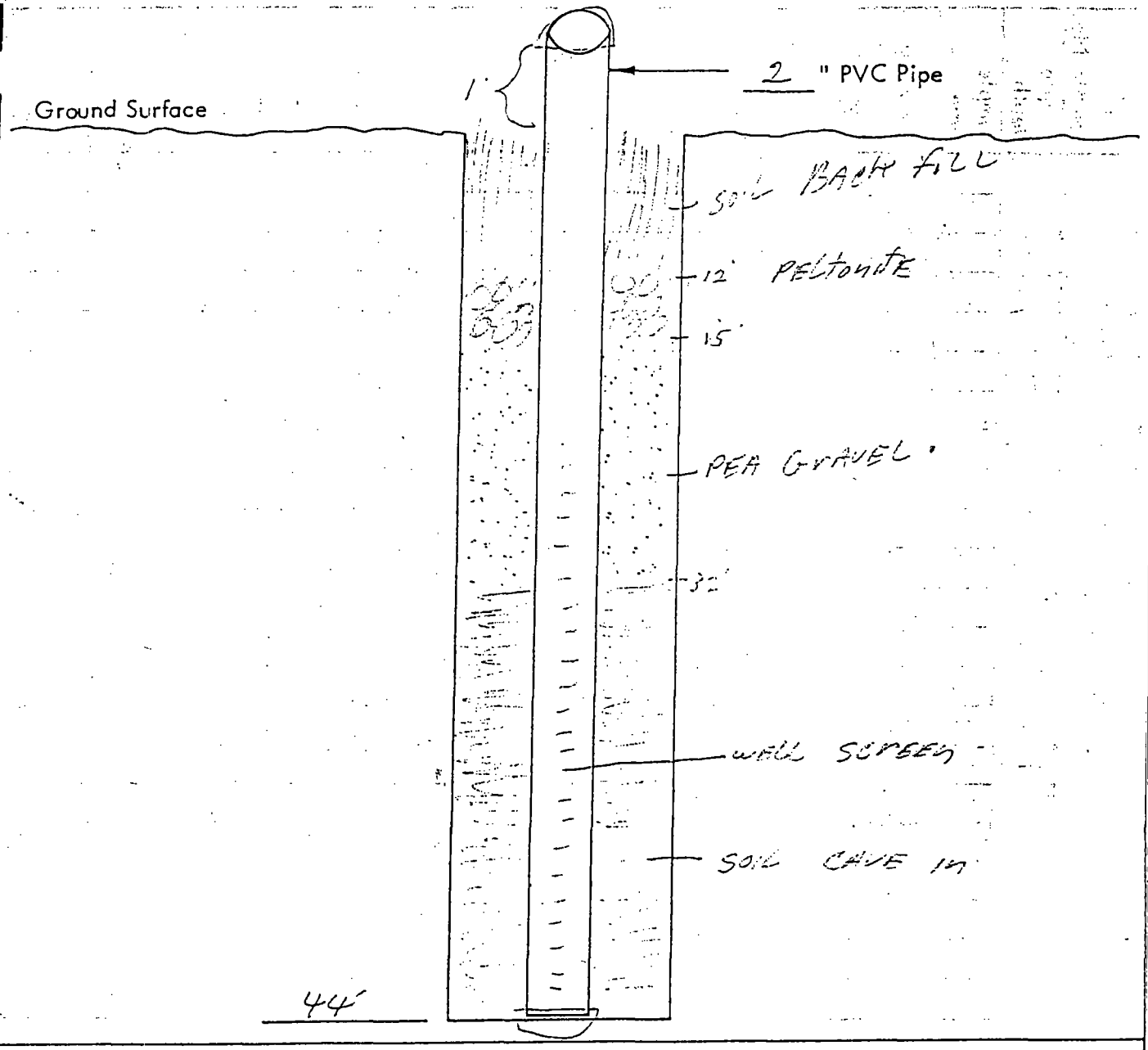
GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ _____ AFTER _____ _____

SCALE 1" = 5'

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 10 Contract No. 607 Date Installed 7-17-79



NOTES:

BEI 023556

Information Checklist: Type of Backfill Soil Strata

~~Type of Screen~~ ~~Length of Screen~~ ~~Length of Pipe~~ ~~Height of Pipe Above Ground~~

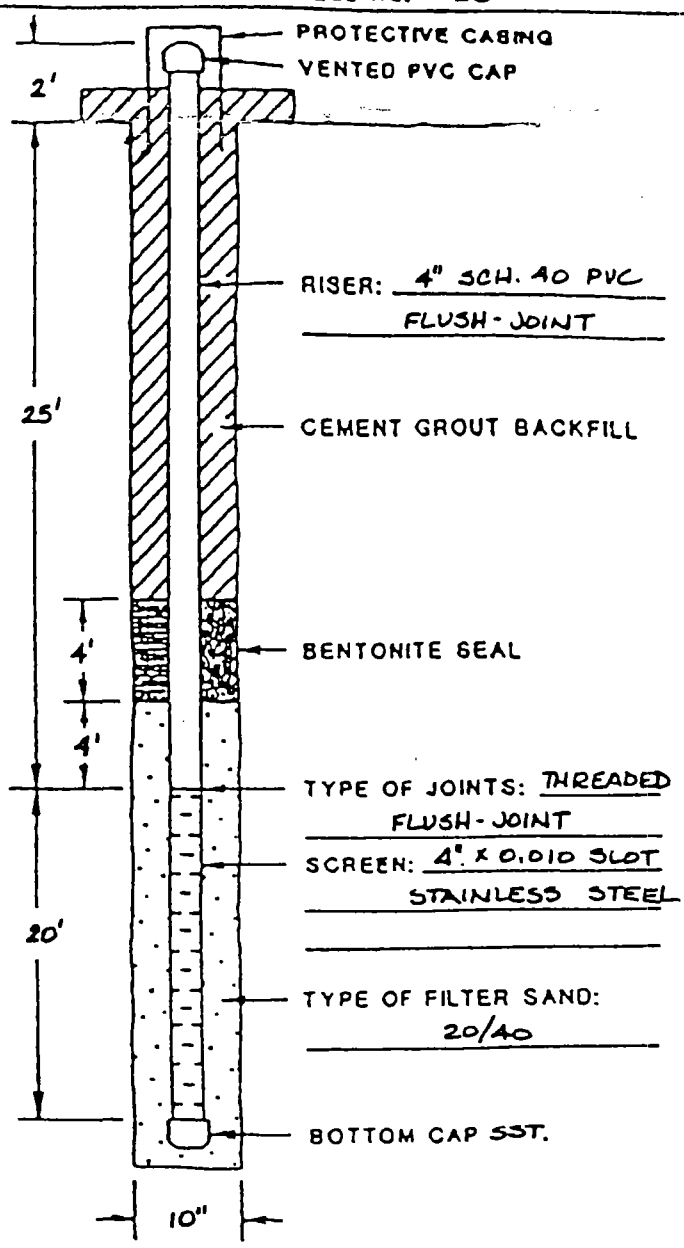
Cap on Bottom Cap on Top How Sealed at Surface

LOCATION: CLARK OIL REFINERY - HARTFORD, IL.

LOG OF BORING NO. RB-10

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION
			TOP OF RISER EL GROUND SURFACE EL
			BLACK CLAY
10			
			BLACK AND GRAY CLAY
20			GRAY CLAY
30			GRAY SAND
40			
			T.O.B.
50			
60			
			TOTAL DEPTH: 47'

LOG OF MONITORING WELL NO. RB-10



INSTALLATION METHOD: OVERDRILLED 2" WELL WITH 4 1/4 HSA, REMOVED 2" WELL MATERIALS, REAMED WITH 6 1/4 HSA AND SET 4" WELL.

COMPLETION DEPTH:

BORING COMPLETION DATE: 10-21-94

DEPTH TO WATER:

JOB: CLARK OIL COMPANY
JOB NO.: 661552
LOCATION: HARTFORD, IL.

MONITORING WELL INSTALLATION REPORT

DATE: 11-04-94

Layne-Western Company, Inc.

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation, Clark Oil BORING RB-25

On Premcor Facility

CONTRACT 60?-79 DRILLED BY Bignam

DRILLING METHOD Hollow Auger LOGGED BY Schaefer

DATE DRILLED 11/28/79 PIEZOMETER Yes

SURFACE ELEVATION 430 (est)

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Dark Gray CLAY w/traces of gravel		
				Gray CLAY w/oxidized spots & stains		
5	1	SS			3-5	
				Gray Clayey SILT w/traces of fine Sand -w/oxidized spots & stains @ 9.0'		
10	2	SS			2-3	
15	3	SS			2-2	
				Gray Silty CLAY w/oxidized spots		
20	4	SS			2-3	
			Hit Water @ 24.0	Gray & Brown CLAY -w/oxidized spots & stains & calcarous concretions @ 24.0'		
25	5	SS			2-3	
	6	SS	No sample taken		----	
				-Gray & Reddish Gray w/traces of fine Sand @ 29.0'		
30	7	SS			2-2	
	8	SS	Added Water	Gray fine SAND -w/organic stains @ 34.0'	6-15	
35	9	SS		Cont.	9-9	

SHEAR STRENGTH, TSF — SV, QP/2, QU/2 — 0, 0.5, 1.0, 1.5, 2.0, 2.5

WATER CONTENT % — PL, LL — 0, 20, 40, 60, 80, 100

BEI 020523

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ _____ AFTER _____ _____

SCALE 1" = _____

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation, Clark Oil

BORING RB-25 cont.

On Premier Facility

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION 395 (est))	BLOWS	DRY UNIT WEIGHT PCF
	9	SS		Gray fine SAND		
			Added	-w/organic matter @ 36.5'		
	10	SS	Water		7-7	
				Gray CLAY		
40	11	SS		-w/silt & organic matter @ 39.0'	2-2	
				-w/fine Sand @ 41.5'		
	12	SS		Gray fine to medium SAND	6-12	
				-fine to coarse below 44.0'		
45	13	SS			26-27	
	14	SS			23-26	
				T.O.B.		
50						

SHEAR STRENGTH, TSF: SV △ — OP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2.5)

WATER CONTENT, % (0, 20, 40, 60, 80, 100): PL + — ● — LL +

BEI 023524

CONTRACT 607-79

DRILLING METHOD Hollow Auger

DATE DRILLED 11/28/79

PIEZOMETER Yes

DRILLED BY Bignell

LOGGED BY Schaefer

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ AFTER _____

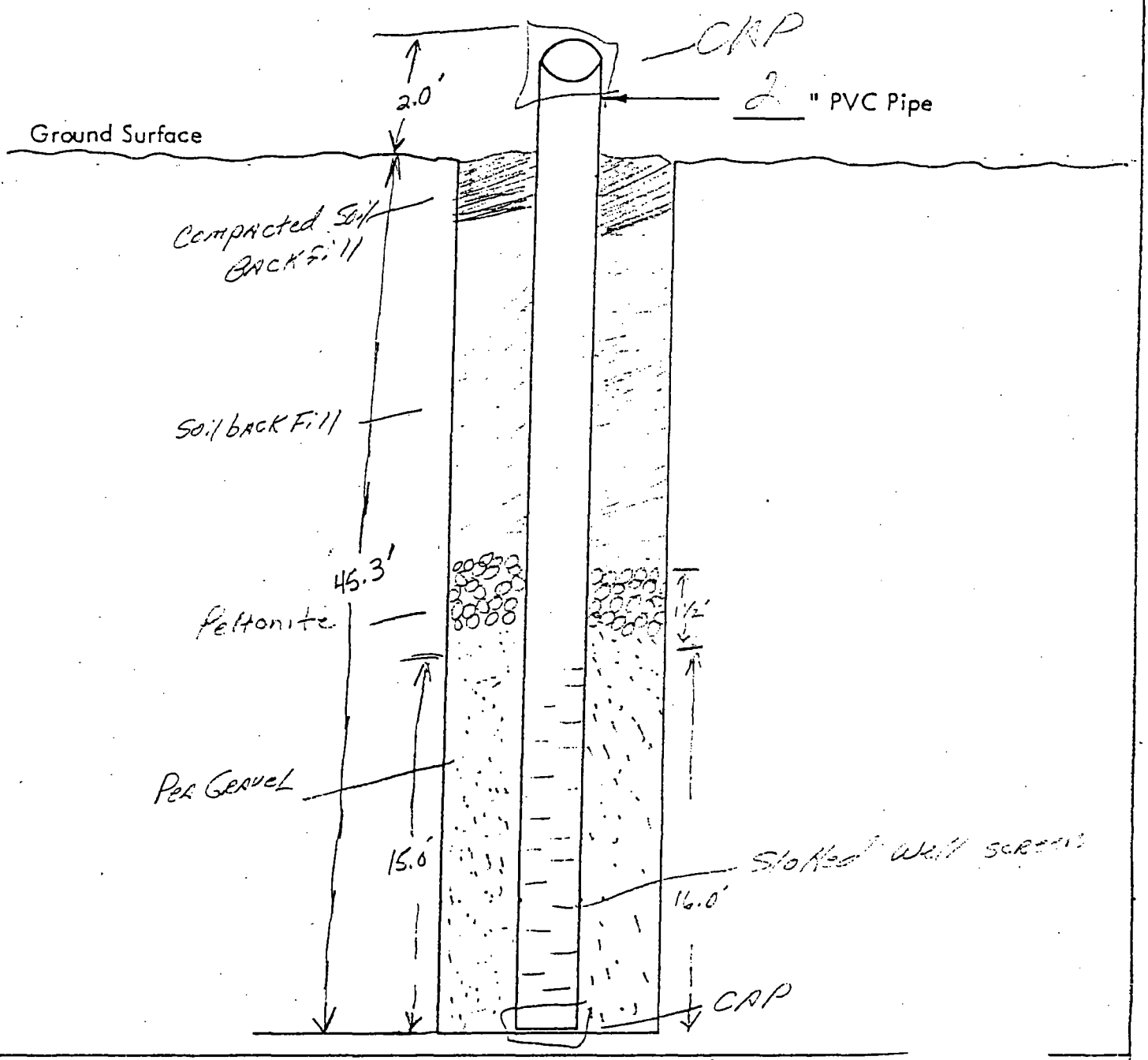
SCALE 1" = 5'

JOHN MATHES & ASSOCIATES, INC.

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. 25 Contract No. 607 Date Installed 11-29-79



NOTES:

BEI 023569

Information Checklist: Type of Backfill Soil Strata

Type of Screen Length of Screen Length of Pipe Height of Pipe Above Ground

Cap on Bottom Cap on Top How Sealed at Surface

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation, Clark Oil

BORING RB-26 On Premier Facility

DRILLED BY Bigham

LOGGED BY Schaefer

DATE DRILLED 11/29/79

PIEZOMETER Yes

DRILLING METHOD Hollow Auger

CONTRACT 607-79

SURFACE ELEVATION 430 (est)

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL	BLOWS	DRY UNIT WEIGHT PCF
				Dark Brown CLAY w/traces of Gravel		
				Gray CLAY w/oxidized spots & stains		
5	1	SS			3-5	
				Gray Clayey SILT w/fine Sand -w/oxidized stains @ 9.0'		
10	2	SS			4-5	
				-w/odor @ 14.0'		
15	3	SS			1-2	
				Gray CLAY -w/silt & odor @ 19.0'		
20	4	SS			2-2	
			Hit Water @ 23.0'	-w/oxidized spots & stains below 24.0'		
25	5	SS			2-2	
	6	SS			2-3	
				Reddish Gray Silty CLAY -w/sand lenses @ 31.5'		
30	7	SS			1-2	
	8	SS			2-3	
				Gray Silty SAND w/odor		
35	9	SS	Added Water	Cont.	3-6	

SHEAR STRENGTH, TSF — SV △, OP/2 □, OU/2 ○ — 0, 0.5, 1.0, 1.5, 2.0, 2.5

WATER CONTENT, % — PL +, ● — 0, 20, 40, 60, 80, 100, LL +

BEI 023525

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ _____ AFTER _____ _____

SCALE 1" = 5'

JOHN MATHES & ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

JOHN MATHES & ASSOCIATES, INC.

PROJECT Hydrocarbon Investigation, Clark Oil BORING RB-26 cont.

On Premier Facility

CONTRACT 607-79 DRILLING METHOD Hollow Auger DATE DRILLED 11/29/79 PIEZOMETER Yes DRILLED BY Bignall LOGGED BY Schaefer

DEPTH (FT.)	SAMPLE NUMBER	SAMPLE TYPE	NOTES	DESCRIPTION OF MATERIAL (ELEVATION 395 (est))	BLOWS	DRY UNIT WEIGHT PCF
	9	SS		Gray fine SAND w/organic matter, odor		
	10	SS		Gray clayey SILT w/fine Sand	3-2	
40	11	SS		Gray Silty CLAY w/fine Sand & fine Sand lenses	2-3	
	12	SS		Gray fine to coarse SAND w/odor	23-27	
45	13	SS			18-26	
	14	SS			32-35	
50	15	SS		-fine to medium @ 49.0'	38-42	
				T.O.B.		
55						

SHEAR STRENGTH, TSF: SV △ — QP/2 □ — QU/2 ○ (0, 0.5, 1.0, 1.5, 2.0, 2.5)

WATER CONTENT, % (0, 20, 40, 60, 80, 100): PL + — ● — LL +

BEI 023526

GROUND WATER DEPTH AT COMPLETION _____ AFTER _____ _____ AFTER _____ _____

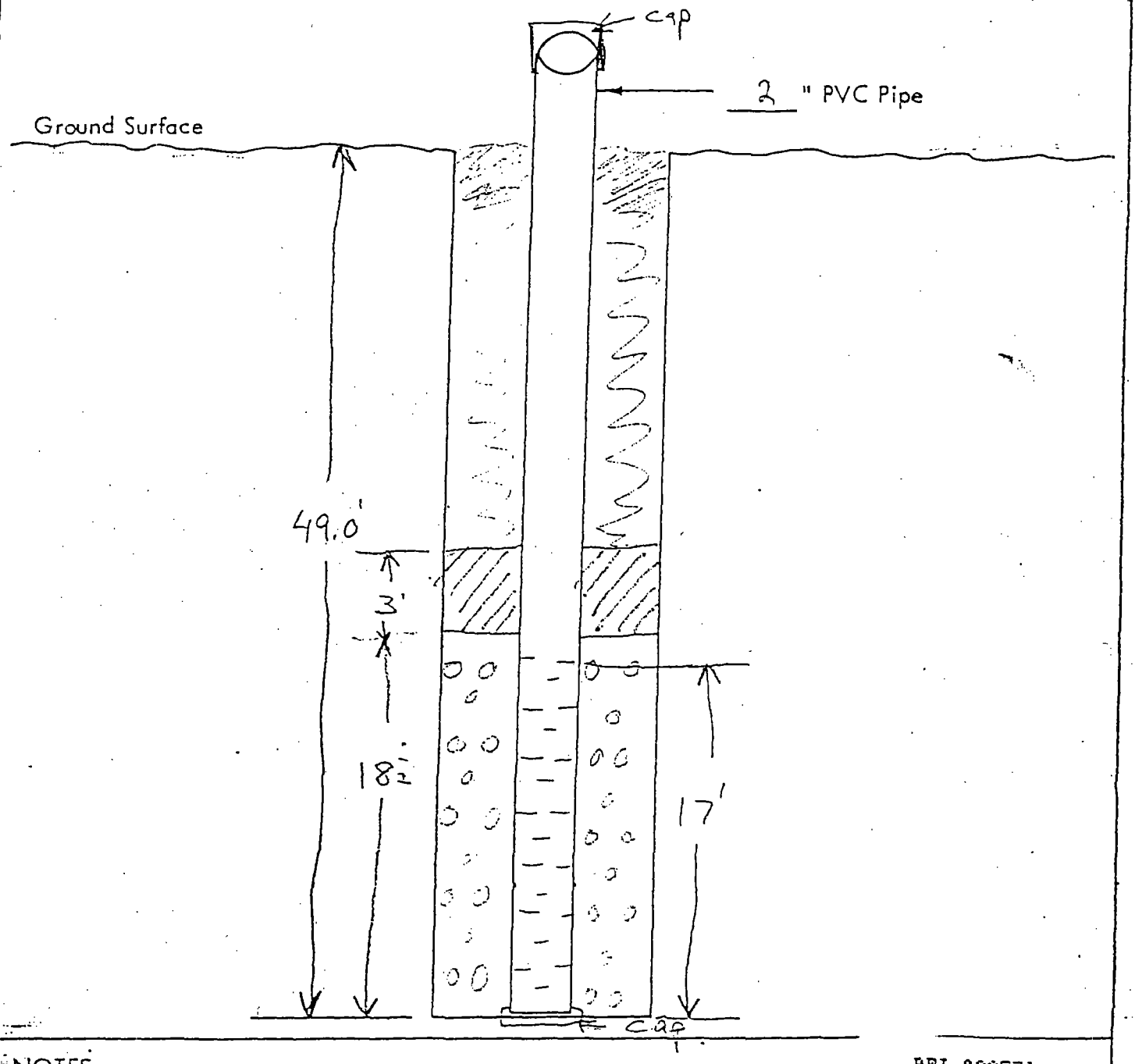
SCALE 1" = 5'

JOHN MATHES & ASSOCIATES, INC.

RECORD OF PIEZOMETER INSTALLATION

JOHN MATHES & ASSOCIATES

Boring No. B-26 Contract No. 607 Date Installed 11-29-79



NOTES:

BEI 023570

Information Checklist: ~~Type of Backfill~~ ~~Soil Strata~~

Type of Screen | Length of Screen | Length of Pipe | Height of Pipe Above Ground

Cap on Bottom | Cap on Top | How Sealed at Surface

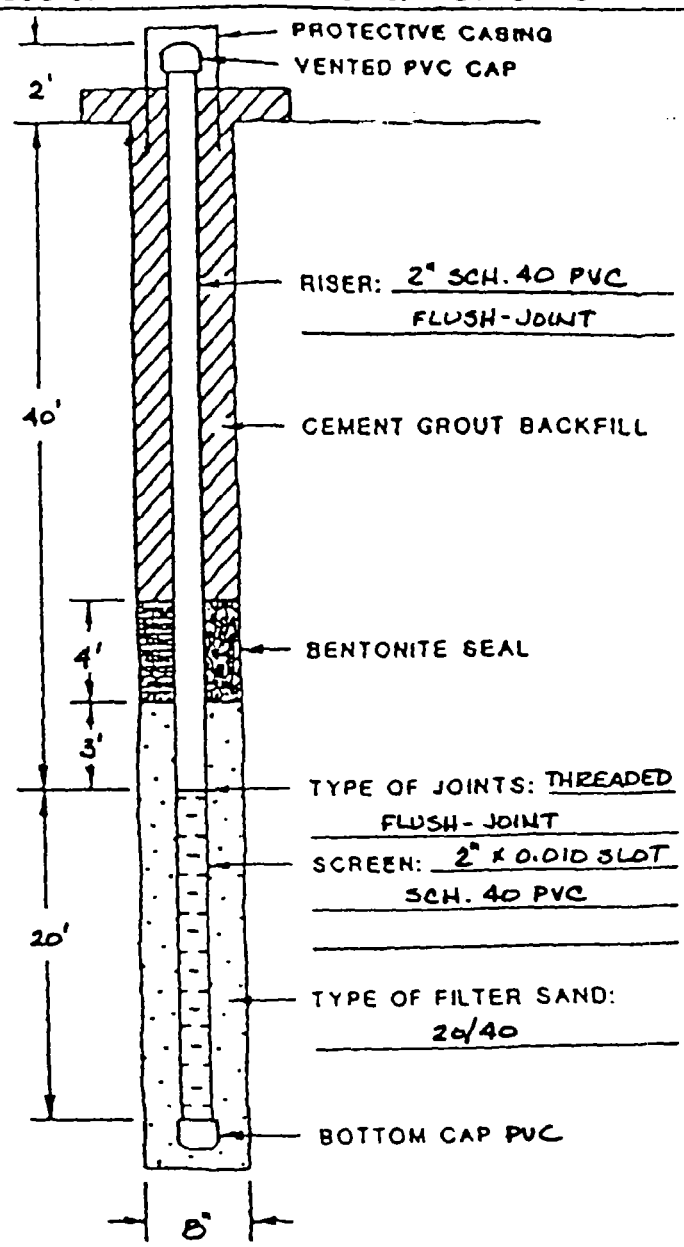
LOCATION: CLARK OIL REFINERY

RB-37

LOG OF BORING NO. RB-37

LOG OF MONITORING WELL NO. BO-6 #2

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION
			TOP OF RISER EL
			GROUND SURFACE EL
	SS		BLACK AND GRAY CLAY
10	SS		GRAY SILTY CLAY TO GRAY CLAY
	SS		GRAY SILTY CLAY
20	SS		DARK GRAY CLAY
	SS		GRAY CLAY, SILTY CLAY, AND SAND
30	SS		FINE SAND
	SS		SAND AND COARSE GRAVEL
40	SS		
	SS		FINE SAND AND COARSE GRAVEL
50	SS		
	SS		SAND
60	SS		FINE TO COARSE SAND
			T.D.B.
			TOTAL DEPTH: 62'



INSTALLATION METHOD: 4¼" HOLLOW STEM AUGERS

COMPLETION DEPTH: 62'

BORING COMPLETION DATE: 10-26-94

DEPTH TO WATER:

JOB: CLARK OIL COMPANY
JOB NO.: 661552
LOCATION: HARTFORD, IL.

MONITORING WELL INSTALLATION REPORT

DATE: 11-04-94

Layne-Western Company, Inc.

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-39	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING	
		START	FINISH
	WATER LEVEL 29.0	TIME 1100	TIME 0900
RUST PROJECT NO. 73337.100	TIME 0900		
	DATE 08/28/95	DATE 08/25/95	DATE 08/28/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 429.27	
DRILL RIG	LOCATION: NORTHING 3752.03	EASTING -5004.02	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	5-5-4-4	0	1	SS		Black Silty Clay FILL with gravel	
	2-3-5-6	12	2	SS		Gray Silty Clay CH	
5	2-2-4-6	16	3	SS			
	2-4-4-6	18	4	SS		Brown and Gray Silty Clay CL	
	2-2-2-2	18	5	SS		Brown Clayey Silt, trace Fine Sand ML	
10	2-3-5-4	18	6	SS			
	2-3-4-3	20	7	SS		Brown Silty Fine Sand SM	
15	1-1-2-3	24	8	SS		Brown Clayey Silt, trace Fine Sand ML Brown and Gray Silty Clay CH	
	1-1-2-3	24	9	SS			
	WR-2-3-4	24	10	SS			WR - Weight of the Rods
20	1-2-3-4	24	11	SS			
	1-2-3-4	24	12	SS			
25	1-2-3-3	24	13	SS		— 1/2 inch Fine Sand seam	
	1-2-7-7	18	14	SS			
	WR-1-6-3	24	15	SS		Brown Silty Fine Sand SM	
30	3-3-10-10	24	16	SS			
	1-7-6-5	18	17	SS		Brown Fine to Medium Sand, poorly graded SP	
35	1-2-3-6	18	18	SS		— 1 inch peat seam at 36.0' — 2 inch peat seam at 36.5' — 2 inch peat seam at 37.0'	
	1-2-2-4	24	19	SS			
	1-2-2-4	24	20	SS		Brown Silty Clay, trace Fine Sand ML — 2 inch peat seam at 38.0' — 2 inch Silty Clay (CH) seam at 39.0'	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-39
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	1-2-4-8	24	21	SS		Brown Silty Clay CH	
	WR-5-11	12	22	SS		Medium to Coarse Sand, poorly graded SP	
45						Termination of Boring at 44.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

FILE NUMBER 070.28

RETAIN IN FILE UNTIL _____

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-39

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3752.03 Easting -5004.02

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 08/25/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 08/28/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

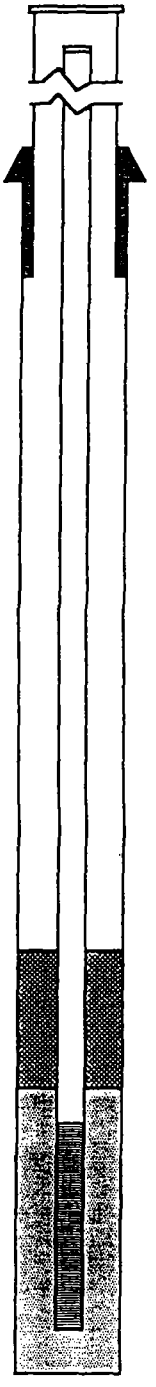
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
432.22	MSL Top of Riser Pipe
2.95	ft. Casing Stickup
429.27	MSL Ground Surface
-0.05	ft. Top of annular sealant
-22.7	ft. Top of Seal
3.6	ft. Total Seal Interval
-26.3	ft. Top of Sand
-28.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-43.0	ft. Bottom of Screen
-44.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	30.95
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2.0"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-40	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL 29.0	TIME 1300	TIME 1500
RUST PROJECT NO. 73337.100	TIME 1500		
	DATE 08/29/95	DATE 08/29/95	DATE 08/29/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 431.74	
DRILL RIG	LOCATION: NORTHING 3829.33	EASTING -2597.73	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	1-2-4-3	18	1	SS			
5	WR-2-3-3	18	2	SS			WR - Weight of the Rods
	2-2-3-4	18	3	SS			
	2-2-3-5	18	4	SS		Gray Silty Clay CH	
10	1-5-4-7	18	5	SS			
	1-2-3-5	18	6	SS			
15	1-3-4-4	18	7	SS		Brown Silty Fine Sand SM	
	2-6-6-10	14	8	SS		Fine to Medium Sand, poorly graded SP	
	4-6-7-11	12	9	SS			
20	5-10-10-9	16	10	SS			
	3-8-8-9	18	11	SS			
25	3-7-8-12	18	12	SS			
	5-10-12-16	18	13	SS			
	3-11-15-19	18	14	SS			
30	3-4-10-25	24	15	SS		— 5 inch Silty Clay (CL) seam at 31.5'	
	5-11-14-23	24	16	SS			
35	3-6-8-13	24	17	SS			
	3-6-8-13	24	18	SS			
	4-8-12-21	24	19	SS			
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-40
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE	DATE / DATE
DATUM	CASING DEPTH	
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	7-11-10-24	24	20	SS			
	11-15-21-18	24	21	SS			
45	9-15-21-12	24	22	SS			
						Termination of Boring at 46.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-40

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3829.33 Easting -2597.73

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 08/29/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 08/30/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

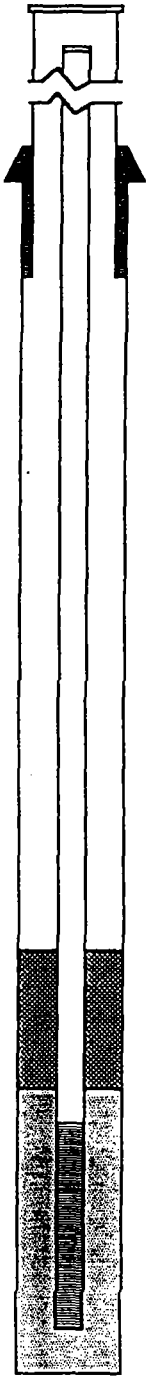
* FLUSH THREADED MATERIALS

Measurements

to 0.01 ft. (where applicable)

Riser pipe length	31.97
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
434.21	MSL Top of Riser Pipe
2.47	ft. Casing Stickup
431.74	MSL Ground Surface
-0.5	ft. Top of annular sealant
-25.7	ft. Top of Seal
1.8	ft. Total Seal Interval
-27.5	ft. Top of Sand
-29.5	ft. Top of Screen
15.0	ft. Total Screen Interval
-44.5	ft. Bottom of Screen
-46.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING	RB-41
		SHEET	1 OF 2
	SAMPLING METHOD Continuous Split Spoon	DRILLING START	DRILLING FINISH
	WATER LEVEL 27.0	TIME 1315	TIME 0820
RUST PROJECT NO. 73337.100	TIME 0820		
	DATE 08/31/95	DATE 08/30/95	DATE 08/31/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 431.63	
DRILL RIG	LOCATION: NORTHING 3841.32	EASTING -1904.23	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Gray Silty Clay FILL	
5	1-3-3-4	14	1	SS			
	1-2-3-3	12	2	SS			
	1-2-2-4	20	3	SS		Gray Silty Clay CH	
10	2-2-4-6	20	4	SS			
	2-4-4-6	20	5	SS			
15	1-3-2-3	20	6	SS		Gray Silty Clay CL	
						Gray Clayey Fine Sand SC	
	2-2-3-6	20	7	SS		Gray Silty Fine Sand SM	
	4-5-7-10	22	8	SS			
20	5-7-11-17	16	9	SS		Gray Fine to Medium Sand, poorly graded SP	
	6-10-16-15	24	10	SS			
25	6-8-12-12	18	11	SS			
	5-10-13-13	24	12	SS			
	6-8-11-15	18	13	SS			
30	8-12-20-24	24	14	SS			
	10-19-25-35	24	15	SS		Gray Fine Sand, poorly graded SP	
35	14-19-20-18	20	16	SS			
	3-8-12-16	18	17	SS			
	7-12-12-17	20	18	SS			
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-41
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE	DATE / DATE
DATUM	CASING DEPTH	
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	*LOCATION: NORTHING*	*EASTING*

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	4-7-10-13	0	21	SS			
	1-6-7-13	12	22	SS			
45						Termination of Boring at 45.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-41

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3841.32 Easting -1904.23

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 08/30/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 08/31/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

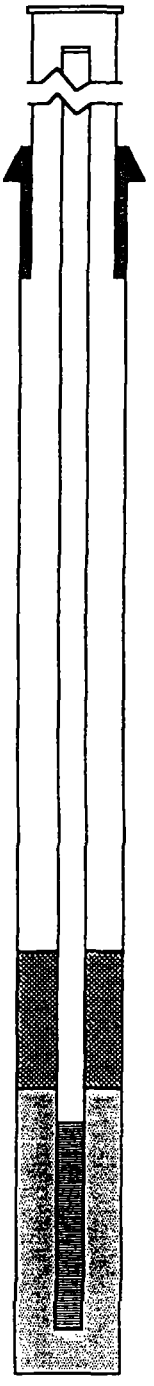
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	32.41
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
433.94	MSL Top of Riser Pipe
2.41	ft. Casing Stickup
431.63	MSL Ground Surface
-0.5	ft. Top of annular sealant
-25.5	ft. Top of Seal
2.0	ft. Total Seal Interval
-27.5	ft. Top of Sand
-30.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-45.0	ft. Bottom of Screen
-45.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION: Clark Refinery, Hartford, Illinois	DRILLING METHOD: Hollow Stem Auger	BORING: RB-42	
	SAMPLING METHOD: Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL: 24.5	TIME: 1530	TIME: 1200
RUST PROJECT NO. 73337.100	TIME: 1200		
	DATE: 09/01/95	DATE: 08/31/95	DATE: 09/01/95
DATUM	CASING DEPTH		

DRILLING CONTRACTOR: Roberts Env. Drilling
DRILL RIG
SURFACE CONDITIONS
ELEVATION: 426.57
LOCATION: NORTHING 3482.21 EASTING -1091.85

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	oil contamination
	1-2-1-1	8	1	SS			
5	2-2-3-4	12	2	SS		Gray Silty Clay CH	
	1-4-6-6	20	3	SS			
	2-1-3-3	16	4	SS			
10	2-4-5-6	20	5	SS		Brown Clayey Sand SC	
	6-7-8-8	18	6	SS		Brown Silty Fine Sand SM	
15	4-6-7-10	18	7	SS		Brown Fine to Medium Sand, poorly graded SP	
	5-9-11-12	16	8	SS			
	3-8-7-7	14	9	SS			
20	8-12-14-14	10	10	SS			
	6-8-9-4	16	11	SS			
25	WR-2-2-4	24	12	SS		1 inch Silty Clay (CL) seam at 24.1' 8 inch Silty Clay (CL) seam at 24.3'	WR - Weight of the Rods
	5-12-12-8	24	13	SS		4 inch Silty Clay (CL) seam at 27.2' 0.5 inch organic seam at 27.5'	
	4-11-7-8	16	14	SS		6 inch Silty Clay (CL) seam at 28.5'	
30	5-12-13-13	14	15	SS			
	5-7-8-16	16	16	SS			
35	3-8-8-13	20	17	SS		Brown Fine Sand, poorly graded SP	
	5-7-12-17	20	18	SS		Brown Fine to Medium Sand, poorly graded SP	
	5-10-16-23	16	19	SS			
40							

LOGGED BY Bill Sloan
DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-42
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE	DATE / DATE
DATUM	CASING DEPTH	
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	5-11-14-16	16	20	SS			
	6-8-12-14	18	21	SS			
45						Termination of Boring at 45.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-42**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3482.21 Easting -1091.85

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 08/31/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/01/95

Drilling Method: 4.25-inch Hollow Stem Auger *Drilling Fluids (type):* _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

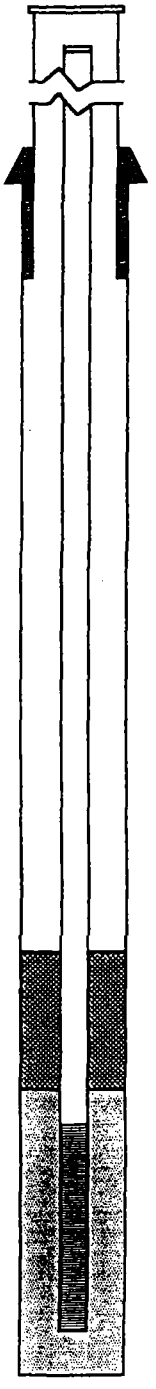
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
429.15	MSL Top of Riser Pipe
2.58	ft. Casing Stickup
426.57	MSL Ground Surface
-0.5	ft. Top of annular sealant
-20.9	ft. Top of Seal
4.1	ft. Total Seal Interval
-25.0	ft. Top of Sand
-27.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-42.0	ft. Bottom of Screen
-45.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	29.58
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION: Clark Refinery, Hartford, Illinois	DRILLING METHOD: Hollow Stem Auger	BORING: RB-43	
	SAMPLING METHOD: Continuous Split Spoon	SHEET 1 OF 1	
		DRILLING START	DRILLING FINISH
	WATER LEVEL: 21.0	TIME: 1330	TIME: 1530
RUST PROJECT NO. 73337.100	TIME: 1530		
	DATE: 09/07/95	DATE: 09/07/95	DATE: 09/07/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR: Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION: 426.75	
DRILL RIG	LOCATION: NORTHING 2119.62	EASTING -194.04	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	3-3-3-3	0	1	SS			
5	2-1-3-6	16	2	SS		Brown Silty Clay CL	
	3-3-7-9	20	3	SS		Brown Silty Clay CH	
						Brown Clayey Sand SC	
	2-5-5-3	18	4	SS		Brown Silty Fine to Medium Sand SM	
10	2-2-3-4	24	5	SS		Brown Silty Clay CH	
	2-2-3-4	24	6	SS			
15	6-2-4-3	20	7	SS			
						Brown Clayey Sand SC	
	2-2-10-11	18	8	SS		Brown Fine to Medium Sand, poorly graded SP	
	4-12-16-17	16	9	SS			
20	4-8-12-15	20	10	SS		— 1 inch Silty Clay (CL) seam at 20.6'	
	2-8-9-13	20	11	SS			
25	3-8-12-16	24	12	SS			
	4-6-10-16	24	13	SS			
	2-6-9-15	24	14	SS			
30	1-5-7-10	18	15	SS			
	5-10-15-17	20	16	SS		Brown Silty Fine to Medium Sand SM	
35	5-12-18-15	20	17	SS			
	5-8-12-23	24	18	SS		Brown Fine to Medium Sand, poorly graded SP	
	10-9-11-13	18	19	SS		— 10 inch Silty Fine Sand (SM) seam at 39.0'	
40						Termination of Boring at 40.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-43

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 2119.62 Easting -194.04

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/07/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/07/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

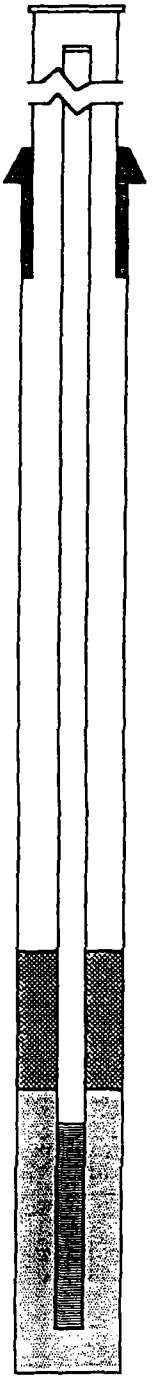
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
428.64	MSL Top of Riser Pipe
1.89	ft. Casing Stickup
426.75	MSL Ground Surface
-0.5	ft. Top of annular sealant
-16.0	ft. Top of Seal
2.0	ft. Total Seal Interval
-18.0	ft. Top of Sand
-20.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-35.0	ft. Bottom of Screen
-40.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS *to 0.01 ft. (where applicable)*

Measurements

Riser pipe length	21.89
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-44	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL 24.5	TIME 0930	TIME 1300
RUST PROJECT NO. 73337.100	TIME 1300		
	DATE 09/08/95	DATE 09/08/95	DATE 09/08/95
DATUM	CASING DEPTH		

DRILLING CONTRACTOR Roberts Env. Drilling
SURFACE CONDITIONS ELEVATION 430.95
DRILL RIG
LOCATION: NORTHING 2067.61 EASTING -1639.22

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay CH	
	1-2-3-4	16	1	SS			
5	3-3-6-8	16	2	SS			
	2-2-5-5	16	3	SS			
	2-4-6-9	16	4	SS			
10	3-3-4-4	16	5	SS		Brown Silty Clay CL	
	1-5-5-4	18	6	SS		Brown Silty Fine Sand SM	
15	2-4-4-5	20	7	SS			
	4-8-9-12	18	8	SS		Brown Fine to Medium Sand, poorly graded SP	
	4-10-8-7	18	9	SS		Brown Silty Fine Sand SM	
20	6-8-8-9	20	10	SS		— 4 inch Silty Clay (CH) seam at 20.3'	
	5-6-7-11	20	11	SS		Brown Fine to Medium Sand, poorly graded SP	
25	8-10-10-12	20	12	SS			
	9-13-17-21	20	13	SS			
	6-7-9-12	20	14	SS			
30	6-8-14-19	24	15	SS			
	4-8-16-16	24	16	SS			
35	WR-5-6-9	6	17	SS			WR - Weight of the Rods
	2-6-11-14	14	18	SS			
	3-6-10-14	20	19	SS			
40							

LOGGED BY Bill Sloan
DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-44
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	1-7-10-14	18	20	SS			
						Termination of Boring at 42.0'	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-44**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 2067.61 Easting -1639.22

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/08/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/08/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

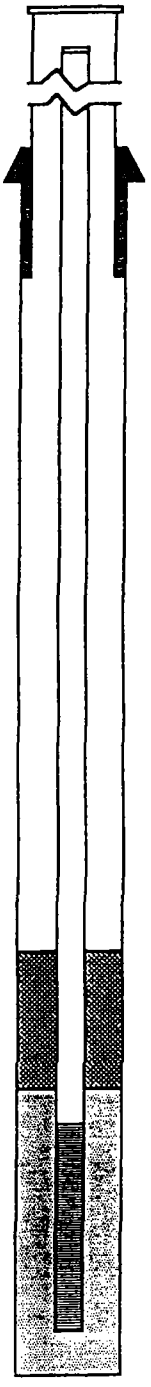
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	25.71
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
433.66	MSL Top of Riser Pipe
2.71	ft. Casing Stickup
430.95	MSL Ground Surface
-0.5	ft. Top of annular sealant
-19.0	ft. Top of Seal
2.0	ft. Total Seal Interval
-21.0	ft. Top of Sand
-23.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-38.0	ft. Bottom of Screen
-42.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-45	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL 25.0	TIME 1430	TIME 0830
RUST PROJECT NO. 73337.100	TIME 0830		
	DATE 09/07/95	DATE 09/06/95	DATE 09/07/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 430.23	
DRILL RIG	LOCATION: NORTHING 2067.58	EASTING -2335.79	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay with Gravel FILL	
	4-12-5-5	4	1	SS			
5	2-4-5-6	16	2	SS			
	2-3-6-8	18	3	SS		Brown Silty Clay CL	
	2-3-3-4	20	4	SS			
10	1-2-2-4	20	5	SS		Brown Clayey Silt ML	
	WR-1-2-2	18	6	SS		Brown Silty Clay CH	WR - Weight of the Rods
15	2-3-3-4	18	7	SS		Brown Clayey Sand SC Brown Silty Fine Sand SM	
	2-4-5-6	18	8	SS		Brown Fine Sand, poorly graded SP	
	5-8-10-10	18	9	SS			
20	4-7-8-10	16	10	SS			
	2-5-6-6	18	11	SS			
25	2-3-4-4	18	12	SS			
	3-6-6-6	24	13	SS		Brown Fine to Medium Sand, poorly graded SP	
	3-6-7-8	24	14	SS			
30	4-6-5-6	24	15	SS		— 7 inch Clayey Silt (ML) seam at 31.0' — 1 inch Silty Clay (CH) seam at 31.6' — 4 inch Clayey Silt (ML) seam at 31.7' — 1 inch Clayey Silt (ML) seam at 33.0'	
	2-5-6-9	24	16	SS			
35	WR-1-3-9	24	17	SS			
	2-4-7-9	16	18	SS			
	5-6-9-13	16	19	SS			
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-45
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	4-7-10-11	14	20	SS		Brown Medium Sand, poorly graded SP	
	5-7-10-14	14	21	SS			
45						Termination of Boring at 45.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-45

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 2067.58 Easting -2335.79

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/06/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/07/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

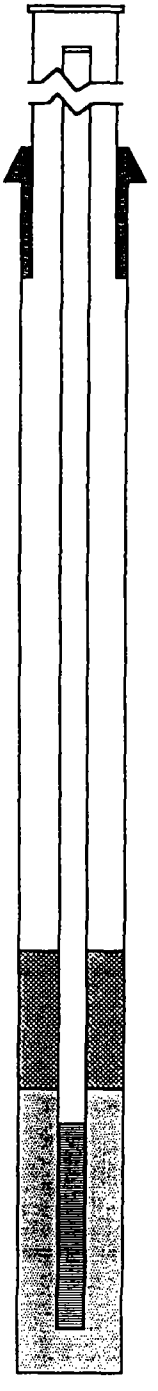
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
432.61	MSL Top of Riser Pipe
2.38	ft. Casing Stickup
430.23	MSL Ground Surface
-0.5	ft. Top of annular sealant
-25.1	ft. Top of Seal
2.3	ft. Total Seal Interval
-27.4	ft. Top of Sand
-30.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-45.0	ft. Bottom of Screen
-45.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS

Measurements to 0.01 ft. (where applicable)

Riser pipe length	32.38
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION: Clark Refinery, Hartford, Illinois	DRILLING METHOD: Hollow Stem Auger	BORING: RB-46	
	SAMPLING METHOD: Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL: 28.0	TIME: 1300	TIME: 1445
RUST PROJECT NO. 73337.100	TIME: 1445		
	DATE: 09/19/95	DATE: 09/19/95	DATE: 09/19/95
DATUM	CASING DEPTH		

DRILLING CONTRACTOR: Roberts Env. Drilling
SURFACE CONDITIONS
ELEVATION: 428.67
DRILL RIG
LOCATION: NORTHING 1841.78 EASTING -3973.28

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	2-3-3-5	16	1	SS		Brown Silty Clay CH	
5	1-3-4-6	16	2	SS			
	2-4-7-8	18	3	SS			
	2-3-5-8	18	4	SS			
10	3-3-4-4	24	5	SS			
						Brown Silty Clay CL	
	1-1-2-3	20	6	SS		Brown Clayey Silt ML	
						Brown Silty Clay CL	
15	2-1-3-2	24	7	SS		Brown Silty Clay CH	
	1-2-4-4	18	8	SS		Brown Clayey Silt, trace Fine Sand ML	
	2-4-5-9	12	9	SS		Brown Silty Fine Sand SM	
20	4-5-11-11	16	10	SS		— 2 inch Clayey Silt (ML) seam at 21.0'	
	4-6-9-9	24	11	SS			
25	5-7-11-13	24	12	SS			
	8-11-13-10	18	13	SS		Brown Fine to Medium Sand with Silt, poorly graded SP	
	3-5-9-10	20	14	SS			
30	NS						NS - No Sample
	5-9-8-12	24	15	SS		— color change to gray at 33.4'	
35	5-9-10-10	20	16	SS			
	WR-4-8-12	20	17	SS		Gray Fine Sand, trace Silt, poorly graded SP	WR - Weight of the Rods
	2-5-12-14	20	18	SS			
40							

LOGGED BY Bill Sloan
DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-46
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	5-10-13-22	24	19	SS			
	4-5-9-10	24	20	SS			
45						Termination of Boring at 44.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-46**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 1841.78 Easting -3973.28

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/19/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/19/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

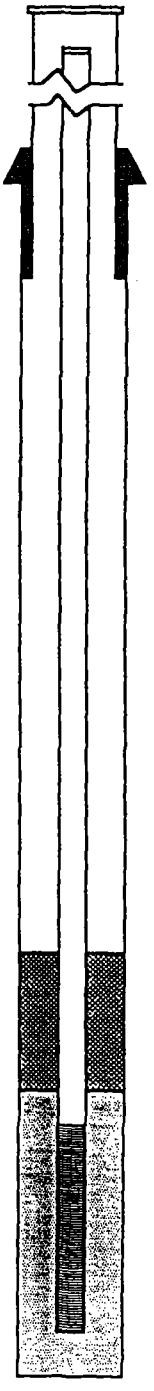
* FLUSH THREADED MATERIALS

Measurements

to 0.01 ft. (where applicable)

Riser pipe length	27.62
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
431.29	MSL Top of Riser Pipe
2.62	ft. Casing Stickup
428.67	MSL Ground Surface
-0.5	ft. Top of annular sealant
-20.8	ft. Top of Seal
2.0	ft. Total Seal Interval
-22.8	ft. Top of Sand
-25.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-44.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING	RB-47
	SAMPLING METHOD Continuous Split Spoon	SHEET	1 OF 2
		DRILLING START	DRILLING FINISH
	WATER LEVEL: 28.0	TIME	TIME
RUST PROJECT NO. 73337.100	TIME: 1100	0900	1100
	DATE: 09/11/95	DATE	DATE
DATUM	CASING DEPTH	09/11/95	09/11/95

DRILLING CONTRACTOR: Roberts Env. Drilling
DRILL RIG:
SURFACE CONDITIONS:
ELEVATION: 429.28
LOCATION: NORTHING 1859.46 EASTING -4197.23

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	3-5-6-7	4	1	SS			
5	3-3-4-7	12	2	SS		Brown Silty Clay CH	
	3-4-5-8	14	3	SS			
	3-4-5-5	24	4	SS			
10	2-4-5-7	20	5	SS			
	1-2-2-2	24	6	SS		Brown Silty Clay CL	
15	2-2-3-3	20	7	SS		Brown Silty Clay CH	
	1-2-2-2	24	8	SS			
	1-2-4-3	20	9	SS		Brown Silty Clay CL	
20	2-5-4-7	18	10	SS		Brown Silty Clay with Fine Sand CL	
	2-3-6-7	20	11	SS		Brown Silty Fine Sand SM	
25	3-5-7-10	18	12	SS			
	WR-5-10-20	18	13	SS			WR - Weight of the Rods
	WR-5-10-20	18	14	SS			
30	9-14-16-18	18	15	SS		Brown Fine Sand, poorly graded, with Silt SP	
	WR-13-21-31	18	16	SS			
35	6-8-8-8	20	17	SS			
	4-7-8-13	24	18	SS			
	3-5-13-18	24	19	SS		thin organic bands from 38.0' to 40.0'	
40							

LOGGED BY Bill Sloan
DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-47
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	9-19-30-43	24	20	SS			
	WR-15-50-50	24	21	SS		— 3 x 1/4 inch organic layers at 43.0'	
45						Termination of Boring at 44.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-47**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 1859.46 Easting -4197.23

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/11/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/11/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

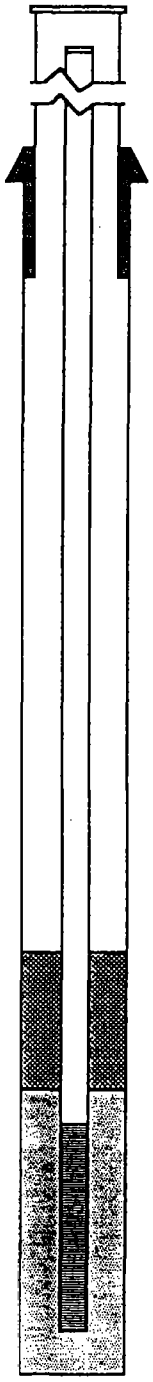
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
431.81	MSL Top of Riser Pipe
2.53	ft. Casing Stickup
429.28	MSL Ground Surface
-0.5	ft. Top of annular sealant
-20.5	ft. Top of Seal
2.5	ft. Total Seal Interval
-23.0	ft. Top of Sand
-25.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-44.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	27.53
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-48	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL 30.0	TIME 0815	TIME 0945
RUST PROJECT NO. 75337.100	TIME 0945		
	DATE 09/19/95	DATE 09/19/95	DATE 09/19/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 429.48	
DRILL RIG	LOCATION: NORTHING 977.74	EASTING -4164.57	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	2-3-3-5	0	1	SS			
5	1-3-5-6	18	2	SS		Brown Silty Clay CL	
	2-2-3-3	20	3	SS			
	1-2-2-1	20	4	SS			
10	2-2-4-5	20	5	SS			
	2-5-5-5	20	6	SS		— 4 inch Silty Fine Sand (SM) seam at 11.7' Brown Sandy Silt ML	
15	3-2-3-3	18	7	SS		Brown Silty Fine Sand SM	
	2-7-7-13	18	8	SS		Brown Silty Clay CL	
	13-16-16-16	20	9	SS		Brown fine Sand, trace Silt, poorly graded SP	
20	7-6-6-10	16	10	SS		Brown Silty Fine Sand SM	
	6-7-8-8	14	11	SS			
25	3-5-10-11	14	12	SS			
	7-10-17-16	20	13	SS			
	3-7-11-13	18	14	SS			
30	6-12-11-12	15	15	SS		Brown Fine to Medium Sand, trace Silt, poorly graded SP	
	3-7-9-14	24	16	SS			
35	10-36-50(5)	18	17	SS		Brown Silty Fine Sand SM	
	17-30-40-50	20	18	SS			
	15-21-18-13	16	19	SS		Brown Fine Sand, trace Silt, poorly graded SP	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger SAMPLING METHOD Continuous Split Spoon	BORING RB-48 SHEET 2 OF 2 DRILLING START TIME / FINISH TIME DRILLING START DATE / FINISH DATE
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	3-4-8-10	18	20	SS			
	WR-5-10-12	18	21	SS		Brown Fine to Medium Sand,trace gravel,poorly graded SP	WR - Weight of the Rods
45						Termination of Boring at 45.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-48**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 977.74 Easting -4164.57

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/15/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/19/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

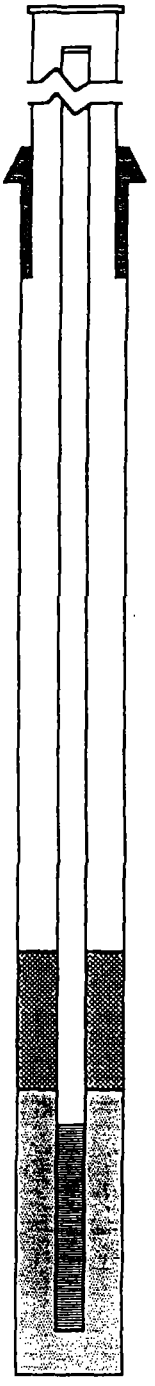
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	27.49
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
431.97	MSL Top of Riser Pipe
2.49	ft. Casing Stickup
429.48	MSL Ground Surface
-0.5	ft. Top of annular sealant
-20.5	ft. Top of Seal
2.5	ft. Total Seal Interval
-23.0	ft. Top of Sand
-25.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-45.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING	RB-51
	SAMPLING METHOD Continuous Split Spoon	SHEET	1 OF 2
		DRILLING START	DRILLING FINISH
	WATER LEVEL 28.0	TIME	TIME
RUST PROJECT NO. 73337.100	TIME 0930	1500	0930
	DATE 09/13/95	DATE	DATE
DATUM	CASING DEPTH	09/12/95	09/13/95

DRILLING CONTRACTOR Roberts Env. Drilling

SURFACE CONDITIONS ELEVATION 429.74

DRILL RIG

LOCATION: NORTHING 769.72 EASTING -5332.05

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay with gravel FILL	
	2-4-6-8	12	1	SS		Brown Silty Clay CL	
5	3-5-5-8	24	2	SS		Brown Silty Clay CH	
	1-3-5-4	20	3	SS			
	3-4-5-6	20	4	SS			
10	2-3-4-5	18	5	SS		Brown Silty Clay CL	
	1-3-3-4	20	6	SS			
						— 4 inch Silty Clay (CH) seam at 14.3'	
15	2-6-9-9	18	7	SS		Brown Clayey Silt, trace Fine Sand ML	
	6-6-8-11	18	8	SS		Brown Fine Sand, trace Silt, poorly graded SP	
	8-16-19-16	20	9	SS			
20	8-5-6-7	20	10	SS			
	4-7-7-8	18	11	SS			
25	5-9-10-11	24	12	SS		Brown Fine to Medium Sand, trace Silt, poorly graded SP	
	3-7-7-8	20	13	SS			
	3-11-17-18	24	14	SS			
30	8-15-15-21	24	15	SS			
	7-9-8-12	24	16	SS		Brown Fine Sand, poorly graded SP	
35	4-8-12-14	24	17	SS		Brown Fine Sand, trace Silt, poorly graded SP — 1/2 inch organic seam at 35.0'	
	1-5-8-16	24	18	SS		Brown Fine to Medium Sand, poorly graded SP	
	5-8-5-3	24	19	SS		— trace gravel from 38.0' to 41.0'	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-51
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	1-1-2-2	24	20	SS		Brown Clayey Silt MH	
	WR-5-7-8	18	21	SS		Brown Medium to Coarse Sand with Gravel SP	WR - Weight of the Rods
45						Termination of Boring at 44.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-51

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 769.72 Easting -5332.05

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/12/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/13/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

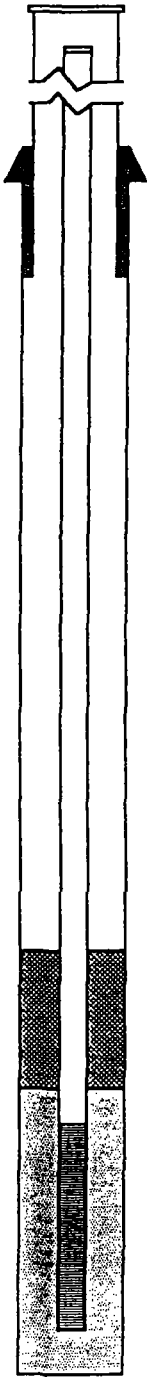
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
432.30	MSL Top of Riser Pipe
2.56	ft. Casing Stickup
429.74	MSL Ground Surface
-0.5	ft. Top of annular sealant
-21.1	ft. Top of Seal
1.9	ft. Total Seal Interval
-23.0	ft. Top of Sand
-25.0	ft. Top of Screen
15.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-44.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			2"	
Riser pipe below w.t.			*	
Screen			2"	
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	27.56
Protective casing length	N/A
Screen length	15.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	8"
ID of riser pipe (in.)	2"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD					BORING	RB-52
Clark Refinery	Hollow Stem Auger					SHEET	1 OF 2
Hartford, Illinois	SAMPLING METHOD					DRILLING	
	Continuous Split Spoon					START	FINISH
	WATER LEVEL	28.0				TIME	TIME
RUST PROJECT NO. 73337.100	TIME	0945				1415	0945
	DATE	09/12/95				DATE	DATE
DATUM	CASING DEPTH					09/11/95	09/12/95

DRILLING CONTRACTOR Roberts Env. Drilling — SURFACE CONDITIONS — ELEVATION 430.66

DRILL RIG — LOCATION: NORTHING 2134.75 EASTING - 5498.04

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	No Samples					Dark Gray Silty Clay with Gravel FILL	Strong fuel odor
5						Gray Silty Clay CL	Drilled first 8.0' slowly, and without sampling per S. Haug, Clark.
	1-3-3-5	18	1	SS		Gray-green Silty Clay CH	
10	1-2-1-2	6	2	SS		Gray-green Silty Clay CL	
	1-3-3-4	20	3	SS		Gray-green Silty Clay CH	
15	1-2-3-5	20	4	SS		— 6 inch Clayey Silt (ML) seam at 15.5' — 14 inch Silty Clay (CL) seam at 16.3'	
	1-2-1-3	20	5	SS			
	1-2-3-4	20	6	SS		— 6 inch Clayey Silt (ML) seam at 18.5' — 2 inch Sandy Silt (ML) seam at 19.8'	
20	2-4-3-5	18	7	SS		Gray Silty Fine Sand SM Gray Sandy Silt ML	
	1-1-2-2	18	8	SS		Gray Silty Clay CL	
25	1-1-3-3	18	9	SS		— 12 inch Clayey Silt with Fine Sand (ML) seam at 25.0'	
	WR-WR-1-2	24	10	SS		— 1 inch Clayey Silt with Fine Sand (ML) seam at 27.0'	WR - Weight of the Rods
	WR-1-2-3	20	11	SS		Gray-brown Silty Fine Sand SM	
30	1-1-1-3	24	12	SS		Gray-brown Sandy Silt ML	
	3-4-13-15	24	13	SS		Gray-brown Fine to Medium Sand, trace Gravel, poorly graded SP	
35	WR-5-6-7	18	14	SS			
	WR-2-3-2	16	15	SS		Gray-brown Silty Sand SM	
	1-1-3-12	18	16	SS		— 4 inch Fine to Medium Sand (SP) seam at 38.0' Gray-brown Silt with Fine Sand, trace Clay ML	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-52
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE	DATE / DATE
DATUM	CASING DEPTH	
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	WR-WR-1-5	14	17	SS		Gray-brown Medium to Coarse Sand, trace Gravel, poorly graded SP	
						Termination of boring at 42.0'	
45							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-52

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 2134.75 Easting -5498.04

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/11/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/12/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

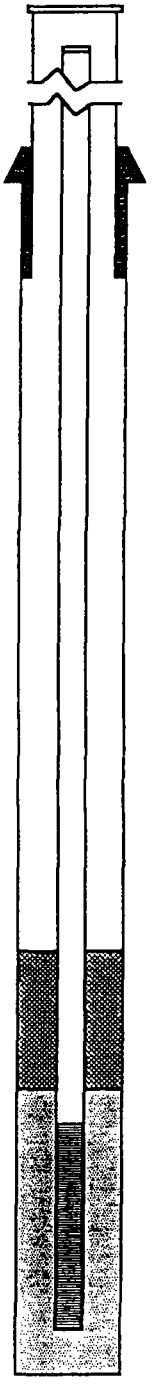
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
432.72	MSL Top of Riser Pipe
2.06	ft. Casing Stickup
430.66	MSL Ground Surface
-0.5	ft. Top of annular sealant
-18.0	ft. Top of Seal
2.0	ft. Total Seal Interval
-20.0	ft. Top of Sand
-22.0	ft. Top of Screen
20.0	ft. Total Screen Interval
-42.0	ft. Bottom of Screen
-42.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			4"	
Riser pipe below w.t.			*	
Screen	4"			
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	24.06
Protective casing length	N/A
Screen length	20.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	10"
ID of riser pipe (in.)	4"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING	RB-53
	SAMPLING METHOD Continuous Split Spoon	SHEET	1 OF 2
		DRILLING START	DRILLING FINISH
	WATER LEVEL: NA	TIME: 0715	TIME: 1030
RUST PROJECT NO. 73337.100	TIME		
	DATE	DATE: 09/05/95	DATE: 09/05/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR: Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION	431.76
DRILL RIG	LOCATION: NORTHING 3126.22	EASTING	-5645.38

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay with Sand and Gravel FILL	
	7-8-9-9	4	1	SS			
5	2-4-7-10	12	2	SS		Brown Silty Clay CH	
	3-6-6-8	18	3	SS			
	5-6-6-8	14	4	SS		Brown Silty Clay CL	
10	3-4-6-8	18	5	SS			
	4-4-4-3	20	6	SS		Brown Silt with Clay, trace Fine Sand ML — 9 inch Silty Fine Sand (SM) seam at 13.1'	
15	3-1-2-1	20	7	SS			
	WR-1-1-1	16	8	SS		Brown Silty Clay CL	WR - Weight of the Rods
	1-2-2-3	20	9	SS		Brown Silty Clay CH — 4 inch Brown Silty Clay (CL) seam at 19.6'	
20	1-3-3-4	24	10	SS			
	1-4-4-6	24	11	SS			
25	1-4-5-7	24	12	SS			
	1-3-5-7	24	13	SS		Brown Clayey Sand SC	
	PR	14	14	SS		Brown Silty Sand SM	PR - Pushed Rods
30	PR	24	15	SS		Brown Fine to Medium Sand, poorly graded SP	
	PR	20	16	SS		— 1 inch Clayey Silt (ML) seam at 33.5'	
35	PR	20	17	SS			
	PR	16	18	SS		— 1 inch Silty Clay (CH) seam at 38.0'	
	PR	16	19	SS		Brown Medium to Coarse Sand, poorly graded SP	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-53	
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2	
		DRILLING START TIME	DRILLING FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE	DATE
DATUM			
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION	
DRILL RIG	LOCATION: NORTHING	EASTING	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	PR	2	20	SS		Brown Coarse Sand, trace Gravel, poorly graded SP	
						Termination of Boring at 42.0'	
45							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-53

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3126.22 Easting -5645.38

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/05/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/05/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			4"	
Riser pipe below w.t.			*	
Screen	4"			
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	24.29
Protective casing length	N/A
Screen length	20.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	10"
ID of riser pipe (in.)	4"

Elevations - 0.01 ft.

_____	MSL Top of Protective Casing
434.05	MSL Top of Riser Pipe
2.29	ft. Casing Stickup
431.76	MSL Ground Surface
-0.5	ft. Top of annular sealant
-18.0	ft. Top of Seal
2.0	ft. Total Seal Interval
-20.0	ft. Top of Sand
-22.0	ft. Top of Screen
20.0	ft. Total Screen Interval
-42.0	ft. Bottom of Screen
-42.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD: Hollow Stem Auger	BORING RB-54	
	SAMPLING METHOD Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL 23.0	TIME 0715	TIME 1000
RUST PROJECT NO. 73337.100	TIME 1000		
	DATE 09/06/95	DATE 09/06/95	DATE 09/06/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION 430.00	
DRILL RIG	LOCATION: NORTHING 3277.94	EASTING -5198.53	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	2-3-6-8	12	1	SS		Brown Silty Clay CH	
5	1-4-4-5	16	2	SS			
	2-2-4-4	18	3	SS		Brown Silty Clay CL	
	2-2-2-3	18	4	SS		Brown Clayey Silt ML	
10	2-2-2-2	16	5	SS			
	1-1-2-2	18	6	SS			
						Brown Silty Clay CL	
15	WR-1-2-4	20	7	SS		Brown Silty Clay CH	WR - Weight of the Rods
	1-2-3-3	18	8	SS			
	1-2-2-2	24	9	SS			
20	3-3-3-4	20	10	SS		Brown Silty Clay CL	
	2-2-3-5	24	11	SS		Brown Silty Clay CH	
25	2-2-2-5	24	12	SS		— 2 inch Clayey Silt (ML) seam at 24.7'	
	2-3-4-4	24	13	SS			
	2-3-3-3	24	14	SS			
30	1-1-3-3	24	15	SS			
	1-1-4-7	24	16	SS			
35	WR-1-2-4	16	17	SS		— 4 inch Silty Clay (CL) seam at 34.3' Brown Fine to Medium Sand, poorly graded SP	
	WR-WR 1-1	24	18	SS		Brown Clayey Silt ML	
	WR-1-3-3	24	19	SS		Brown Silty Clay CL	
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-54
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
		DRILLING START TIME / FINISH TIME
RUST PROJECT NO. 73337.100	WATER LEVEL / TIME / DATE / CASING DEPTH	DATE / DATE
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	WR-1-5-12	24	20	SS			
	WR-WR-2-3	14	21	SS		Brown Fine to Medium Sand, poorly graded SP	
45	WR-1-3-9	24	22	SS		Brown Medium to Coarse Sand with Gravel SP	
						Termination of Boring at 46.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-54

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3277.94 Easting -5198.53

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/06/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/06/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

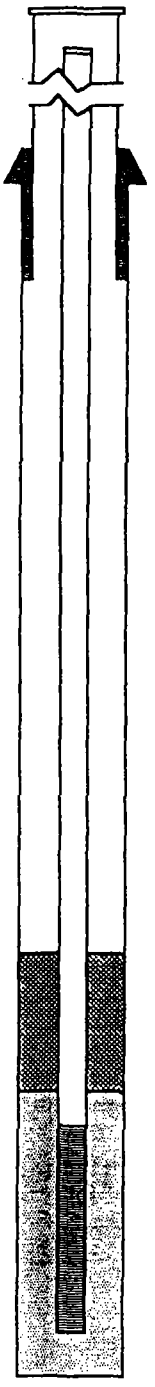
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



	MSL Top of Protective Casing
432.54	MSL Top of Riser Pipe
2.54	ft. Casing Stickup
430.0	MSL Ground Surface
-0.5	ft. Top of annular sealant
-16.1	ft. Top of Seal
19	ft. Total Seal Interval
-18.0	ft. Top of Sand
-20.0	ft. Top of Screen
20.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-46.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			4"	
Riser pipe below w.t.			*	
Screen	4"			
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	22.54
Protective casing length	N/A
Screen length	20.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	10"
ID of riser pipe (in.)	4"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING	RB-55
	SAMPLING METHOD Continuous Split Spoon	SHEET	1 OF 1
		DRILLING START TIME	1500
		DRILLING FINISH TIME	0930
RUST PROJECT NO. 73337.100	WATER LEVEL: NA		
	TIME		
	DATE	DATE	08/28/95
DATUM	CASING DEPTH	DATE	08/31/95
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION	432.33
DRILL RIG	LOCATION: NORTHING 3151.41	EASTING	-4468.37

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	No Sample					Brown Silty Clay with Gravel FILL	
	2-2-3-4	12	1	SS			
5	2-2-3-5	14	2	SS		Dark Gray Silty Clay CH	strong fuel odor
	2-3-5-6	20	3	SS			
	2-3-6-8	20	4	SS		Gray Silty Clay CL	
10	2-2-4-4	16	5	SS		— 2 inch Silty Sand (SM) seam at 11.3'	
	1-4-5-6	18	6	SS		Gray Clayey Silt, trace Fine Sand ML	
15	2-3-2-4	20	7	SS			
	1-1-1-2	18	8	SS			
	1-2-3-4	24	9	SS		Gray Silty Clay CH	
20	1-1-2-3	24	10	SS			
	1-1-3-3	20	11	SS		— 3 inch Clayey Silt (ML) seam at 23.0'	
25	1-3-4-6	24	12	SS			
	2-3-4-7	24	13	SS			
	2-3-4-5	24	14	SS			
30	2-3-3-5	24	15	SS		Gray Clayey Silt MH	
	3-15-15-24	20	16	SS		Brown Fine Sand, poorly graded SP — 1 inch Clayey Silt (ML) seam at 34.0'	no samples from 34.0' to 40.0'
35							
40						Termination of Boring at 40.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: RB-55

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 3151.41 Easting -4468.37

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 08/28/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 08/31/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: *Filter sand, Morie grade # 0*

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Well Construction Materials

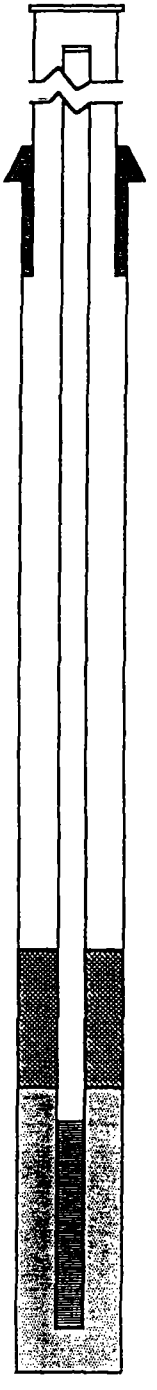
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			4"	
Riser pipe below w.t.			*	
Screen	4"			
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

Riser pipe length	22.57
Protective casing length	N/A
Screen length	20.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	10"
ID of riser pipe (in.)	4"

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
434.9	MSL Top of Riser Pipe
2.57	ft. Casing Stickup
432.33	MSL Ground Surface
-0.5	ft. Top of annular sealant
-15.05	ft. Top of Seal
2.4	ft. Total Seal Interval
-17.8	ft. Top of Sand
-20.0	ft. Top of Screen
20.0	ft. Total Screen Interval
-40.0	ft. Bottom of Screen
-40.0	ft. Bottom of Borehole

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION: Clark Refinery, Hartford, Illinois	DRILLING METHOD: Hollow Stem Auger	BORING: RB-56	
	SAMPLING METHOD: Continuous Split Spoon	SHEET 1 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL: NA	TIME: 0800	TIME: 1300
RUST PROJECT NO. 73337.100	TIME		
	DATE	DATE: 09/18/95	DATE: 09/18/95
DATUM	CASING DEPTH		
DRILLING CONTRACTOR: Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION: 430.08	
DRILL RIG	LOCATION: NORTHING 2570.15	EASTING -5276.73	

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
						Brown Silty Clay FILL	
	3-4-6-7	12	1	SS		Brown Silty Clay CH	
5	3-4-6-8	20	2	SS			
	3-4-4-6	18	3	SS		Brown Silty CLay CL	
	2-3-3-3	16	4	SS		Brown Clayey Silt ML	
10	2-3-4-4	14	5	SS			
	3-3-2-2	16	6	SS			
15	2-1-2-3	16	7	SS			
	2-2-2-2	18	8	SS		Brown Silty Clay CH	
	1-2-2-3	20	9	SS			
20	1-2-3-3	24	10	SS			
	2-2-3-6	24	11	SS			
25	2-3-3-5	24	12	SS			
	2-3-3-3	24	13	SS			
	1-2-2-3	24	14	SS		Brown Clayey Sand SC	
30	2-3-8-11	16	15	SS		Brown Fine to Medium Sand with Silt, poorly graded SP	
	1-4-7-11	20	16	SS			
35	1-8-13-18	24	17	SS		Brown Fine to Medium Sand, trace Gravel, poorly graded SP	
	4-8-15-14	24	18	SS			
	WR-4-3-4	16	19	SS			WR - Weight of the Rods
40							

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

RUST Environment & Infrastructure
555 N. New Ballas Rd.
St. Louis, MO 63141

SOIL BORING LOG

SITE NAME AND LOCATION Clark Refinery Hartford, Illinois	DRILLING METHOD Hollow Stem Auger	BORING RB-56
	SAMPLING METHOD Continuous Split Spoon	SHEET 2 OF 2
	WATER LEVEL / TIME / DATE / CASING DEPTH	DRILLING START TIME / DATE; FINISH TIME / DATE
RUST PROJECT NO. 73337.100		
DATUM		
DRILLING CONTRACTOR Roberts Env. Drilling	SURFACE CONDITIONS	ELEVATION
DRILL RIG	LOCATION: NORTHING	EASTING

DEPTH (FEET)	BLOWS / 6 IN.	RECOVERY (IN.)	SAMPLE NO.	SAMPLE TYPE	SYMBOL/ LITHOLOGY	DESCRIPTION OF MATERIAL	NOTES
	3-3-10-13	24	20	SS		Brown Silty Clay CH	
	3-6-10-13	24	21	SS		Brown Medium to Coarse Sand with Gravel. poorly graded SP	
45						Termination of Boring at 45.0'	

LOGGED BY Bill Sloan

DRILLED BY Jim Breeding

Illinois Environmental Protection Agency **Well Completion Report**

Site #: _____ County: _____ Well #: **RB-56**

Site Name: Clark Refinery - Hartford, Illinois Grid Coordinate: Northing 2570.15 Easting -5276.73

Drilling Contractor: Roberts Environmental Drilling Date Drilled Start: 09/18/95

Driller: Jim Breeding Geologist: Bill Sloan Date Completed: 09/18/95

Drilling Method: 4.25-inch Hollow Stem Auger Drilling Fluids (type): _____

Annular Space Details

Type of Surface Seal: Pre-mix Concrete

Type of Annular Sealant: Cement / Bentonite Grout

Amount of cement: # of bags _____ lbs. per bag _____

Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Bentonite Seal (Granular, Pellet): Chips

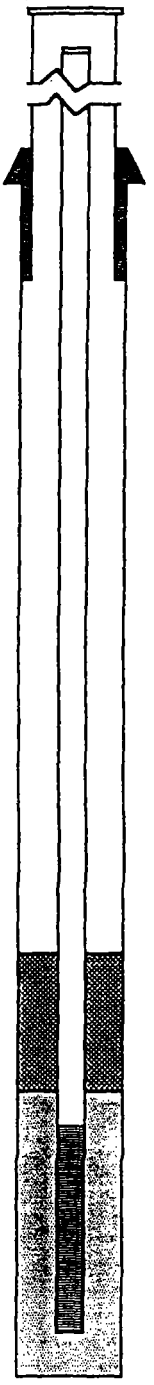
Amount of bentonite: # of bags _____ lbs. per bag _____

Type of Sand Pack: Filter sand, Morie grade # 0

Source of Sand: Morie Co.

Amount of Sand: # of bags _____ lbs. per bag _____

Elevations - 0.01 ft.



_____	MSL Top of Protective Casing
432.62	MSL Top of Riser Pipe
2.54	ft. Casing Stickup
430.08	MSL Ground Surface
-0.5	ft. Top of annular sealant
-20.0	ft. Top of Seal
2.2	ft. Total Seal Interval
-22.2	ft. Top of Sand
-24.0	ft. Top of Screen
20.0	ft. Total Screen Interval
-44.0	ft. Bottom of Screen
-45.0	ft. Bottom of Borehole

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			*	
Riser pipe above w.t.			4"	
Riser pipe below w.t.			*	
Screen	4"			
Coupling joint screen to riser			*	
Protective casing			NONE	

* FLUSH THREADED MATERIALS to 0.01 ft. (where applicable)

Measurements

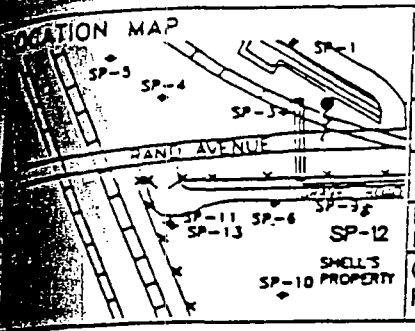
Riser pipe length	26.54
Protective casing length	N/A
Screen length	20.0
Bottom of screen to end cap	N/A
Top of screen to first joint	N/A
Total length of casing	N/A
Screen slot size	.010
% of openings in screen	N/A
Diameter of borehole (in.)	10"
ID of riser pipe (in.)	4"

Completed by: Bill Sloan Surveyed by: M. B. Corlew & Assoc. Ill. registration # _____

Clayton
GROUP SERVICES

SHELL WELLS – RAND AVENUE SITE AND TANNERY PROPERTY

FPH Investigation Plan
The Hartford Working Group
15-03095 10rc001 / 1/7/2004 / KDC/BRS

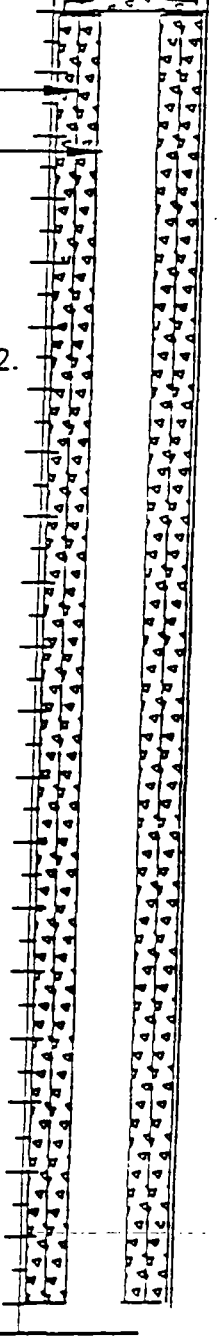


SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-12	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

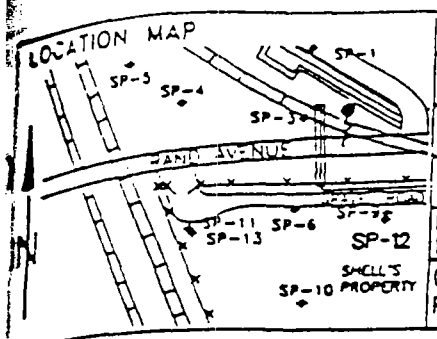
CASING	TYPE SCHEDULE 40 PVC		DIAMETER 6" 4"		LENGTH 28' 30'	HOLE DIA. 10" 6"	
SCREEN	TYPE S.40 PVC	SLOT 0.01"	DIAMETER 4"		LENGTH 20'	TOTAL DEPTH 50'	

SOIL TYPE	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS	WELL COMPLETION
					0				FLUSH MOUNT
					1			6" CASING	
					2			4" CASING	
					3				
					4			Description of the shallow section of this well is on SP-9 well log. Well SP-9 is 10' NNE fron well SP-12.	
					5				
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				



LEGEND: GROUT, BENTONITE, SAND, CASING, SCREEN, WATER LEVEL

BEI 022439



SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-12	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

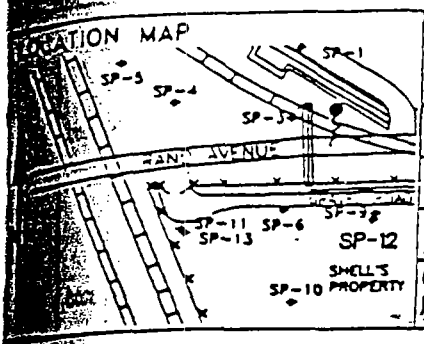
CASING	TYPE SCHEDULE 40 PVC	DIAMETER 6" 4"	LENGTH 28' 30'	HOLE DIA. 10" 6"	
SCREEN	TYPE S.40 PVC SLOT 0.01"	DIAMETER 4"	LENGTH 20'	TOTAL DEPTH 50'	

LITHOLOGY CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						20			
						21			
						22			
						23			6" CASING
						24			
						25			
						26			
						27			
						28			4" CASING
						29			
						30			
						31			
						32			
						33		9	
	mod	loose		1	1.1	34	1.06	10	0.00'-0.89' SAND, gray, fine-to medium grained, subrounded.
	m	stiff	plas					10	0.89'-1.06' CLAY, red-brown, sandy.
								11	
						35			
						36			
	poor	mdense							0.00'-0.46' SAND, reddish brown-gray, medium-to coarse-grained with some fine-to coarse-grained, subrounded to rounded.
						37			
						38		19	
	poor	mdense		2	1.6	39	1.13	26	0.46'-1.13' SAND, gray with some black banding, fine-to very fine-grained, subrounded.
								25	
						40		45	

WELL COMPLETION

EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022440



SHELL OIL COMPANY - WELL LOG

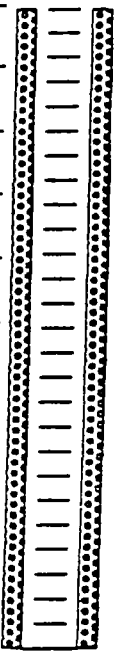
WELL NUMBER	SP-12	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING: TYPE SCHEDULE 40 PVC — DIAMETER 6" 4" — LENGTH 28' 30' — HOLE DIA. 10" 6"

SCREEN: TYPE S.40 PVC — SLOT 0.01" — DIAMETER 4" — LENGTH 20' — TOTAL DEPTH 50'

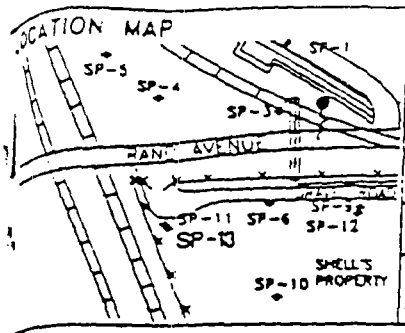
CONSISTENCY	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						40			
						41			
						42			
						43			
		soft	plas	3	0.9	44	2.00	3	0.00'-0.21' CLAY, gray, silty.
		soft	plas					4	0.21'-0.47' SILT, gray, clayey.
	poor	loose						5	0.47'-0.73' SAND, gray, very fine-to fine-grained, very silty, subrounded.
						45		5	
						46			
						47			
						48			
	poor	loose		4	2.4	49	0.96	21	0.00'-0.16' SAND, gray, medium-to coarse-grained, some small pebbles, subrounded to rounded.
								23	
								30	
								22	
		stiff	s plas			50			0.16'-0.37' CLAY, gray, sandy.
	poor	loose							0.37'-0.96' SAND, gray, medium-to coarse-grained, some small pebbles, subrounded to rounded.
						51			
						52			
						53			
						54			
						55			
						56			
						57			
						58			
						59			
						60			

WELL COMPLETION



EXPLANATION: GROUT, BENTONITE, SAND, CASING, SCREEN, WATER LEVEL

BEI 022441



SHELL OIL COMPANY - WELL LOG

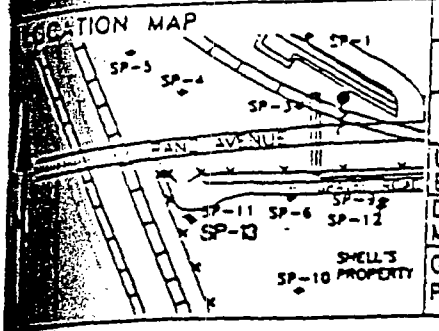
WELL NUMBER	SP-13	LOCATION	WRMC SPILL AREA
DATE	1-13-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING	TYPE SCHEDULE 40 PVC	DIAMETER	6" 4"	LENGTH	28' 30'	HOLE DIA.	10" 6"
SCREEN	TYPE S.40 PVC SLOT 0.01"	DIAMETER	4"	LENGTH	20'	TOTAL DEPTH	50'

SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	HP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS	WELL COMPLETION
					0				FLUSH MOUNT
					1			6" CASING	
					2			4" CASING	
					3				
					4			Description of the shallow section of this well is on SP-11 well log. Well SP-11 is 6' NNW to well SP-13.	
					5				
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				

BEI 022442

EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL



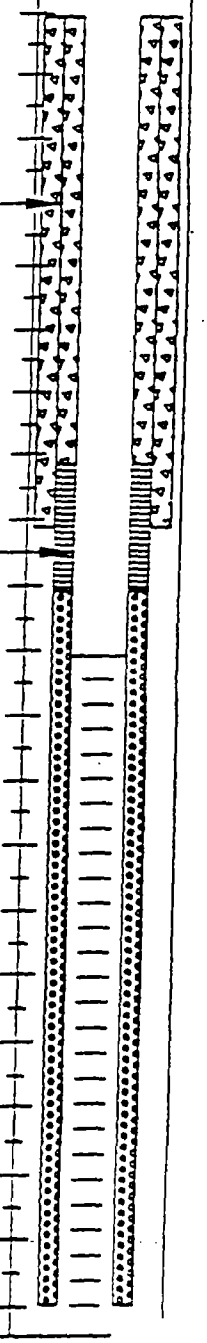
SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-13	LOCATION	WRMC SPILL AREA
DATE	1-13-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING	TYPE SCHEDULE 40 PVC	DIAMETER	6" 4"	LENGTH	28' 30'	HOLE DIA.	10" 6"
SCREEN	TYPE S.40 PVC	SLOT 0.01"	DIAMETER 4"	LENGTH 20'		TOTAL DEPTH	50'

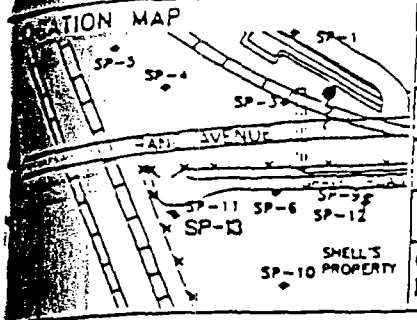
CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						20			
						21			
						22			
						23			6" CASING
						24			
						25			
						26			
						27			
						28			4" CASING
						29			
						30			
						31			
						32			
mod	loose					33			
				1	23.7	34	0.63	6 13 18 34	0.00'-0.63' SAND, gray, fine-to medium-grained, subrounded.
						35			
mod	loose					36			0.00'-0.31' SAND, gray, fine-to medium-grained, some coarse-grained, subrounded.
						37			
	hard								0.31'-0.38' COAL, black, anthracite.
mod	loose					38			0.38'-0.72' SAND, medium-to coarse-grained, some fine-and very coarse-grained with some small pebbles, subrounded to rounded.
				2	4.7	39	0.72	12 19 7 9	
						40			

WELL COMPLETION



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022443



SHELL OIL COMPANY - WELL LOG

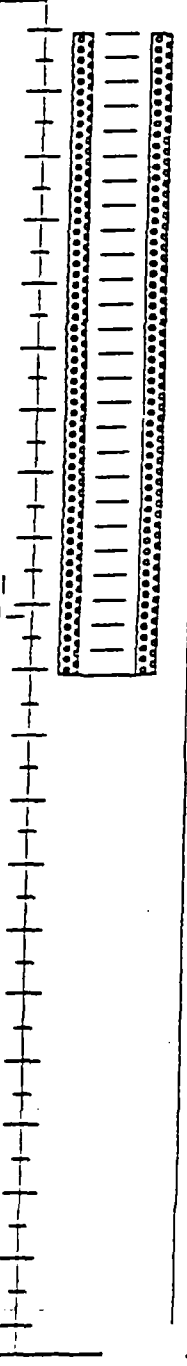
WELL NUMBER	SP-13	LOCATION	WRMC SPILL AREA
DATE	1-13-90	WEATHER	SUNNY MID 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING ▶ TYPE SCHEDULE 40 PVC DIAMETER 6" 4" LENGTH 28' 30' HOLE DIA. 10" 6"

SCREEN ▶ TYPE S.40 PVC SLOT 0.01" DIAMETER 4" LENGTH 20' TOTAL DEPTH 50'

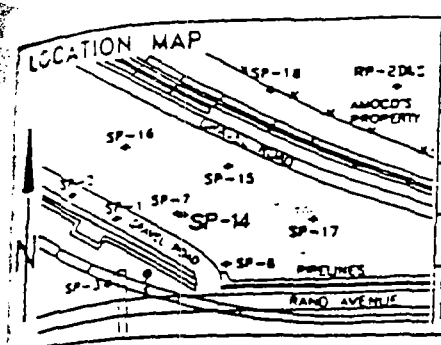
CONSISTENCY SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
					40			
					41			
					42			
	soft	plas						0.00'-0.34' SILT, gray, clayey.
	soft	plas			43			0.31'-0.49' CLAY, gray, silty.
poor	loose		3	3.2	44	1.47	3, 3, 5, 5	0.49'-0.53' SAND, gray, very fine-to fine-grained, subrounded.
	soft	plas						0.53'-0.83' CLAY, gray, silty.
poor	vloose				45			0.83'-0.96' SAND, gray, very fine- to fine-grained, subrounded.
	soft	plas			46			0.96'-1.21' CLAY, gray, silty.
poor	vloose							1.21'-1.47' SAND, gray, very fine-to fine-grained, subrounded.
					47			
poor	loose				48			0.00'-1.21' SAND, gray, medium-to coarse-grained, some small pebbles, subrounded to well-rounded, different product odor.
			4	117.2	49	1.21	20, 31, 24, 19	
					50			
					51			
					52			
					53			
					54			
					55			
					56			
					57			
					58			
					59			
					60			

WELL COMPLETION



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022444

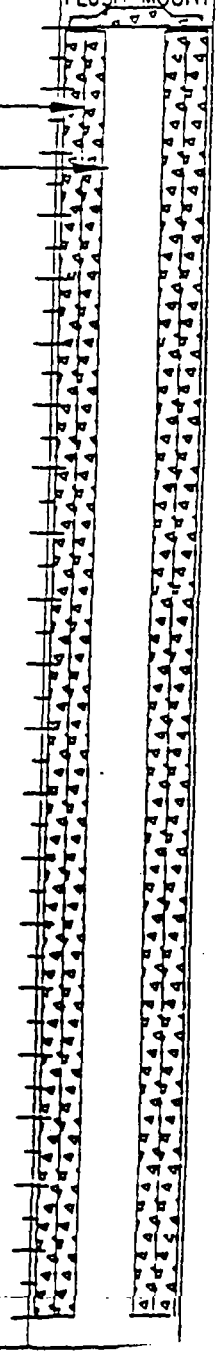


SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-14	LOCATION	WRMC SPILL AREA
DATE	1-10-90 1-12-90	WEATHER	SUNNY, WINDY LOW 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

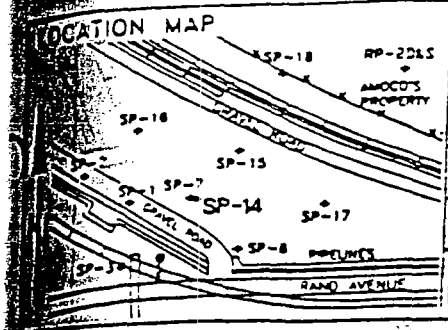
CASING	TYPE SCHEDULE 40 PVC		DIAMETER 6" 4"		LENGTH 28' 30'	HOLE DIA. 10" 6"	
SCREEN	TYPE S.40 PVC	SLOT 0.01"	DIAMETER 4"		LENGTH 20'	TOTAL DEPTH 50'	

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS	WELL COMPLETION
						0				FLUSH MOUNT
						1			6" CASING	
						2			4" CASING	
						3				
						4			Description of the shallow section of this well is on SP-7 well log. Well SP-7 is 10' SW to well SP-14.	
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022445



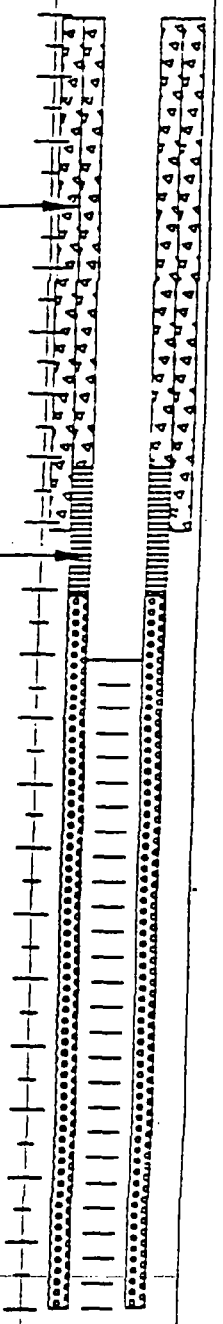
SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-14	LOCATION	WRMC SPILL AREA
DATE	1-10-90 1-12-90	WEATHER	SUNNY, WINDY LOW 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING	TYPE SCHEDULE 40 PVC	DIAMETER	6" 4"	LENGTH	28' 30'	HOLE DIA.	10" 6"
SCREEN	TYPE S.40 PVC SLOT 0.01"	DIAMETER	4"	LENGTH	20'	TOTAL DEPTH	50'

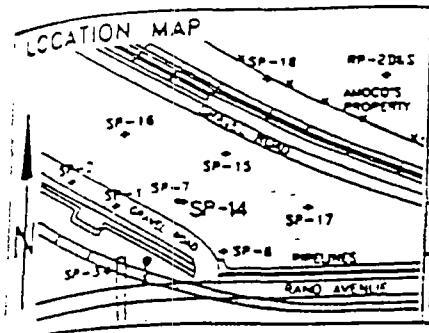
COHESIVE	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						20			
						21			
						22			
						23			6" CASING
						24			
						25			
						26			
						27			
						28			4" CASING
						29			
						30			
						31			
						32			
						33		4	0.00'-0.23' SAND, gray, very fine-to fine-grained, subrounded.
						34	0.73	4	
	soft	loose	plas	1	6.1			7	0.23'-0.46' SILT, gray, very sandy.
		loose						6	0.46'-0.73' SAND, gray, very fine-to fine-grained, subrounded.
						35			
						36			
		loose							0.00'-0.37' SAND, gray, very fine-to fine-grained, subrounded.
						37			
	soft		plas						0.37'-0.52' CLAY, gray.
		loose				38		5	0.52'-1.13' SAND, gray, very fine-to fine-grained, subrounded.
								5	
	soft		v plas	2	1.3	39	1.64	4	1.13'-1.31' CLAY, gray.
		loose						7	1.31'-1.64' SAND, gray, very fine-to fine-grained, subrounded.
						40			

WELL COMPLETION



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022446



SHELL OIL COMPANY - WELL LOG

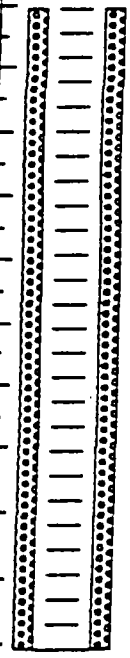
WELL NUMBER	SP-14	LOCATION	WRMC SPILL AREA
DATE	1-10-90 1-12-90	WEATHER	SUNNY, WINDY LOW 40's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	8.25" HOLLOW-STEM AUGER 5.875" MUD ROTARY	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	50'-29' WB-40 SAND	SEAL	0'-27' GROUT 27'-29' BENTONITE

CASING ▶ TYPE SCHEDULE 40 PVC DIAMETER 6" 4" LENGTH 28' 30' HOLE DIA. 10" 6"

SCREEN ▶ TYPE S.40 PVC SLOT 0.01" DIAMETER 4" LENGTH 20' TOTAL DEPTH 50'

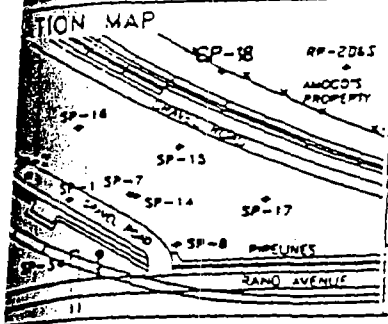
MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						40			
						41			
						42			
wet	mod	loose				43			0.00'-0.47' SAND, gray, fine-to medium-grained, subrounded.
								6	
wet		soft	plas	3	3.2	44	1.86	5	0.47'-0.78' CLAY, gray, sticky.
wet	mod	loose						8	0.78'-1.07' SAND, gray, fine-to very fine-grained, subrounded.
								6	
wet		soft	plas			45			1.07'-1.86' SILT, gray, sandy, clayey.
						46			
						47			
wet	mod	loose				48		12	0.00'-0.87' SAND, gray, medium-to coarse-grained, subrounded to rounded.
				4	2.7	49	0.87	14	
								15	
								20	
						50			
						51			
						52			
						53			
						54			
						55			
						56			
						57			
						58			
						59			
						60			

WELL COMPLETION



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022447



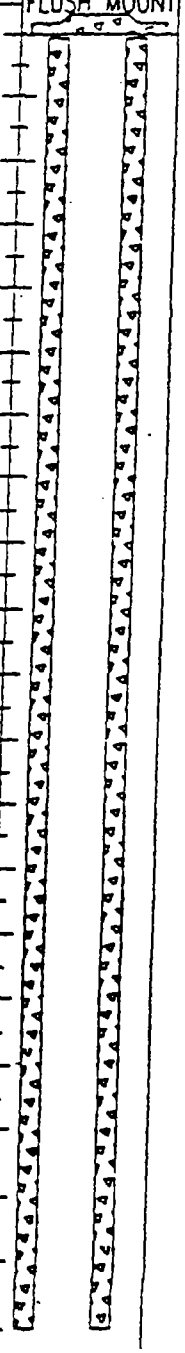
SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-18	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 50's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	6.25" HOLLOW-STEM AUGER	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	46'-30' WB-SAND	SEAL	0'-28' GROUT 28'-30' BENTONITE

SING	TYPE SCHEDULE 40 PVC	DIAMETER 4"	LENGTH 31'	HOLE DIA. 10"
REEN	TYPE S.40 PVC SLOT 0.01"	DIAMETER 4"	LENGTH 15'	TOTAL DEPTH 46'

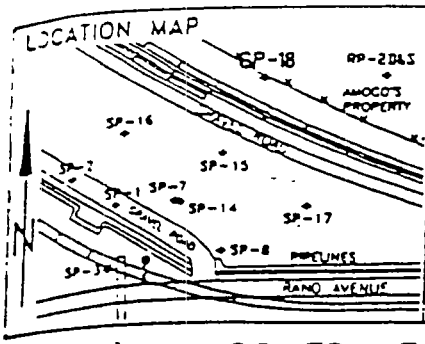
SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
	soft	plas	1	1.1	0–4	1.45	Pushed	0.00'–1.45' CLAY, gray.
	soft	plas	2	35.1	8–9	1.77	2, 3, 3, 3	0.00'–1.77' CLAY, mottled tan and light gray with some red-brown splotches.
					12–13			0.00'–0.39' SAND, light brown and tan, very fine-to fine-grained, subrounded, grades into silt.
	soft	plas	3	415	13–14	1.48	1, 2, 2, 3	0.39'–0.56' SILT, light brown and tan. 0.56'–0.72' CLAY, light brown and tan. 0.72'–1.03' SAND, brown, very fine to-fine-grained, subrounded, silty.
	soft	plas			16			1.03'–1.48' CLAY, light brown and tan.
	soft	plas	4	885	18–19	2.00	2, 2, 2, 2	0.00'–2.00' CLAY, light tan grading into light gray and then into dark gray, rust colored clay filled burrows from 0.18'–0.31', very slight product odor near burrows.

WELL COMPLETION: FLUSH MOUNT



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022454



SHELL OIL COMPANY - WELL LOG

WELL NUMBER	SP-18	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 50's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	6.25" HOLLOW-STEM AUGER	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	46'-30' WB-SAND	SEAL	0'-28' GROUT 28'-30' BENTONITE

CASING ▶ TYPE SCHEDULE 40 PVC DIAMETER 4" LENGTH 31' HOLE DIA. 10"

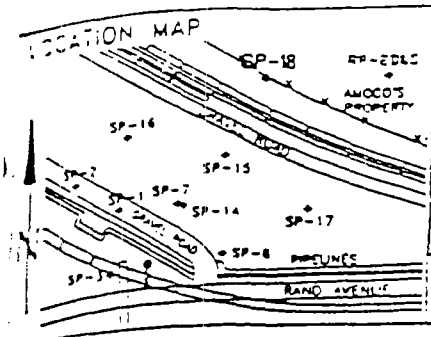
SCREEN ▶ TYPE S.40 PVC SLOT 0.01" DIAMETER 4" LENGTH 15' TOTAL DEPTH 46'

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						20			
						21			
						22			
						23			
damp		soft	plas	5	14.5	24	1.63	2, 2, 2, 3	0.00'-1.63' CLAY, blue to greenish-gray, silty.
						25			
						26			
						27			
						28			
wet		soft	v plas	6	3.7	29	2.00	2, 2, 1, 3	0.00'-2.00' CLAY, gray.
						30			
						31			
						32			
wet		soft	v plas			33			0.00'-0.34' CLAY, red-brown, very sticky
sat	mod	loose		7	3.6	34	1.57	3, 10, 13, 8	0.34'-1.57' SAND, gray, fine-to medium-grained, subrounded, bands of red-brown clay, product odor in cuttings.
						35			
sat	poor	loose				36			0.00'-1.01' SAND, gray, fine-to medium-grained, subrounded, product odor in cuttings, organic matter bands @ .23', .27', .31'-.33', .56'-.62' and .72'-.85'.
						37			
						38		2	
wet		soft	v plas	8	691	39	1.95	2, 3, 4	1.01'-1.13' CLAY, gray.
sat	poor	loose							1.13'-1.95' SAND, gray, fine -to very fine-grained, with thin beds of coal.
						40			

WELL COMPLETION

EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022455



SHELL OIL COMPANY - WELL LOG

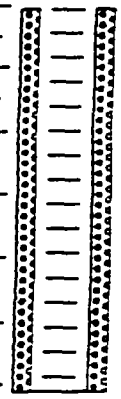
WELL NUMBER	SP-18	LOCATION	WRMC SPILL AREA
DATE	1-14-90	WEATHER	SUNNY MID 50's
LOGGED BY	R. CHAPIN	DRILLED BY	MATHIS INC.
DRILLING METHOD	6.25" HOLLOW-STEM AUGER	SAMPLING METHOD	TWO-FOOT SPLIT SPOON
GRAVEL PACK	46'-30' WB-SAND	SEAL	0'-28' GROUT 28'-30' BENTONITE

CASING ▶ TYPE SCHEDULE 40 PVC DIAMETER 4" LENGTH 31' HOLE DIA. 10"

SCREEN ▶ TYPE S.40 PVC SLOT 0.01" DIAMETER 4" LENGTH 15' TOTAL DEPTH 46'

CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NUMBER	TIP READING (PPM)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY/REMARKS
						40			
						41			
						42			
						43			
	mod	loose		9	1051	44	1.63	↓ 1 3 3	0.00'-1.63' SAND, gray, fine- to medium-grained, subrounded.
						45			
						46			
						47			
						48			
	mod	loose		10	1180	49	2.00	3 2 3 3	0.00'-0.37' SAND, gray, fine-to medium-grained, subrounded. 0.37'-1.85' SAND, gray, medium-to coarse-grained, some small pebbles, subrounded to rounded.
	mod	loose				50			
	mod	loose				51			1.85'-2.00' GRAVEL, small pebbles, subrounded.
						52			
						53			
						54			Hole drilled to 48'; filled back in to 46'.
						55			
						56			
						57			
						58			
						59			
						60			

WELL COMPLETION



EXPLANATION: GROUT, SAND, SCREEN, BENTONITE, CASING, WATER LEVEL

BEI 022456