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5711

REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 5 REFERENCE APPENDICES VOLUME 10 OF 12 APPENDIX P (CONTINUED) DRAFT JUNE 1994

06/23/94

DOE-FN 1986 REPORT

EPA

REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 5

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

REFERENCE APPENDICES

VOLUME 10 OF 12

APPENDIX P (Continued)

JUNE 1994

U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

DRAFT

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE 12-12-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-20-91/1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 8/10

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	12-12-91 1410 53625	3 5 5	11	Stiff yellowish brown (10 YR, 5/4) CLAYEY SILT with organic matter, moist	ML	1.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
.9 1.5	12-12-91 1415 53626	5 13 15	10	Hard yellowish brown (10YR, 5/4) SILTY CLAY with sand and some black weathering, a little organic matter, damp, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
2.3 3.0	12-12-91 1420 53627	15 16 20	6	Hard light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and a little fine gravel, dry, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
3.5 4.5	12-12-91 1430 53628	18 18 18	10	Hard light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and trace fine gravel, damp, non plastic	CL	4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
5.3 6.0	12-12-91 1435 53629	17 17 16	10	Hard light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and a little gravel, damp, non plastic	CL	4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
6.8 7.5							

NOTES:
Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples Collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu = A01343	.2 ppm	Background Levels
Bγ S/N: 73937	60 cpm	
α S/N: 73908	0 cpm	

402-11-66

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE: 12-12-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91/1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth: Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: CABLE Tool 10" drill bit		PAGE 2 OF 8/10

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	12-12-91 1440 53630	13 12 21	0	No Recovery	N/A	N/A	Hnu= Br= α= N/A
9.0 9.5	12-12-91 1450 53631	13 21 30	6	Stiff light yellowish brown (2.5Y,6/4) CLAY with some sand and fine gravel, moist, medium plasticity	CL	1.5	Hnu=.2 ppm Br=60 cpm α=0 cpm
10.5 11	12-16-91 1314 53632	8 12 18	6	Stiff light yellowish brown (2.5Y,6/4) SANDY CLAY with gravel, moist medium plasticity	CL	1.5	Hnu=.2ppm Br=40 cpm α=0 cpm
12	12-16-91 1325 53633	12 28 31	18	Very stiff gray (2.5Y, 5/0) SANDY CLAY with gravel, damp, low plasticity	CL	3.0	Hnu=.2 ppm Br=40 cpm α=0 cpm
13.5 13.75	12-16-91 1345 53634	7 9 12	3	Same as above	CL	3.0	Hnu=.2 ppm Br=40 cpm α=0 cpm
15							

NOTES

On 12-16-91 Gary Dye was the Assistant Driller

12-16-91

Hnu S/N: A01343	.2 ppm	Background Levels
Br S/N: 73937	40 cpm	
α S/N: 73908	0 cpm	

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2400	COORDINATES:	DATE 12-16-91	
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91/1230	DATE STARTED: 12-12-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91	
DRILLING METHODS: CABLE Tool 10" Drill Bit		PAGE 3 OF 8/10	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	12-16-91 1400 53635	3 5 8	12	Very stiff gray (5Y, 5/1) SANDY CLAY with gravel, damp, low plasticity	CL	3.0	Hnu = .2 ppm Br = 40 cpm α = 0 cpm
16.5	12-16-91 1410 53636	3 4 8	6	Same as above	CL	3.0	Hnu = .2 ppm Br = 40 cpm α = 0 cpm
18	12-16-91 1430 53637	3 8 10	12	Very stiff gray (5Y, 5/1) SANDY CLAY with gravel, damp, medium plasticity	CL	2.0	Hnu = .2 ppm Br = 40 cpm α = 0 cpm
19.5	12-16-91 1540 53638	3 6 9	0	No Recovery	N/A	N/A	N/A
21	12-16-91 1645 53639	5 9 9	12	Very stiff gray (5Y, 5/1) SANDY CLAY with gravel, damp, medium plasticity	CL	2.5	Hnu = .2 ppm Br = 40 cpm α = 0 cpm
22.5							

NOTES

402-11-66

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	K.M. 12-16-91
BORING NUMBER: 2400	COORDINATES:	DATE 12-16-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91 1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marien	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 4 OF ~~8~~ 10

K.M. 1-6-92

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	12-16-91 1655 53640	2 4 5	14	Loose olive brown (2.5Y, 4/3) medium SAND with trace gravel, dry	SP	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
23.7							
24	12-17-91 0900 53641	4 6 12	12	Medium dense grayish brown (2.5Y, 5/2) medium SAND with trace gravel, dry	SP	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
25							
				Samples will be taken at 5 ft. intervals			
30							

NOTES:

12-17-91

Hnu S/N: 711111	.2 ppm	Background Levels
Bγ S/N: 73937	40 cpm	
α S/N: 73968	0 cpm	

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RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE 12-17-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91/1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF 8/10

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	12-17-91 0945 53642	39 45 49	14	Very dense light yellowish brown (2.5Y, 6/3) gravelly SAND, dry	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
31.5							
35	12-17-91 1015 53643	19 18 23	18	Same as above but dense	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
36.5							
40	12-17-91 1120 53644	10 17 20	15	Same as above	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
41.5							
45							

NOTES

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

CT NUMBER: 602-3-23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE 12-17-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91 / 1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF ~~8~~ 10

K.M. 1-6-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	12-17-91 1430 53645	17 49 50	18	Same as above but very dense	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
46.5							
50	12-17-91 1520 53646	6 15 27	14	Same as above but dense	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
55	12-17-91 1600 53647	39 50	12	Very dense light yellowish brown (2.5Y, 6/3) Sandy Gravel dry	GW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
56							
56.5							
60							

NOTES:

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE 12-18-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91/1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 7 OF 8/10

K.M. 1-16-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	12-18-91 0915 53648	3 6 9	10	Medium dense grayish brown (2.5Y, 5/2) medium sand with fine gravel, damp	SP	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
60.8 61.5				Water Level ▽			The water level = 63.4 ft below the ground surface on 12-21-91 at 1230
63.4							
65	12-18-91 1030 53649	5 6 13	10	Medium dense grayish brown (2.5Y, 5/2) fine gravel with sand, wet	GW ~~SW~~ K.M. 12-18-91	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
66.5							
70	12-18-91 1417 53650	2 3 5	18	Loose ~~Medium dense~~ K.M. 12-18-91 grayish brown (2.5Y, 5/2) SAND with ~~fine~~ K.M. 12-18-91 a little gravel, wet	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
71.5							
75							

NOTES:

12-18-91

Hnu S/N: 71111	.2 ppm	Background Levels
Bγ S/N: 73937	40 cpm	
α S/N: 73808	0 cpm	

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2400	COORDINATES:	DATE 12-18-91
ELEVATION:	GWL: Depth 63.4 Date/Time 12-21-91 1230	DATE STARTED: 12-12-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 8 OF 8 10

K.M. 1-4-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	12-18-91 1500 53651	3 6 9	14	Medium dense grayish brown (2.5Y, 5/2) SAND with fine gravel, wet	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
76.5							
80							
80.4	12-18-91 1549 53652	5 7 6	5	Same as above	SW	N/A	Hnu = .2 ppm Bγ = 40 cpm α = 0 cpm
8...				Bottom of Bore Hole Drilled to 80 ft. Depth of sampling - 81.5 ft			

NOTES:

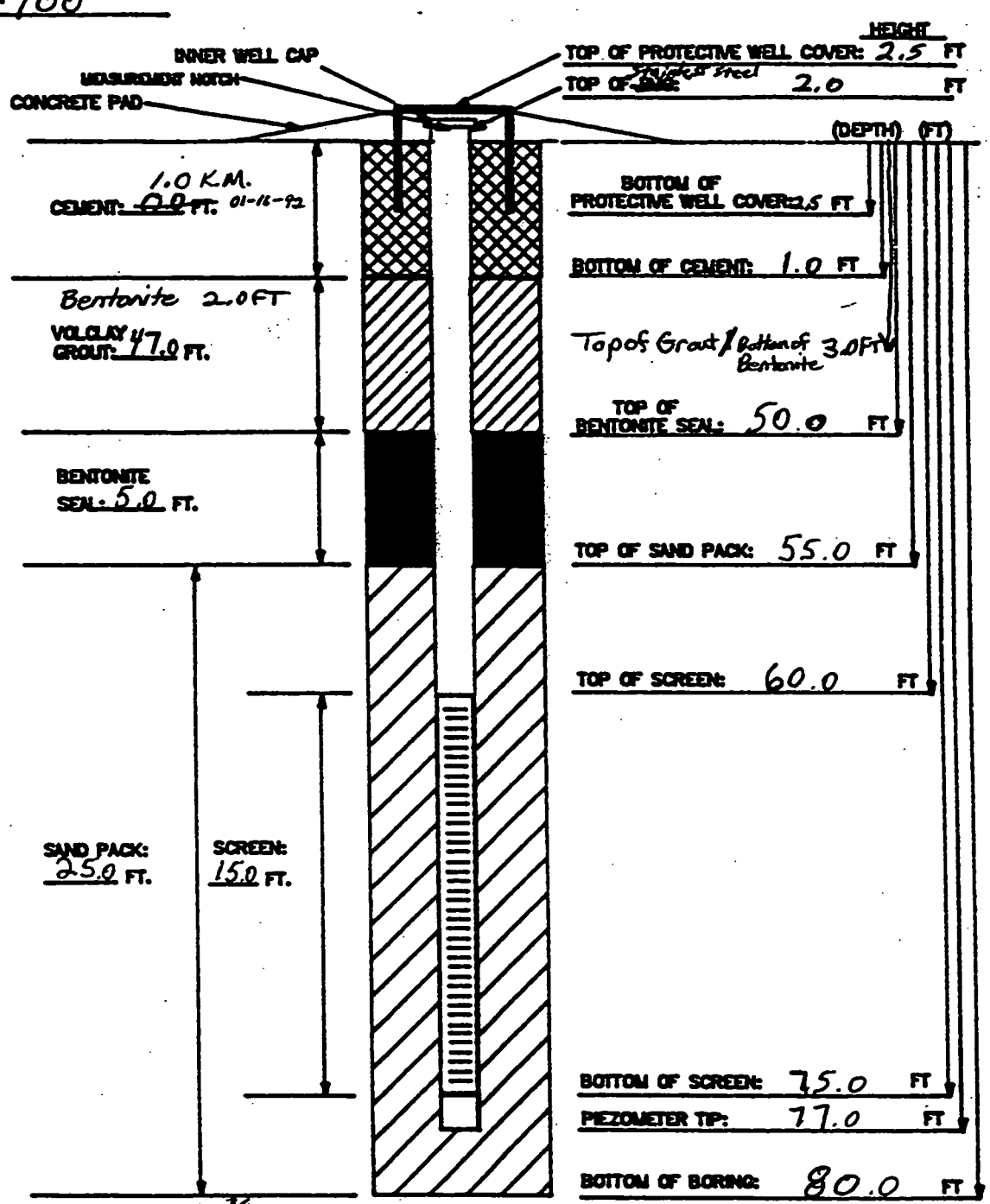
000009

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
2400

INSTALLATION DATE: 12-20-91



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 Sand, 14 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 11
BAGS OF VOLCLAY GROUT: 9
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 800 gallons
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC-PIPE; FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC-PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 63.4 ft. / 12-21-91
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.23 GEOLOGIST/ENGINEER: Ken Marion

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Kay Morion DATE 12-22-91
PROJECT NO. 6023-23 CHECKED BY C Gula DATE 01/16/92
BORING NO. 2400
PIEZOMETER NO. ~~2400~~ ~~N/A~~ 2400 K.M. 12-22-91 DATE OF INSTALLATION 12-20-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT 10" churn bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0 TO 80.0	SIZE 10 3/4 in FROM 0.0 TO 80.0
FLUID ____ FROM ____ TO ____	SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Cable Tool	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4 in. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 60 (6 - 10 ft. Section, 1 - 2 ft. Section)
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD flush - Joint Threaded
TOTAL PERFORATED AREA 15 ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.	OTHER PROTECTION Steel Well Cover with lock
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	Top 0.0	Bottom 1.0		
CEMENT GROUT/SLURRY	TOP 3.0	BOTTOM 50.0	TOP	BOTTOM
BENTONITE	TOP 1.8 30.0	BOTTOM 3.0 55.0	TOP	BOTTOM
SAND	TOP 55.0	BOTTOM 80.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 60.0	BOTTOM 75.0	TOP	BOTTOM
PIEZOMETER TIP	77.0			
BOTTOM OF BOREHOLE	80.0			
GWL AFTER INSTALLATION	63.4 ft. on 12-21-91			

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
IS SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS The temporary casing was removed during the installation of the well

FERNALD
RI/FS

6711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: ~~2401~~ 1401 (J.L. 12-19-91)	COORDINATES:		DATE: 12-17-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST: J. Lear	Depth	Date/Time	DATE COMPLETED: 12-19-91
DRILLING METHODS: Cable tool			PAGE 1 OF 4

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	53654 1330 12-17-91	2 3 5	10	Stiff, dark yellowish brown, (10yr, 4/4) silty clay, trace gravel, Trace coal dust low to med plasticity, moist.	CL	1.25	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
2	53655 1335 12-17-91	3 5 6	2	S.A.A, no coal dust	CL	1.25	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
3 4	53656 1340 12-17-91	4 7 7	5	med dense, dark yellowish brown, (10yr, 4/6) Gravelly clay, some sand, med plasticity, moist.	CL	NA	Hnu - 0; Bq - 100 cpm; α - 0 cpm
5 6	53657 1345 12-17-91	40 11 7	1	Stiff, dark yellowish brown (10yr, 4/4) clay, some cement gravel, trace High Bq organics, med plasticity, moist	CL	1.25	Hnu - 0 ppm; Bq - 700 cpm; α - 3 cpm
7	53658 1350 12-17-91	8 13 16	10	Stiff, brown, (10yr, 5/3) silty clay, some cement gravel, trace sand, med Plasticity, moist	CL	1.25	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
Perched water zone 8	53659 1355 12-17-91	12 13 13	12	med. dense, Dark yellowish brown (10yr. 4/6) silty clay, some sand, some gravel, wet (no plast. possible) 8.0 (J.L. 12-17-91)	CL	NA	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
9				med dense, dark yellowish brown, 10yr, 4/6) silty sand (poorly graded) sand, wet.	SP	NA	
9.75	53660 1515 12-17-91	8 11 17	18	med dense, brown, 10yr, 5/3) clay gravel sand "soup", wet.	CL	NA	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
Clay zone 10				V. stiff dark yellowish brown, (10yr, 4/4) silty clay, trace gravel, low plast. moist	CL	3.0	
11 12.0	53661 1530 12-17-91	7 12 12	7	med dense, dark yellowish brown (10yr. 4/6) sandy silt, saturated.	ML	NA	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm
12 13	53662 1410 12-18-91	24 31 36	8	Hard, gray, (10yr, 5/1) silty clay, trace gravel low plasticity, sl. moist.	CL	4.0	Hnu - 0 ppm; Bq - 100-120 cpm; α - 0 cpm
14 15	53663 1420 12-18-91	15 41 50/3	9	J.L. 12-18-91 S.A.A. 14.7 Hard, dark yellowish brown, (10yr 4/6) silty clay, trace gravel, slow Plasticity, sl. moist	CL CL	4.0 >4.0	Hnu - 0 ppm; Bq - 100 cpm; α - 0 cpm

NOTES

Drilling Contractor - Penn Drilling
Drilling equipment - Cyclone 45
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A. Same As Above

Backgrounds
Hnu - 0 ppm
Bq - 80 - 120 cpm
α - 0 cpm

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FERNALD RI/FS

▶ 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: Temp RI/FS	
BORING NUMBER: 1401	COORDINATES:	DATE: 12-18-91
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time	DATE COMPLETED: 12-19-91
DRILLING METHODS: Cable Tool		PAGE 2 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	NA NA NA	NA	NA	Inpenetrable struck at 15.0ft Drill through to 16.5ft ~~16.5 See Bore of 1414~~ CY 4/21/92	NA	NA	NA
17	53664 14445	45 34	8	V. Dense, dark yellowish brown 10yr, 4/6 Poorly graded ~~large~~ med sand, trace gravel, Sl. moist.	SP	NA	Hnu - 0 ppm Bq - 100-120 cpm α - 0 cpm
18	12-18-91	25					

Boring Plugged and Abandoned
Drilling depth 16.5ft
Sampling depth 18.0ft

Aquafer met at 15.0-16.5ft

NOTES: see page 1

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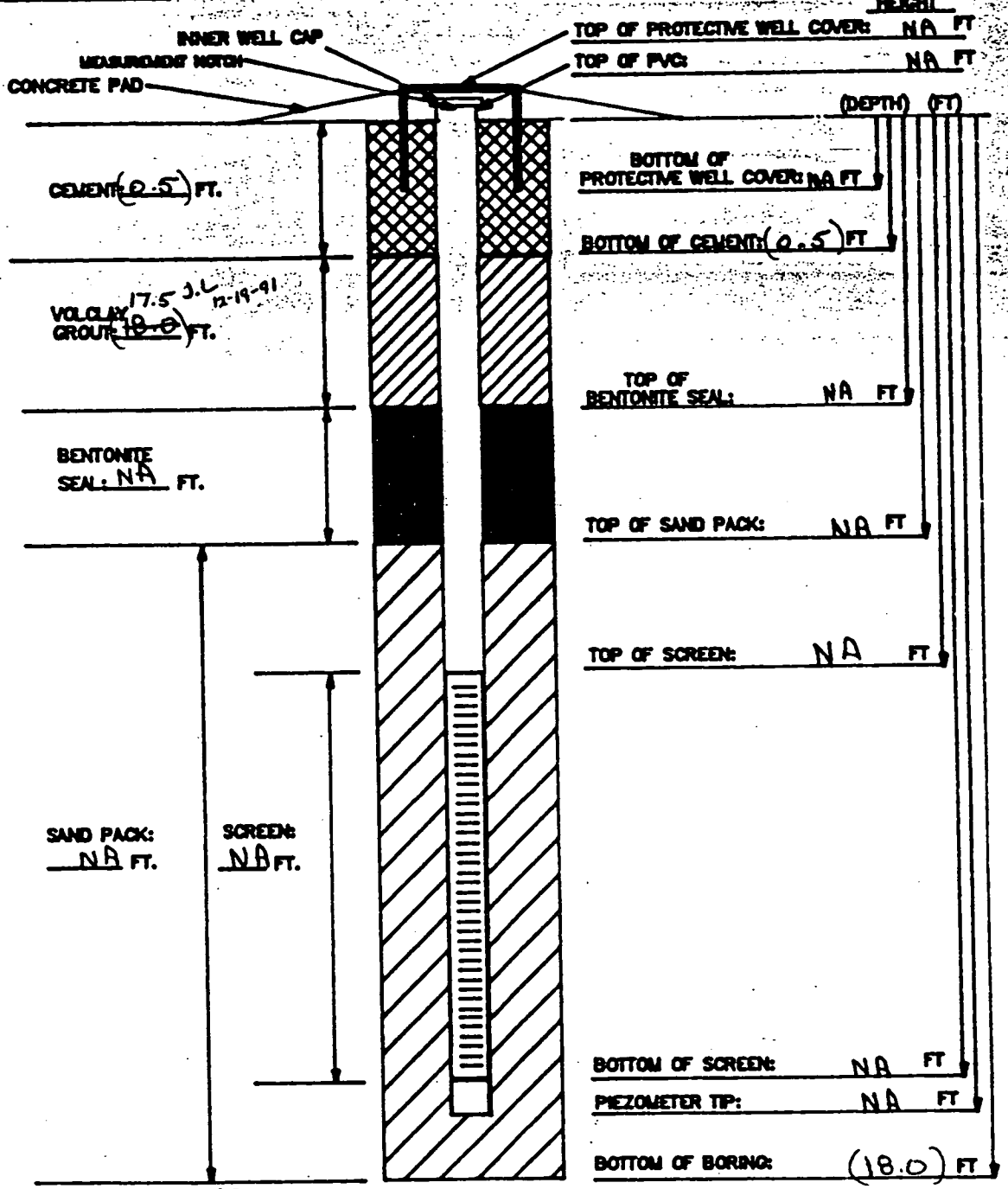
FERNALD RI/FS

INSTALLATION DATE: 12-19-91

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged Boring 1401



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4-80lb bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 150 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.23 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME Femp RI/FS
FIELD ENG./GEO. J. Lear
DATE 12-19-91
PROJECT NO. 602.3.23
CHECKED BY
DATE
BORING NO. 1401
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging 12-19-91
J.L 12-19-91

BOREHOLE DRILLING

DRILLING METHOD Cable tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 TO 16.5
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT Cable tool
CASING SIZE (S) USED:
SIZE 10 in FROM 0.0 TO 15.0
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0	BOTTOM 0.5		
	TOP 0.5	BOTTOM 18.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	18.0			
GWL AFTER INSTALLATION	NA			

Not Applicable

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS Drilling Depth was 16.5 ft Sample Depth is 18.0 ft
Boring is 10 in wide up to 16.5 ft then spoon width of 2.0 in from 16.5-18.0

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.3.23	PROJECT NAME. Fernald RI/FS Misc Wells		
BORING NUMBER: 2401	COORDINATES:	DATE 3/3/92	
ELEVATION:	GWL: Depth 51.6 Date/Time 3/6/92	DATE STARTED: 3/3/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/3/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 7	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
CB 1	1615 38460 3/3/92	3 5 6	12	Very stiff. 10YR(5/3) brown silty clay. No plasticity slightly moist.	CL	2.75	HNU = 0 ppm BG = 50cpm
CB 2	1617 38461 3/3/92	4 8 10	10	Stiff. 10YR (6/6) Brownish yellow silty clay. Low plasticity, slightly moist	CL	1.75	HNU = 0 ppm BG = 60cpm
3 CB 4	1625 38462 3/3/92	8 9 12	12	SAA, high plasticity SAA, ht 6"±	CL	1.75	HNU = 0 ppm BG = 40cpm
5 CB	1625 38463 3/3/92	11 9 9	18	Medium Dense. 10YR(5/3) brown clayey sand poorly graded moist.	SC	NA	HNU = 0 ppm BG = 40cpm
6 7	1630 38464 3/3/92	5 6 8	18	Very stiff 10YR (6/6) brownish yellow mottled w/ gray silty, sandy clay low plasticity slightly moist	CL	2.5	HNU = 0 ppm BG = 60 cpm
8 CB 9	1635 38465 3/3/92	18 16 13	12	Medium Dense. 10YR(5/3) brown clayey sand w/ gravel poorly graded, wet	SC	NA	HNU = 0 ppm BG = 50cpm
CB 10	1640 38466 3/3/92	16 20 18	18	SAA Stiff. 10YR(5/6) brownish yellow mottled w/ gray silty clay, low plast. wet Stiff, 5Y (6/1) light gray silty clay low plast. wet	CL	1.75	HNU = 0 ppm BG = 60cpm
11 12	1645 3/3/92	2 2 4	0	No Recovery	NA	NA	HNU = NA BG = NA
CB 13	1700 38467 3/3/92	6 7 10	8	Stiff. 5Y(5/1) gray clay mud. plasticity, moist.	CL	1.0	HNU = 0 ppm BG = 40cpm
14 CB 15	1710 38468 3/3/92	6 7 11	15	Stiff. 5Y(5/1) gray clay mud. plasticity, moist	CL	1.25	HNU = 0 ppm BG = 50 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Craig Coulter

~~Gary Dye~~ John Yandina

3/3/92

Bkgd: HNU = 0 ppm
BG = 40-60cpm

SAA - same as above
NA - not applicable

Samples collected per ASTM standard Penetration Test
Colors identified using Munsell Color Chart

402-11-66

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.23	PROJECT NAME. Fernald RI/FS Misc. Wells		
BORING NUMBER: 2401	COORDINATES:	DATE 3/4/92	
ELEVATION:	GWL: Depth 34.4 Date/Time 3/4/92	DATE STARTED: 3/3/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/5/92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	0840 38469 3/4/92 3/4/92	9 28 50	10	Very soft. 5Y(5/1) Gray clay with gravel, no plasticity slightly moist.	cl	2.25	HNU= 0ppm BX= 60cpm
17 18	0915 38470 3/4/92 3/4/92	21 48 50/3	2	SAA	cl	2.5	HNU= 0ppm BX= 60cpm
19	0935 38471 3/4/92 3/4/92	31 43 50	7	Top 3" SAA Bottom 4" Very dense, 10YR(6/4) Light yellowish brown sand with gravel, poorly graded, moist.	cl / sp	2.5 / NA	HNU=0ppm BX=50cpm
20 21 22 23 24				Base of Till - Sample every 5ft at approx 18.5ft			
25 26	0950 38472 3/4/92 3/4/92	14 26 43	15	Very dense. 10YR(5/6) yellowish brown sand with gravel. Poorly graded, moist	sp	NA	HNU= 0ppm BX= 60cpm
27 28 29 30							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Craig Coulter
Seth Vandine

SAA - same as above
NA - not applicable

see p 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.3.23	PROJECT NAME. Fernald RI/FS Misc. Wells		
BORING NUMBER: 2401	COORDINATES:	DATE 3/4/92	
ELEVATION:	GWL: Depth 51.6 Date/Time 3/6/92	DATE STARTED: 3/3/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/5/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
CD 2/31/92 31	1025 38473 ~~38473~~ 3/4/92	15 16 18	18	Dense. 10YR(5/4) Yellowish brown, sand some gravel, poorly graded, coarse in the middle of spoon dry.	SP	NA	HNU = 0ppm BG = 60 cpm
32							
33							
34							
35							
CD 2/34/92 36	1100 38474 ~~38474~~ 3/4/92	30 50/4	0	Dense 10YR (5/4) Yellowish brown, coarse sand some gravel, well graded, dry	CD 4/1/92 SW ~~SPT~~	NA	HNU = 0 ppm BG = 40 cpm
37							
CD 3/4/92 38							
39							
40							
CD 3/4/92 41	1335 38475 ~~38475~~ 3/4/92	45 50/3	12	Very Dense. 10YR(5/4) Yellowish brown, coarse sand, gravel, well graded. Moist	4/4/92 SW ~~SPT~~	CD NA	HNU = 0 ppm BG = 60 cpm
42							
43							
44							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Craig Coulter
John Vandine

NA- not applicable

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.23	PROJECT NAME. Fernald RI/FS Misc. Wells		
BORING NUMBER: 2401	COORDINATES:	DATE 3/4/92	
ELEVATION:	GWL: Depth 51.6 Date/Time 3/6/92	DATE STARTED: 3/3/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/5/92	
DRILLING METHODS: Cable Tool		PAGE 4 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1430 CS-#47 384086 3/4/92	100/5	12	Very dense 10YR(5/4) Yellowish brown mod. coarse poorly graded moist. Next 3" coarse, SAA. Bottom 3" fine, SAA	SP	NA	HNU = 0 ppm BG = 40 cpm
47							
48							
49							
50	1500 BG-#7 384087 3/4/92	5 15 17	15	Dense. 10YR(5/4) Yellowish brown mod. coarse poorly graded, wet (sand)	SP	NA	Hit water table 51 ft. HNU = 0 ppm BG = 50 cpm
51							
52				Ground Water Level 51.6 Ft on 3/6/92			
53							
54							
55	1600 BG-#7 384088 3/4/92	6 8 10	7	Medium Dense. 10YR(5/4) Yellowish brown, sand, mod. coarse poorly graded, wet.	SP	NA	HNU = 0 ppm BG = 60 cpm
56							
57							
58							
59							
60							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Craig Coulter
Seth Vandine

NA- not applicable

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.3.23	PROJECT NAME. Fernald RI/FS Misc. GWS		
BORING NUMBER: 2401	COORDINATES:	DATE 3/4/92	
ELEVATION:	GWL: Depth 51.6 Date/Time 3/6/92	DATE STARTED: 3/3/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/5/92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	1615 ~~SS~~ 7 30469 3/4/92	7 14 16	18	Medium Dense. 10YR (5/4) yellowish brown, medium coarse sand, poorly graded, wet.	SP	NA	HNU = 0 ppm BG = 40 cpm
62							
63							
64							
65							
66	1645 38480 ~~SS~~ 3/4/92	6 7 10	18	SAA	SP	NA	HNU = 0 ppm BG = 60 cpm
67				End of boring 65 ft			
68				Bottom of sampling 66.5 ft			
69							
70							
71							
72							
73							
74							
75							

NOTES:

NA - not applicable

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Craig Coulter
John Vanding

See p. 1

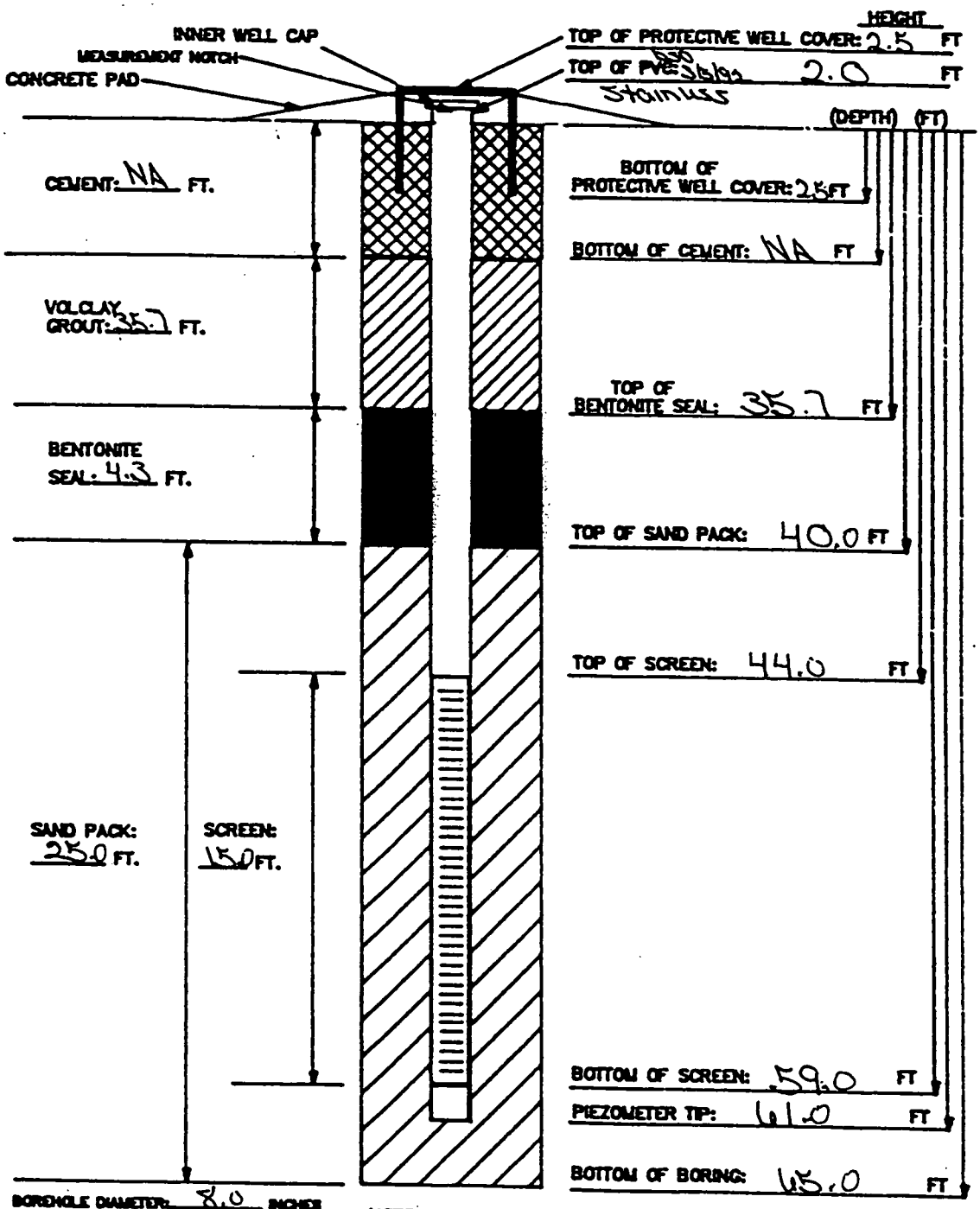
402-11-46

6047

FERNALD RI/FS

INSTALLATION DATE: 3/5/92

INSTALLATION DIAGRAM
MONITORING WELL NO.
2401



MATERIALS USED:

SAND TYPE AND QUANTITY: 9 bag 10/20 sand
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: 5
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 500 gal
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH-SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 4 inch 316 Stainless Steel
2) SCREEN IS 2-INCH-ID-SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS. 4 inch ID 316 SS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. 4 inch 316 SS or needed Cap
4) WATER DEPTH/DATE: ~~49.8 3/5/92~~ 31.6 3/6/92 3/6/92
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK. 316 SS
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.23

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

7017

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS Misc. Wells FIELD ENG./GEO. D. O'Brien DATE 3/5/92
PROJECT NO. 402.50.08.08 CHECKED BY C. Grube DATE 4/15/92
BORING NO. 2401
PIEZOMETER NO. 2401 DATE OF INSTALLATION 3/5/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 65 ft	SIZE 8" in. FROM 0 TO 65
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0" in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 inch I.D. 4.0" in
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 15' screen 48' riser
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 15 ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 in	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 35.7	TOP	BOTTOM
BENTONITE	TOP 35.7	BOTTOM 40.0	TOP	BOTTOM
SAND	TOP 40.0	BOTTOM 63.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 44.0	BOTTOM 59.0	TOP	BOTTOM
PIEZOMETER TIP	61.0			
BOTTOM OF BOREHOLE	65.0			
GWL AFTER INSTALLATION	51.6			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2402	COORDINATES:	DATE 12-20-91
ELEVATION:	GWL: Depth 46.85 Date/Time 12-21, 1315	DATE STARTED: 12-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-22-91
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	53666 1015 12-20-91	3 3 8	8	med dense, dark yellowish brown to yellowish brown (10yr, 4/4 to 10yr 5/4) clayey silt, some organics, moist.	ML	NA	Hnu - 0 ppm BD - 40 cpm α - 0 cpm
2 3	53667 1020 12-20-91	7 10 15	12	V. dense, yellowish brown to brown, (10yr 4/6 to 10yr, 5/3) silty clay, trace sand, low plast. Sl. moist.	CL	3.75	Hnu - 0 ppm BD - 40 cpm α - 0 cpm
4	53668 1025 12-20-91	25 31 35	14	Hard, yellowish brown to light gray (10yr, 4/6 to 10yr, 7/1) silty clay, trace sand, Sl. moist. Low plasticity.	CL	>4.0	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
5 6	53669 1030 12-20-91	50/4	3	S.A.A. add trace gravel	CL	>4.0	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
7	53670 1035 12-20-91	10 50/5	12 12-20-91	Hard, yellowish brown to brown, (10yr, 5/6 to 10yr 5/3) silty clay, trace sand, low plast. Sl. moist.	CL	>4.0	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
8 9	53671 1100 12-20-91	14 13 14	18	Hard, pale brown to light gray to yellowish brown silty clay (10yr, 6/3 to 10yr, 5/6 to 10yr, 7/1) some sand, low plast., sl. moist. ~9.25 med dense, brown to pale brown (10yr, 5/3 to 10yr 6/3 sandy silt grading to silty sand, sl. moist.	CL ML-SP	>4.0 NA	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
10	53672 1110 12-20-91	3 5 6	18	med dense, yellowish brown (10yr, 4/4) to (10yr 4/6) silty sand grading to sand, some clay, (poorly graded) moist to dry	SP	NA	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
11 12	53673 1430 12-20-91	8 15 19	0	N.R.	NA	NA	NA
13	53674 1435 12-20-91	15 21 23	3	V. stiff, yellowish brown, (10yr, 5/4) silty clay, trace gravel, low plasticity, moist.	CL	3.5	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
14 15	53675 1440 12-20-91	12 20 20	5	S.A.A	CL	3.5	Hnu - 0 ppm BD - 50 cpm α - 0 cpm

NOTES

Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 45
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A. - Same As Above
N.R. - No Recovery
Sl. - slightly

Background
Hnu - 0 ppm
BD - 50 cpm
α - 0 cpm

402-11-85

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: FEMP RI/FS	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2402	COORDINATES:	DATE 12-20-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-20-91
ENGINEER/GEOLOGIST: J. Leur	Depth Date/Time	DATE COMPLETED: 12-22-91
DRILLING METHODS: Cable Tool		PAGE 2 OF 7

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	53676 1445 12-20-91	10 25 30	12	V. stiff, gray, (10yr, 5/1) silty clay, some sand, some gravel, low plastic., sl moist.	CL J.L 12-20-91	3.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
17	53677 1450 12-20-91	5/01 5/04	10	S.A.A -17.0- V stiff, yellowish brown, (10yr, 5/4) silty clay, some sand some gravel, sl. moist	CL	3.5	Hnu - 0 ppm Bg - 50 cpm α - 0 cpm
18	53678 1500 12-20-91	11 24 36	16	Dense, yellowish brown, (10yr, 5/6) well graded gravelly sand, sl. moist. Dense, (10yr, 5/6) yellowish brown poorly graded med sand, trace gravel, sl. moist.	SW SP	NA NA	Hnu - 0 ppm Bg - 50 cpm α - 0 cpm
19							
20	53679 1510 12-20-91	14 16 22	15	Dense, yellowish brown, (10yr, 5/6) Poorly graded med sand, trace gravel, dry	SP	NA	Hnu - 0 ppm Bg - 50 cpm α - 0 cpm
21							
22				Aquifer met at 18.0ft - 19.5ft interval sampling will resume at 5.0ft intervals			
23							
24							
25	53680 1630 12-20-91	10 5/15	8	V. Dense. yellowish brown to dark yellowish brown (10yr 5/6 to 10yr 4/6) ~~poor~~ well graded sand, sl moist.	SW	NA	Hnu - 0 ppm Bg - 50 cpm α - 0 cpm
26							
27							
28							
29							
30							

NOTES

See page 1

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2402.	COORDINATES:	DATE 12-20-91 JL 12-20-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-22-91
DRILLING METHODS: Cable Tool		PAGE 3 OF 7

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	53681 1650 12-20-91 ~~12-20-91~~ JL 12-22-91	24 32 50/3	10	V. Dense, (10yr, 4/6) dark yellowish brown well graded, sand, some gravel, moist.	SW	NA	Hnu - 0 ppm BZ - 50 cpm α - 0 cpm
32							
33							
34							
35	53682 1730 12-20-91	6 11 24	8	Dense, Pale brown, (10yr, 6/3) poorly graded, sand, trace gravel, dry.	SP	NA	Hnu - 0 ppm BZ - 40 cpm α - 0 cpm
36							
37							
38							
39							
40	53683 0830 12-21-91	7 12 14	10	med dense, brown, (10yr, 6/3) poorly graded fine to med sand, moist.	SP	NA	Hnu - 0 ppm BZ - 50 cpm α - 0 cpm
41							
42							
43							
44							
45							

NOTES
see page 1

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FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2402	COORDINATES:	DATE 12-20-91 J.L 12-21-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-22-91
DRILLING METHODS: Cable tool		PAGE 4 OF 7

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
46	53684 0910 12-20-91	50/4	6	Dense, yellowish brown (10yr, 5/4) poorly graded med gravel grading to large sand, v moist. (trace clay)	GP, SP	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
47	J.L 12-21-91						
48							
49							
50	53685 0930 12-20-91	2 2 3	14	loose, yellowish brown, (10yr, 5/4) well graded sand, trace gravel, wet. (trace clay)	SW	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
51							
52	J.L 12-21-91						
53							
54							
55	53686 1005 12-20-91	23 28 31	12	V. dense, yellowish brown, (10yr, 4/4) well graded sand, trace gravel, trace clay, wet	SW	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
56							
57	J.L 12-21-91						
58							
59							
60							

NOTES
See page 1

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2402	COORDINATES:	DATE 12-21-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-22-91
DRILLING METHODS: cable tool		PAGE 5 OF 7

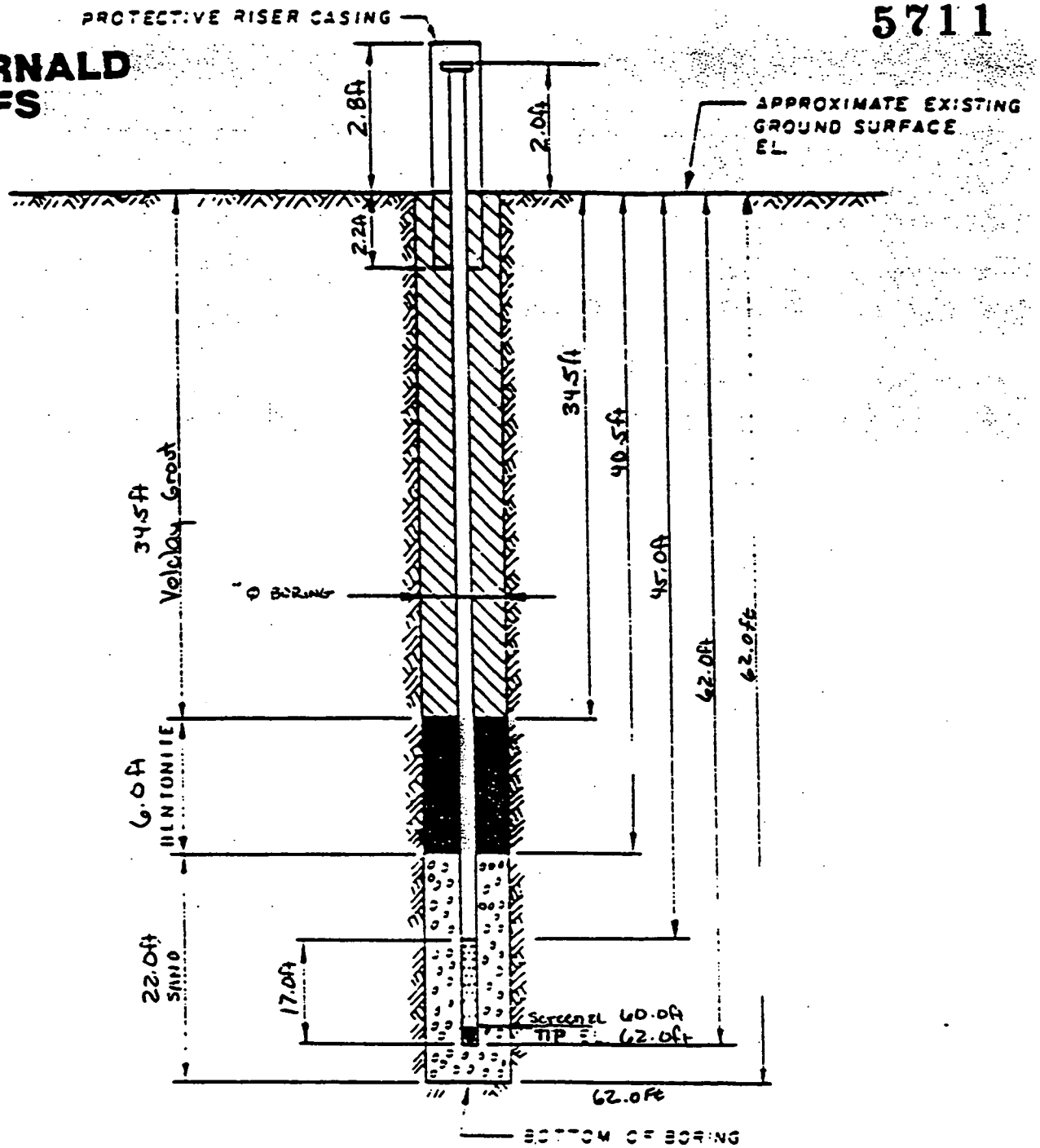
DEPTH (Ft) 60	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	53687	3		S.A.A	SW	NA	Hnu - 0 ppm
61	1025	5	18				BI - 50 cpm
	12-21-91	7		61.0 S.A.A add Some clay	SW	NA	α - 0 cpm
62	JL 12-21-91			Drilling stops at 62.0 ft Sampling stops at 61.5 ft			

NOTES
See page 1

402-11-86

5711

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY / APPROVED BY

J. Lear 12-22-91

DRAWN BY

NOTES

1. RISER PIPE 1 5/4 0 IN I.D. ~~SCREENED~~ 316 Stainless Steel PIPE, THREADED, FLUSH JOINTED. 12-22-91
2. SCREEN 1 5/4 0 IN I.D. SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 46.85ft
5. WATER LEVEL READING ON 12-21, 1315

300 gals H_2O used
5 – 5 gal buckets of bentonite used; 1 bucket used on ground surface
8 – bags 10x20 sand used
5 – bags volclay grout used

INSTALLATION DETAILS
MONITORING WELL
2402

PREPARED FOR
Fernald RI/FS

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
FIELD ENG./GEO. J. Lear
DATE 12-22-91
PROJECT NO. F 6OZ.3.23
CHECKED BY C. Shuler
DATE 01/13/92
BORING NO. 2402
PIEZOMETER NO. 2402
DATE OF INSTALLATION 12-22-91

BOREHOLE DRILLING

DRILLING METHOD Cable tool
DRILLING FLUID (S) USED: H_2O
FLUID H_2O FROM 0.0ft TO 62.0ft
FLUID NA FROM ~~TO~~

TYPE OF BIT Cable tool
CASING SIZE (S) USED:
SIZE 8in FROM 0.0ft TO 62.0ft
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 4in I.D Stainless steel
DIAMETER OF PERFORATED SECTION 4in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ Slotted SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.010in
TOTAL PERFORATED AREA 15 ft

RISER PIPE MATERIAL 316 Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10ft, 5ft, 3ft
JOINING METHOD Threaded flush Joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0ft
PROTECTIVE PIPE O.D. 10.75in

OTHER PROTECTION Vented Cap. Hinged Well Cap. Locked

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.2			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0ft	BOTTOM 34.5ft	TOP	BOTTOM
BENTONITE	TOP 34.5ft	BOTTOM 40.5ft	TOP	BOTTOM
SAND	TOP 40.5ft	BOTTOM 62.5ft	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 45.0ft	BOTTOM 60.0ft	TOP	BOTTOM
PIEZOMETER TIP	62.0ft			
BOTTOM OF BOREHOLE	62.0ft			
GWL AFTER INSTALLATION	46.85			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

000029

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER: 602.3.23	PROJECT NAME. FEMP RI/FS	
:ORING NUMBER: 3402	COORDINATES:	DATE. 3-12-92
.LEVATION:	GWL: Depth 45.04 Date/Time 3-24-92 / 0930	DATE STARTED: 3-12-92
:NGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-24-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 7

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				The description of the interval from 0-65 ft, is described in the visual classification of soils sheet for well 2402			
			45.04	▽			The water level is 45.04 ft. below the ground surface
65.0							

.OTES

Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

This is a contingency well for well 2402.

Samples Collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

3-12-92

Hnu S/N: 1185	0.1 ppm	Background Levels
BG S/N: 50773	30 cpm	
α S/N: 55361	0 cpm	

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3402	COORDINATES:	DATE: 3-16-92
ELEVATION:	GWL: Depth 45.04 Date/Time 3-24-92 / 0830	DATE STARTED: 3-12-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-24-92
DRILLING METHODS: Cable Tool 10" Drill Bit		PAGE 2 OF 7

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
65.0	038120 1039 3-16-92	11 16 19	18	Dense yellowish brown (10YR, 5/4) well graded SAND with trace fine gravel, wet	SW	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
66.5				Split Spoon Samples will be taken at 5ft. intervals.			
70.0	038121 1102 3-16-92	5 8 13	18	Medium dense yellowish brown (10YR, 5/4) well graded SAND, wet	SW	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
71.5							
75.0	038122 1404 3-16-92	3 11 11	8	Medium dense yellowish brown (10YR, 5/4) well graded SAND, with trace gravel, wet	SW	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
76.5							
80.0							

NOTES

See Page 1

3-16-92

Hnu S/N: 1185 | 0.1 ppm
Bγ S/N: 50773 | 30 cpm
α S/N: 55361 | 0 cpm
} Background Levels

:ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3402	COORDINATES:	DATE: 3-16-92
ELEVATION:	GWL: Depth 45.04 Date/Time 3-24-92/0830	DATE STARTED: 3-12-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-24-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 23 OF 67

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	K.M. 4-17-92 REMARKS
80.0	038123 1609 3-16-92	8 16 21	18	Dense Yellowish brown (10YR, 5/4) well graded SAND with trace gravel, wet	SW	N/A	Hnu = 0.1 ppm Bx = 30 cpm α = 0 cpm
81.5							
85	038124 1639 3-16-92	2 3 5	18	Loose Yellowish brown (10YR, 5/4) Poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Bx = 30 cpm α = 0 cpm
86.5							
90.0	038125 0850 3-17-92	7 6 10	18	Medium Dense ~~Loose~~ KM 3-17-92 yellowish brown (10YR, 5/4) Poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Bx = 30 cpm α = 0 cpm
91.5							
95.0							

NOTES

See page 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3402	COORDINATES:	DATE: 3-17-92
ELEVATION:	GWL: Depth 45.04 Date/Time 3-24-92/0830	DATE STARTED: 3-12-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-24-92
DRILLING METHODS: Cable Tool	10" drill bit	PAGE 3-4 OF 67

K.M. 4-1-92

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
95.0	038126 0930 3-17-92	5 1 1	18	Very Loose yellowish brown (10YR, 5/4) Poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
96.5							
101.5	038127 1340 3-17-92	5 8 7	11	Medium dense yellowish brown (10YR, 5/4) poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
105.0							
106.5	038128 ~~1345~~ 3-17-92	11 19 20	13	Dense yellowish brown (10YR, 5/4) Poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Bγ = 30 cpm α = 0 cpm
110.0							

NOTES

See Page 1

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
IORING NUMBER: 3402	COORDINATES:	DATE: 3-17-92	
.LEVATION:	GWL: Depth 45.04 Date/Time 3-24-92/0830	DATE STARTED: 3-12-92	
:NGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-24-92	
)RILLING METHODS: Cable Tool 10" drill bit		PAGE 45 OF 67	

K.M. 4-1-92

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
110.0	038129 1507 3-17-92	3 6 13	10	Medium dense yellowish brown (10YR, 5/4) poorly graded medium SAND, wet	SP	N/A	Hnu = 0.1 ppm Br = 30 cpm α = 0 cpm
111.5							
116.0 116.5	038130 1616 3-17-92	3 7 13	18	Medium dense Light olive brown (2.5Y, 5/4) Poorly graded medium SAND with trace gravel, wet 116.5 Ft. Stiff olive gray (5Y, 5/2) SILTY CLAY with black (5Y, 2.5/1) mottling, low Plasticity, Slightly moist	SP CL	N/A 1.0	Hnu = 0.1 ppm Br = 30 cpm α = 0 cpm The last six inches is the "Blue Clay"
118.5	038131 0940 3-19-92	Shelby N/A Tube	23	Very Stiff, Very Dark Gray (2.5Y, 3/0) SILTY CLAY with some sand and trace gravel, low plasticity, moist	CL	2.0	Hnu = 0.1 ppm Br = 30 cpm α = 0 cpm Shelby tube pushed 2.0 ft.
				Bottom of Bore Hole Drilled to 116.5 ft. Pushed Shelby Tube from 116.5 ft. to 118.5 ft.			

.OTES

ed a 30 in. shelby tube, 3 inch diameter
pushed it 2.0 ft.

See Page 1

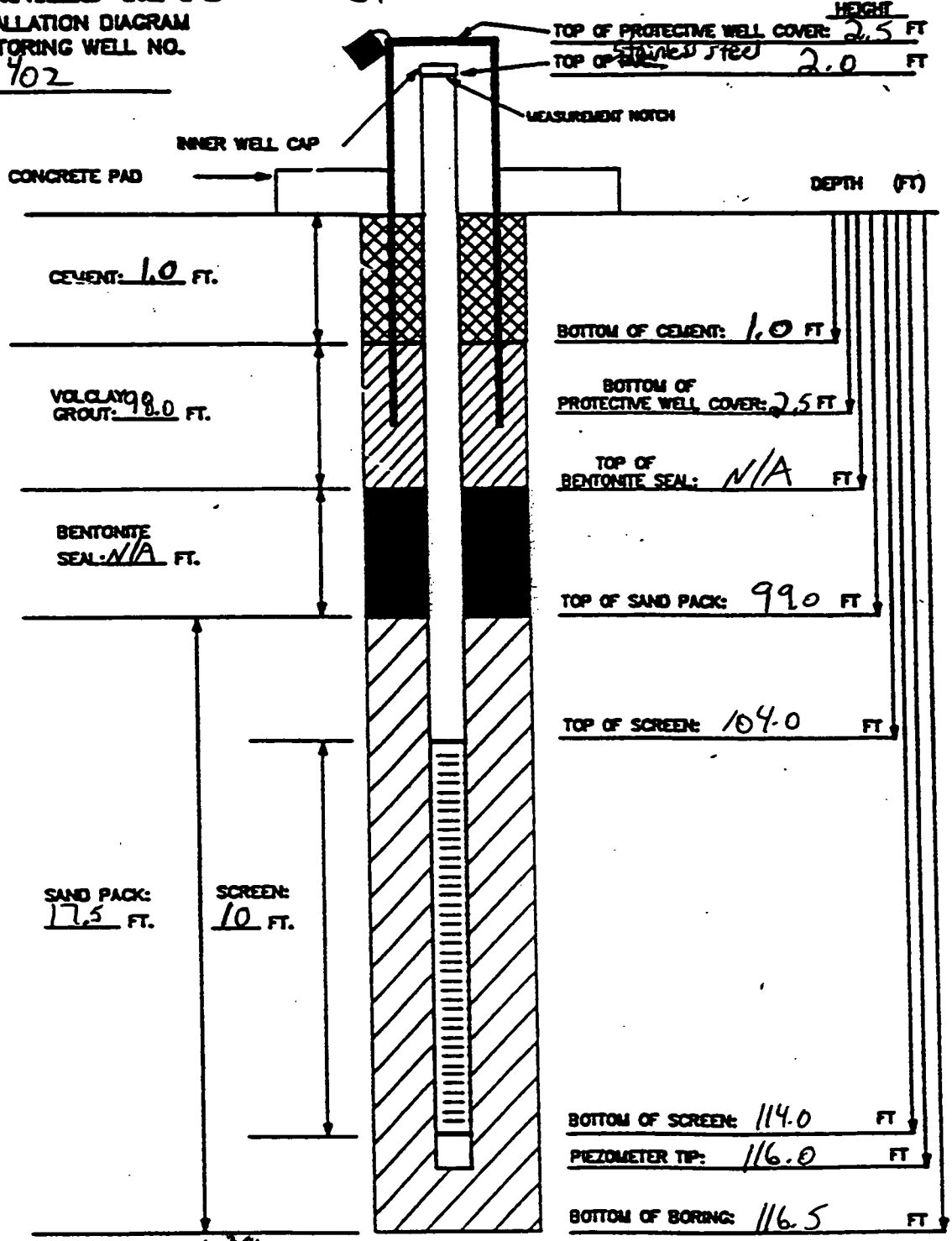
 KM. 4-1-92

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 3402

Stickups

INSTALLATION DATE: 3-24-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 16 bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A.
BAGS OF VOLCLAY GROUT: 33
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 1300 gallons
OTHER: NA

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ 4in 316 Stainless Steel PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 Stainless Steel 4in. I.D. PVC PIPE WITH 0.020-INCH SLOTS .010 in. Slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP welded sump
4) WATER DEPTH/DATE: 45.04 / ~~3-24-92~~ 3-24-92 KM. 3-26-

KM 3-26-92

TASK: 602.3-23 GEOLOGIST/ENGINEER: Ken Marion

FERNALD RI/FS

76 of 65711
K.M. 4-1-92

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 3-26-92
PROJECT NO. 602.3.23 CHECKED BY _____ DATE _____
BORING NO. 3402
PIEZOMETER NO. ~~N/A~~ 3402 DATE OF INSTALLATION 3-24-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT 10" Churn bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0 TO 116.5 ft	SIZE 10 3/4 FROM 0.0 TO 116.5 ft
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Stainless Steel	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10 - 10 ft. Sections, 3 - 2 ft. Sections
AVERAGE SIZE OF PERFORATIONS .010 in.	JOINING METHOD Flush Joint Threaded
TOTAL PERFORATED AREA ~~0.015.0~~ 10.0 ft. (KM 4/2/92)	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.	OTHER PROTECTION Steel well cover with lock
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 99.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
SAND	TOP 99.0	BOTTOM 116.5	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 104.0	BOTTOM 114.0	TOP	BOTTOM
PIEZOMETER TIP	~~114.0~~ K.M. 3-26-92 116.0			
BOTTOM OF BOREHOLE	116.5			
GWL AFTER INSTALLATION	45.04			

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS The temporary casing was removed during the installation of the well

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1403	COORDINATES:		DATE: 8-12-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8-12-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth	Date/Time	DATE COMPLETED: 8-12-89
DRILLING METHODS: MOBILE DRILL HSA			PAGE 1 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	55034 0927 8-12	5	6	MEDIUM DENSE, LIGHT BROWN (10YR 4/3) SILT, DRY.	ML	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 100 CPM
	55035 0927 8-12	10	0	NO RECOVERY			
	55036 0927 8-12	10	0				
2	55037 0934 8-12	4	5	MEDIUM DENSE, DARK BROWN (10YR 3/3) SILT, TRACE OF CLAY, NON COHESIVE, DRY TO MOIST.	ML	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 90 CPM
	55038 0934 8-12	10	0	NO RECOVERY			
3	55039 0934 8-12	4	0				
4	55040 0940 8-12	9	0	NO RECOVERY FROM THIS INTERVAL WITH 2 ATTEMPTS, TRAPS USED IN SPOONS AS WELL.	N/A	N/A	Hnu = N/A α = N/A βγ = N/A
	55041 0940 8-12	10	0				
	55042 0940 8-12	16	0				
5	55043 1006 8-12	5	6	STIFF, BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5 in) MOIST, MEDIUM PLASTICITY	CL	2.0	Hnu = 0.4 ppm α = 0 CPM βγ = 100 CPM
	55044 1006 8-12	5	6				
6	55045 1006 8-12	6	6			1.75	
7	55046 1015 8-12	8	6		CL	2.0	Hnu = 0.4 ppm α = 0 CPM βγ = 90 CPM
	55047 1015 8-12	10	6				
	55048 1015 8-12	15	0	NO RECOVERY		2.0	

NOTES: DRILLING CO.: Pean Drill.
DRILLER: Harold Andrews
HELPER: Charles Fetkowitz

MATERIALS USED:
3 BAGS SAND 10/20
2 BUCKETS BENTONITE PELLETS
1 BAG CEMENT /15 GALS WATER

SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART. SAMPLES TAKEN FOR WMCO AT INTERVALS 0.0-.5 FT., 2-2.5 FT., 5-5.5 FT, 10-10.5 FT., 15-15.5 FT.

INSTRUMENT BACKGROUND
Hnu = 0.2 ppm
α = 0 CPM
βγ = 80-90 CPM
LEL = 0
O_2 = 21.6%

000037

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1403	COORDINATES:		DATE: 8-12-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8-12-89
ENGINEER/GEOLOGIST: E. TRULLINGER	Depth	Date/Time	DATE COMPLETED: 8-12-89
DRILLING METHODS: MOBILE DRILL HSA			PAGE 2 OF

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55049 1020 8-12	17	6	STIFF, BROWN TO GRAYISH BROWN (10YR 5/3) TO (10YR 4/3) SILTY CLAY OR CLAYEY SILT, COHESIVE, LOW PLASTICITY, MOIST.	ML-CL	1.5	Hnu = 0.4 ppm α = 0 CPM βγ = 90-100 CPM
	55050 1020 8-12	15	6				
9	55051 1020 8-12	13	6			2.0	
	55052 1048 8-12	2	6	LOOSE, BROWN (10YR 4/3) SILT, MOIST TO 50% SATURATED, NON COHESIVE., TRACE OF SAND WELL GRADED.	ML	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 90 CPM
	55053 1048 8-12	6	6				
10	55054 1048 8-12	9	2				
11	55055 1100 8-12	22	6	BECOMING MORE WET	ML	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 90-100 CPM
	55056 1100 8-12	23	6				
12	55057 1100 8-12	30	6				
	55058 1115 8-12	6	6	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, WET.	SW	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 90-100 CPM
13	55059 1115 8-12	10	6				
	55060 1115 8-12	10	0	NO RECOVERY			
14	55061 1147 8-12	7	6	MEDIUM DENSE, BROWN (10YR 5/3) SANDY SILT, NON COHESIVE, WET.	ML	N/A	Hnu = 0.4 ppm α = 0 CPM βγ = 90-100 CPM
	55062 1147 8-12	10	6	STIFF, GRAY (10YR 4/2) CLAY, MEDIUM PLASTICITY, MOIST.	CL	2.0	
	55063 1147 8-12	10	0	NO RECOVERY			

NOTES:

BOTTOM OF BORING @ 15.0 FT
WELL INSTALLED ACCORDING TO DETAILS ON WELL INSTALLATION DIAGRAM

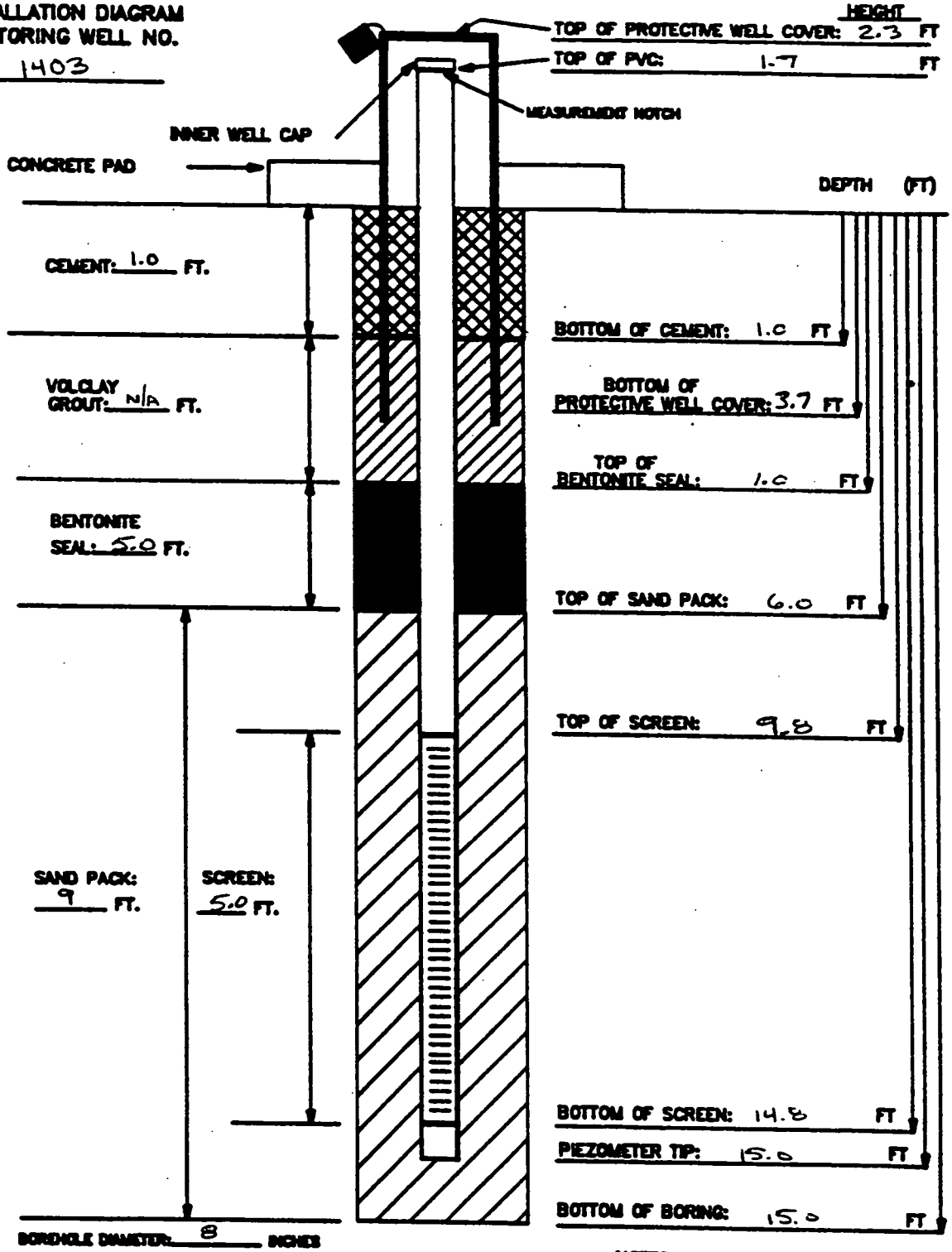
DRILLER: HAROLD ANDREWS
HELPER: Charles Lokowitz

INSTRUMENT BACKGROUND
Hnu = 0.4 ppm
α = 0 CPM
βγ = 90-100 CPM

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1403

INSTALLATION DATE: 8-12-89



MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20, 3 BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF VOLCLAY GROUT: NONE
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 15 GALS
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NOT MEASURED

TASK: 3.7

GEOLOGIST/ENGINEER: E. TROLLINGER

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. E. Trollinger DATE 8-12-89
PROJECT NO. 602 3.7 CHECKED BY _____ DATE _____
BORING NO. 1403
PIEZOMETER NO. 1403 DATE OF INSTALLATION 8-12-89

BOREHOLE DRILLING

DRILLING METHOD 8 in HSA	TYPE OF BIT Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM _____ TO _____	SIZE N/A FROM _____ TO _____
FLUID N/A FROM _____ TO _____	SIZE N/A FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE MONITORING	RISER PIPE MATERIAL SCH. 40 PVC
DIAMETER OF PERFORATED SECTION ~~4 in 0.020 in~~ 2.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2.5 in I.D. 2.0 in
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 10 FT, 2 FT STICK UP
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD FLUSH JOINTED SCREW TYPE
TOTAL PERFORATED AREA 5.0 FT.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.	OTHER PROTECTION LOCKING LID COVER
PROTECTIVE PIPE O.D. 4 5/8 in	WITH PADLOCK INSTALLED 8-12-89

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	1.7			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.7			
BOREHOLE FILL MATERIALS: CEMENT:	TOP 0.0	BOTTOM 1.0		
~~GROUT/SLURRY~~ N/A	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.0 FT.	TOP	BOTTOM
SAND 10/20	TOP 6.0	BOTTOM 15.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 9.8	BOTTOM 14.8	TOP	BOTTOM
PIEZOMETER TIP	15.0			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	NOT MEASURED			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [✓]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [✓]
REMARKS _____

FERNALD RI/FS

Date	7/2/89			
Initial				
	Field Check	1st Rev'n	2nd Rev'n	Final Check

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-3.7.1	PROJECT NAME: Facilities Testing Program FMPC RI/FS	
BORING NUMBER: 1404	COORDINATES:	DATE: 6/13/89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/13/89
ENGINEER/GEOLOGIST: L. Sirfield	Depth Date/Time	DATE COMPLETED: 6/13/89
DRILLING METHODS: CME 45C Rig : Hollow Stem Auger Rig with Split Spoon Sampler		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Concrete Surface: Bγ = 1,700-1,900 cpm; α = 380-440 cpm			6/13/89 Start = 2100
0.5	N/A wmco	N/A	N/A	Concrete Core: Bγ = 180-160 cpm; α = 0 cpm	N/A	N/A	HNU = 0 ppm; α = 80-160 cpm; Bγ = 1,400-2,000 cpm
	N/A		in.	Base: Bγ = 3000 cpm; α = 80-160 cpm 0.7 ft			
1.0							
	SS077	N/A	N/A	Loose, Gravel, massive, WET 6/14/89 @ 1600	GM	Loose TSF	Gravel
1.5							
2.0				Approx 4 in. O.D. pipeline encountered at 1.0 ft. Borehole Cemented to Surface. Cement = 1.5 ft Depth @			HNU = ppm; α = cpm; Bγ = cpm
2.5	wmco		in.				
3.0						TSF	
3.5							HNU = ppm; α = cpm; Bγ = cpm
4.0			in.				
4.5				@		TSF	
5.0				Note This Well/Boring is in the same general location intended to be - "			HNU = ppm; α = cpm; Bγ = cpm
5.5	wmco		in.				
6.0				@		TSF	
6.5							HNU = ppm; α = cpm; Bγ = cpm
7.0			in.				
7.5				@		TSF	

NOTES: Contractor: Penn Drill
Driller: D. Newman
Helper: C. Coulter
Sample Tech: D. Foster
Weather: Partially Cloudy, Warm, Humid
HNU #: HH18

6/14/89 @ 1700
HNU = 0 ppm
air α = 0 cpm
air Bγ = 260-280 cpm
gnd α = 380-440 cpm
gnd Bγ = 1,700-1,900 cpm

6/13/89 Background @ 2100
HNU = 0 ppm
Air α = 0-10 cpm
Air Bγ = 200-280 cpm
Gnd α = 380-440 cpm
Gnd Bγ = 1,700-1,900 cpm

NR = No Recovery, No Sample Taken

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Facilities Testing FMPCRI/FS FIELD ENG./GEO. C. Sinfield DATE 6/13/89
PROJECT NO. 602 3.7.1 CHECKED BY B.D. DATE 7/2/89
BORING NO. 1404
PIEZOMETER NO. N/A DATE OF INSTALLATION 6/13/89 - Abandoned

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED: N/A
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Auger Bit
CASING SIZE (S) USED: N/A
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE: N/A
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION Cement Plug

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:	Cement 0.0ft	1.5ft		
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	1.5ft			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐ N/A
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐ N/A
REMARKS Cement Plug installed from 1.5ft to 0.0ft depth
Borehole Plugged and Abandoned.

000042

4 Inch Pipe encountered 10 ft below Cement Surface.

FERNALD RI/FS

Date	6-29-89			
Initial	NWM			
	Field Check	1st Rev In	2nd Rev In	Final Rev Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: S1 1405 WAH 6-28-89	COORDINATES: N 478,341.8 E 1,380,478.0	DATE: 05-24-89
ELEVATION: 551.5 Ground Level	GWL: Depth Date/Time	DATE STARTED: 05-24-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 05-24-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	98062 1030 05-24	2	9	LOOSE, BROWN (2.5Y 4/2) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-1.0 IN) TRACE CLAY, DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-80 CPM
	98063 1030 05-24	3		VERY STIFF, BROWN (2.5Y 4/2) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25-.50 IN) DAMP	CL	2.5	
	1030 05-24	6		NO RECOVERY OVER INTERVAL 1.0-1.5 FT	—	—	
2	98064 1032 05-24	7	12	STIFF, BROWN (2.5Y 4/2) GRAVELLY CLAY, SOME SAND, SOME GRAVEL (.25-1.0 IN), DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM Bγ = 40-80 CPM
	98065 1032 05-24	8		MEDIUM DENSE, BROWN (2.5Y 4/2) GRAVELLY CLAY, SOME SAND, SOME GRAVEL (.25-1.0 IN) DAMP	SW	N/A	
3	1032 05-24	14		NO RECOVERY OVER INTERVAL 2.5-3.0 FT.	—	—	
4	98066 1034 05-24	14	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, GRAVEL RANGING FROM (.25-.50 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-80 CPM
	98067 1034 05-24	13		A.A.	SW	N/A	
	1034 05-24	11		NO RECOVERY OVER INTERVAL 4.0-4.5 FT	—	—	
5	98068 1036 05-24	11	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, GRAVEL RANGING FROM (.25-.50 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98069 1036 05-24	20		A.A.	SW	N/A	
6	1036 05-24	17		NO RECOVERY OVER INTERVAL 5.5-6.0 FT	—	—	
7	98070 1111 05-24	14	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, GRAVEL RANGING FROM (.25-.50 IN), SOME SILTY CLAY, DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98071 1111 05-24	16		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-.75 IN), DAMP	SW	N/A	
	1111 05-24	17		NO RECOVERY OVER INTERVAL 7.0-7.5 FT.	—	—	

NOTES: CONTRACTOR: PENNDRILL
RIG: MOBILE B-53
DRILLER: J. SACCANI
ASSISTANT: W. KEELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
Bγ = 40-80 CPM
LEL/O_2: LEL = 0 PPM
O_2 = 20.6%

* A.A - AS ABOVE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~S-1~~ 1405 WAH 6-28-89	COORDINATES:		DATE: 05-24-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05-24-89
ENGINEER/GEOLOGIST: M. SLWIARSKI	Depth	Date/Time	DATE COMPLETED: 05-24-89
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98072 1116 05-24	20	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-.75 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
	98073 1116 05-24	14		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SW	N/A	
9	— 1116 05-24	16		NO RECOVERY OVER INTERVAL 8.5-9.0 FT	—	—	
10	98074 1119 05-24	18	18	DENSE, OLIVE-BROWN (2.5Y 4/2) SAND-CLAY MIXTURE, DAMP	SC	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
	98075 1119 05-24	20		DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-.50 IN) DAMP	SW	N/A	
	98076 1119 05-24	16		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SW	N/A	
11	98077 1130 05-24	12	18	A.A.	SW	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
	98078 1130 05-24	14		A.A	SW	N/A	
12	98079 1130 05-24	15		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, DAMP	SP	N/A	
13	98080 1320 05-24	16	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SP	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-50 CPM
	98081 1320 05-24	16		A.A	SP	N/A	
	— 1320 05-24	16		NO RECOVERY OVER INTERVAL 13.0-13.5 FT	—	—	
14	98082 1328 05-24	15	18	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SP	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-50 CPM
	98083 1328 05-24	16		A.A.	SP	N/A	
	98084 1328 05-24	19		A.A.	SP	N/A	

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~S-1~~ 1405 6-2869 WAM	COORDINATES:		DATE: 05-24-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05-24-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth	Date/Time	DATE COMPLETED: 05-24-8
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 3 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98085 1337 05-24	9		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SP	N/A	HNU = 0 PPM
	98086 1337 05-24	13	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, SOME GRAVEL (.25-1.0 IN) DAMP	SW	N/A	α = 0 CPM BG: 40-50 CPM
16	1337 05-24	17		NO RECOVERY OVER INTERVAL 16.0-16.5 FT	—	—	
	98087 1340 05-24	14		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, SOME GRAVEL (.25-1.0 IN) DAMP	SW	N/A	HNU = 0 PPM
17	98088 1340 05-24	15	18	DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, TRACE GRAVEL (.25 IN) DAMP	SP	N/A	α = 0 CPM BG = 40-50 CPM
	98089 1340 05-24	23		A.A.	SP	N/A	
18	98090 1422 05-24	21		DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) DAMP	SW	N/A	HNU = 0 PPM
	98091 1422 05-24	19	16	DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-1.5 IN) DAMP	SW	N/A	α = 0 CPM BG = 40-50 CPM
19	1422 05-24	30		NO RECOVERY OVER INTERVAL 19.0-19.5 FT	—	—	
	98092 1434 05-24	12		DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-.75 IN) DAMP	SW	N/A	HNU = 0 PPM
20	98093 1434 05-24	23	16	VERY DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) DAMP	SW	N/A	α = 0 CPM BG = 40-50 CPM
	98094 1434 05-24	40		VERY DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-1.0 IN) DAMP	SW	N/A	
21	98095 1442 05-24	33		A.A.	SW	N/A	HNU = 0 PPM
	98096 1442 05-24	33	10	VERY DENSE, YELLOW-BROWN (10YR 5/4) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.75 IN), TRACE COARSE GRAVEL (1.0-1.5 IN) DAMP	SW	N/A	α = 0 CPM BG = 40-60 CPM
22	1442 05-24	60		NO RECOVERY OVER INTERVAL 22.0-22.5 FT.	—	—	

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~54~~ 1405 WAH 6-28-89	COORDINATES:		DATE: 05-24-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05-24-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth	Date/Time	DATE COMPLETED: 05-24-89
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 4 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
23	98097 1452 05-24	49	12	VERY DENSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-1.5 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-50 CPM
	98098 1452 05-24	42		A.A.	SW	N/A	
24	1452 05-24	47		NO RECOVERY OVER INTERVAL 23.5-24.0 FT	—	—	
25	98099 1502 05-24	40	12	VERY DENSE, BROWN (10YR5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-1.5 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-50 CPM
	98100 1502 05-24	53		VERY DENSE, YELLOW-BROWN (10YR 5/6) STRONG IRON STAINING, WELL GRADED GRAVEL-SAND MIXTURE SOME GRAVEL (.25-.50 IN) DAMP	SW	N/A	
	98101 1502 05-24	42		A.A.	SW	N/A	
26	98102 1520 05-24	14	12	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) DAMP	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-50 CPM
	98103 1520 05-24	25		VERY DENSE, YELLOW-BROWN (10YR 5/6) STRONG IRON STAINING, WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) DAMP, THIS INTERVAL POSSIBLY REPRESENTS AN OXIDATION/REDUCTION ZONE WITH A DARK GREY MANGANESE PRECIPITATION ZONE FROM 26.0-26.2 FT.	SW	N/A	
27	1520 05-24	32		NO RECOVERY OVER INTERVAL 26.5-27.0 FT.	—	—	
28	98104 1530 05-24	30	12	VERY DENSE, GREY-BROWN (10YR 5/2) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.75 IN) DAMP, APPARENT OXIDATION/REDUCTION ZONE	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-50 CPM
	98105 1530 05-24	30		VERY DENSE, GREY-BROWN/YELLOW-BROWN (10YR 5/4-5/6) WELL GRADED GRAVEL-SAND MIXTURE SOME GRAVEL (.25-.75) DAMP, APPARENT OXIDATION/REDUCTION ZONE	SW	N/A	
	1530 05-24	35		NO RECOVERY OVER INTERVAL 28.0-28.5 FT	—	—	
				APPARENT WATER TABLE 28.5			
29	98106 1536 05-24	14	12	VERY DENSE, GREY-BROWN (10YR 5/2) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.75 IN) WET, APPARENT OXIDATION/REDUCTION ZONE	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-50 CPM
	98107 1536 05-24	18		VERY DENSE, GREY-BROWN/YELLOW BROWN (10YR 5/2-5/6) WELL GRADED GRAVEL SAND MIXTURE, SOME GRAVEL (.25-.75) WET, APPARENT OXIDATION/REDUCTION ZONE	SW	N/A	
	1536 05-24	19		NO RECOVERY OVER INTERVAL 29.5-30.0 FT	—	—	

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~5-1~~ 1405 WAH 6-28-89	COORDINATES:	DATE: 05-24-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05-24-89
ENGINEER/GEOLOGIST: M. SLUSARIKI	Depth Date/Time	DATE COMPLETED: 05-24-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 5 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98108 1546 05-24	6		MEDIUM DENSE, GREY-BROWN (10YR 4/2) WELL GRADED SAND, SOME GRAVEL (.25-.75 IN) WET	SW	N/A	HNU = 0 PPM
	98109 1546 05-24	9	18	MEDIUM DENSE, GREY-BROWN (10YR 4/2) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) WET	SW	N/A	α = 0 CPM Bγ = 40-50 CPM
31	98110 1546 05-24	14		A.A.	SW	N/A	
	98111 1556 05-24	26		DENSE, GREY-BROWN (10YR 4/2) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM
32	98112 1556 05-24	34	18	A.A	SW	N/A	α = 0 CPM Bγ = 40-50 CPM
	98113 1556 05-24	30		A.A.	SW	N/A	
33	98114 1615 05-24	12	12	A.A	SW	N/A	HNU = 0 PPM
	98115 1615 05-24	20		DENSE, GREY-BROWN (10YR 4/2) WELL GRADED SAND, TRACE GRAVEL (.25-1.0 IN) WET	SW	N/A	α = 0 CPM Bγ = 40-50 CPM
34				34.0 BOTTOM OF BORING 34.0 FT.			

NOTES:

BORING ~~5-1~~ 1405 WAH 6-28-89 WAS P&A USING 4 - 50LB BAGS OF VOLCLAY GROUT FROM 0.0 -34.0 FT.

Date	6-28-89			
Initial	WJM			
	Field Check	1st Rev'n	2nd Rev'n	Final Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: Storm Drainage (SD-7)	COORDINATES: N477,049.4 E1,320,168.9	DATE: 5-16-89
ELEVATION: 536.4 Ground Level (1406 WJM 6-28)	GWL: Depth Date/Time	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 5-17-89
DRILLING METHODS: Mobile Drill B53 8" HSA		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98010 1605 5-16	1	6	LOOSE, BROWN (10YR 4/3) WELL GRADED SANDY GRAVEL (.5-1.0 IN), MOIST.	GW	N/A	Hmax = 0.4 ppm
1	1605 5-16	3		NO RECOVERY			α = 0 CPM
	1605 5-16	7					βγ = 60-80 CPM
2	98011 1610 5-16	3	6	LOOSE, BROWN (10YR 4/3) WELL GRADED GRAVELLY SAND (.5-1.5 IN), MOIST.	SW	N/A	Hmax = 0.4 ppm
	98012 1610 5-16	5	5				α = 0 CPM
	1610 5-16	4		NO RECOVERY			βγ = 60 CPM
3	98013 1612 5-16	1	6	VERY LOOSE, YELLOWISH BROWN, (10YR 4/4) POORLY GRADED SAND, TRACE OF GRAVEL (.5 IN) MOIST	SP	N/A	Hmax = 0.2-0.6 ppm
4	98014 1612 5-16	2	6				α = 0 CPM
	1612 5-16	1		NO RECOVERY			βγ = 60-80 CPM
5	98015 1615 5-16	1	6	VERY LOOSE, YELLOWISH BROWN, (10YR 4/4) POORLY GRADED SAND, TRACE OF GRAVEL (.5-.75 IN) MOIST TO WET.	SP	N/A	Hmax = 0.4 ppm
	98016 1615 5-16	1	4				α = 0 CPM
6	1615 5-16	1		NO RECOVERY			βγ = 60-80 CPM
	98017 1620 5-16	2	6	LOOSE, YELLOWISH BROWN (10YR 4/4) WELL GRADED GRAVEL, TRACE OF SILT, WET.	GW	N/A	Hmax = 0.4 ppm
7	1620 5-16	3		NO RECOVERY			α = 0 CPM
	1620 5-16	4					βγ = 60-80 CPM

NOTES: PENN. DRILL CO.
Driller: Jim Saccani
Helper: Gary Dye

Sampling in accordance with ASTM standards, Munsell color chart for color description.

INSTRUMENT BACKGROUND
Hmax = 0.2-0.4 ppm
α = 0-10 CPM
βγ = 40-80 CPM
LEL = 0

4G2-1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: Storm Drainage (S2)	COORDINATES:		DATE: 5-16-89
ELEVATION: 1406.7 WAM 6/28	GWL: Depth	Date/Time	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 5-17-89
DRILLING METHODS: 8 in HSA B53 Mobile Drill			PAGE 2 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98018 1624 5-16	3	6	LOOSE, BROWN (10YR 5/2) SANDY-SILTY GRAVEL, MOIST.	GM	N/A	Hnu = 0.4 ppm
	1626 5-16	4		NO RECOVERY			α = 0 cpm
9	1626 5-16	3					βγ = 60-80 cpm
	98019 1630 5-16	3	6	LOOSE, YELLOWISH BROWN (10YR 4/3) GRAVELLY SAND (.5-1.0 in), MOIST.	SW	N/A	Hnu = 0.4 ppm
	98020 1630 5-16	4	3				α = 0 cpm
10	1630 5-16	6		NO RECOVERY			βγ = 60-80 cpm
11	98021 1635 5-16	3	6	LOOSE, YELLOWISH BROWN, (10YR 4/4) POORLY GRADED SAND, TRACE OF GRAVEL (.5 in), MOIST.	SP	N/A	Hnu = 0.4 ppm
	98022 1635 5-16	3	6				α = 0 cpm
12	1635 5-16	2		NO RECOVERY			βγ = 60 cpm
	98023 1640 5-16	3	6	LOOSE, YELLOWISH BROWN (10YR 4/4) WELL GRADED SAND, SOME GRAVEL (.5-1.0 in) MOIST.	SW	N/A	Hnu = 0.4 ppm
13	1640 5-16	3		NO RECOVERY			α = 0 cpm
	1640 5-16	7					βγ = 60-80 cpm
14	98024 5-16	9	6	MEDIUM DENSE, BROWN (10YR 4/3) WELL GRADED SAND, TRACE OF GRAVEL (.5-.75 in) MOIST TO WET.	SW	N/A	Hnu = 0.4 ppm
	1643 5-16	7		NO RECOVERY			α = 0 cpm
15	1643 5-16	7					βγ = 60 cpm

NOTES:

Driller: Jim Saccani
Helper: Gary Dye

INSTRU. BACKGROUND
Hnu = 0.4 ppm
α = 0-5 cpm
βγ = 40-80 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME:		
BORING NUMBER: Storm Drainage ~~S2~~	COORDINATES:		DATE: 5-16-89
ELEVATION: 1406	GWL: Depth	Date/Time	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 5-17-89
DRILLING METHODS: B53 Mobile Drill 8 in. HSA			PAGE 3 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
14	98025 1650 5-16	3	6	LOOSE, yellowish brown (10YR 5/3) WELL GRADED SAND, WET.	SW	N/A	Hnu = 0.4 ppm α = 0 cpm PY = 40-60 cpm
	98026 1650 5-16	4	6	LOOSE, yellowish brown (10YR 4/4) CLAYEY GRAVEL (.5-1.0 in), WET.	GC	N/A	
	98027 1650 5-16	6	6				
17	98028 1655 5-16	8	5	LOOSE, yellowish brown (10YR 4/4) CLAYEY GRAVEL, WET.	GC	N/A	Hnu = 0.4 ppm PY = 40-60 cpm α = 0 cpm
18				Auger STOPPED AT 17.0 FT. Sampling ended AT 17.0 FT. * BOREHOLE BACKFILLED WITH 2 BAGS VOLCLAY GROUT TO SURFACE. (50 lb. ea)			

NOTES: Driller: Jim Saccani
Helper: Gary Dyke.

INSTRU. BACKGROUND
Hnu = 0.4-0.6 ppm
α = 0-10 cpm
PY = 60-80 cpm

FERNALD
RI/FS

	Date	6-29-89		
	Initial	WAH		
		Field Check	1st Rev'n	2nd Rev'n

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: STORM DRAINAGE ~~(53)~~	COORDINATES: N 476,726.5 E 1,375,611.0	DATE: 5-16-89
ELEVATION: 526.4 Ground Level 1407 WAH	GWL: Depth Date/Time	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. Trollinger 6-28	Depth Date/Time	DATE COMPLETED: 5-16-89
DRILLING METHODS: Mobile B53 8 in HSA		PAGE 1 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	98000 1010 5-16	1	6	VERY LOOSE, BROWN, (10YR 4/3) WELL GRADED SAND, MOIST.	SW	N/A	Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	98001 1010 5-16	1	6				
	1010 5-16	1		NO RECOVERY			
2	98002 1015 5-16	2	6	LOOSE, BROWN, (10YR 4/4) WELL GRADED SAND, TRACE OF GRAVEL (.5-1.0 in) MOIST TO WET.	SW	N/A	Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	1015 5-16	3		NO RECOVERY			
3	1015 5-16	4					
Approx. WATER ELEVATION. in stream bed.	98003 1040 5-16	4	4	VERY LOOSE, BROWN, (10YR 4/4) WELL GRADED SAND, TRACE OF GRAVEL (.5-1.0 in, WET.)	SW	N/A	Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
4	1040 5-16	2		NO RECOVERY			
	1040 5-16	1					
5	98004 1045 5-16	3	6	MEDIUM DENSE, GRAYISH BROWN (10YR 5/2) WELL GRADED GRAVELLY SAND, WET.	SW	N/A	Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	98005 1045 5-16	7	4				
6	1045 5-16	9		NO RECOVERY			
7	98006 1107 5-16	6	6	MEDIUM DENSE, YELLOWISH BROWN (10YR 4/4) POORLY GRADED SAND, TRACE OF FINE GRAVEL (.5 in) WET.	SP	N/A	Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	98007 1107 5-16	5	6	MEDIUM DENSE YELLOWISH BROWN (10YR 4/3) WELL GRADED SAND TRACE OF GRAVEL (.5-1.0 in), WET.	SW	N/A	
	1107 5-16	6		NO RECOVERY			

NOTES: PENN DRILL CORP.
DRILLER: Jim Saccani
HELPER: Gary Dye.

Sampling & Drilling in accordance with ASTM standard specifications. Munsell Color Chart used for color description.

INSTRUMENT BACKGROUND
Hnu = 0.4 ppm - 0.6 ppm
α = 0 cpm
βγ = 40-60 cpm

* UPON COMPLETION HOLE WAS GROUTED TO SURFACE WITH VOLCLAY GROUT (3/4 BAG 50 lb.)

000051

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: Storm Drainage (~~S3~~)	COORDINATES:		DATE: 5-16-89
ELEVATION: 1497 WA4 6-28	GWL: Depth	Date/Time	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. TROWINGER	Depth	Date/Time	DATE COMPLETED: 5-16-89
DRILLING METHODS: DSB Mobile Drill 8 in HSA			PAGE 2 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98008 1120 5-16	5	6	MEDIUM DENSE, YELLOWISH BROWN (10YR 4/4) WELL GRADED SAND, SOME IRON STAINING, WET.	SW	N/A	Hnet = 0.6 ppm
	98009 1120 5-16	7	4	MEDIUM DENSE, YELLOWISH BROWN, (10YR 5/4) SANDY GRAVEL, WET.	GW	N/A	α = 0 cpm
	1120 5-16	9		NO RECOVERY			βγ = 40-60 cpm
9				Auger Stopped at 9.0 FT. Sampling Ended at 9.0 FT.			
10							

NOTES:

DRILLER: Jim Saccani
HELPER: Gary Dyl

INSTRUMENT BACKGROUND.
Hnet = 0.4-0.6 ppm
α = 0 cpm
βγ = 40-60 cpm

402-11

FERNALD RI/FS

Date	6-28-89			
Initial	NVR			
	Field Check	1st Rev In	2nd Rev In	Incorp

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~TP~~ 1408 WAH 6-28-89	COORDINATES: N 460,235.9 E 1,378,708.6	DATE: 06-02-89
ELEVATION: 540.5 GROUND LEVEL	GWL: Depth Date/Time	DATE STARTED: 06-02-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 06-02-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	98152 0904 06-02	1	6	VERY LOOSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) WET.	SW	N/A	HNU = 0 PPM; α = 0 CPM; Bγ = 160-180 CPM
	— 0904 06-02	2	—	NO RECOVERY OVER INTERVAL 0.5-1.0 FT.	—	—	
	— 0904 06-02	2	—	NO RECOVERY OVER INTERVAL 1.0-1.5 FT	—	—	
2	98153 0906 06-02	2	6	LOOSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM; α = 0 CPM; Bγ = 160-180 CPM
	— 0906 06-02	2	—	NO RECOVERY OVER INTERVAL 2.0-2.5 FT	—	—	
3	— 0906 06-02	7	—	NO RECOVERY OVER INTERVAL 2.5-3.0 FT.	—	—	
4	98154 0909 06-02	15	12	DENSE, BROWN (10YR 5/3), WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM; α = 0 CPM; Bγ = 160-180 CPM
	98155 0909 06-02	20		A.A.	SW	N/A	
	— 0909 06-02	17	—	NO RECOVERY OVER INTERVAL 4.0-4.5 FT	—	—	
5	98156 0912 06-02	15	18	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, SOME GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM; α = 0 CPM; Bγ = 160-180 CPM
	98157 0912 06-02	9		A.A.	SW	N/A	
6	98158 0912 06-02	6		MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED FINE SAND, WET	SP	N/A	
7	98159 1000 06-02	5	12	A.A.	SP	N/A	HNU = 0 PPM; α = 0 CPM; Bγ = 160-180 CPM
	98160 1000 06-02	7		A.A.	SP	N/A	
	— 1000 06-02	7	—	NO RECOVERY OVER INTERVAL 7.0-7.5 FT	—	—	

NOTES: CONTRACTOR: PENNDRILL
RIG: MOBILE B-53
DRILLER: J. SACCANI
ASSISTANT: W. FELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
Bγ = 80-120 CPM
LEL/O_2: LEL = 0 PPM
O_2 = 20.6%

AA = AS ABOVE

000053

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~P-4~~ 1408 6-28-89	COORDINATES:	DATE: 06-02-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06-02-89
ENGINEER/GEOLOGIST: M. SWIMSKI	Depth Date/Time	DATE COMPLETED: 06-02-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98161 1004 06-02	7	12	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 160-180 CPM
	98162 1004 06-02	6		A.A.	SP	N/A	
9	— 1004 06-02	10	—	NO RECOVERY OVER INTERVAL 8.5-9.0 FT	—	—	
10	98163 1006 06-02	10	18	MEDIUM DENSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 160-180 CPM
	98164 1006 06-02	10		MEDIUM DENSE, YELLOW-BROWN (10YR 4/6) WELL GRADED SAND, TRACE GRAVEL (.25 in) WET	SW	N/A	
	98165 1006 06-02	13		MEDIUM DENSE, YELLOW-BROWN (10YR 4/6) POORLY GRADED FINE SAND, WET	SP	N/A	
11	98166 1017 06-02	4	12	A.A	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 160-180 CPM
	98167 1017 06-02	4		A.A	SP	N/A	
12	— 1017 06-02	7	—	NO RECOVERY OVER INTERVAL 11.5-12.0	—	—	
13	98168 1020 06-02	3	12	MEDIUM DENSE, YELLOW-BROWN (10YR 4/6) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 160-180 CPM
	98169 1020 06-02	4		A.A.	SP	N/A	
	— 1020 06-02	6	—	NO RECOVERY OVER INTERVAL 13.0-13.5	—	—	
14	98170 1057 06-02	15	18	MEDIUM DENSE, YELLOW-BROWN (10YR 4/6) POORLY GRADED FINE SAND, WET	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 160-180 CPM
	98171 1057 06-02	15		A.A.	SP	N/A	
	98172 1057 06-02	13		A.A.	SP	N/A	

NOTES:

A.A = AS ABOVE

000054

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~P4~~ 1408 WAH 6-25-89	COORDINATES:	DATE: 06-02-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06-02-89	
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 06-02-89	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98173 1107 06-02	9	12	MEDIUM DENSE, BROWN (10YR 5/3) POORLY GRADED FINE SAND, WET	SP	N/A	H_{NU} = 0 PPM α = 0 CPM $B\gamma$ = 160-180 CPM
	98174 1107 06-02	10		A.A	SP	N/A	
16	— 1107 06-02	8	—	NO RECOVERY OVER INTERVAL 16.0-16.5 FT	—	—	
	98175 1115 06-02	10	18	MEDIUM DENSE, BROWN (10YR 5/3) POORLY GRADED FINE SAND, WET	SP	N/A	H_{NU} = 0 PPM α = 0 CPM $B\gamma$ = 160-180 CPM
17	98176 1115 06-02	13		A.A.	SP	N/A	
18	98177 1115 06-02	19		A.A.	SP	N/A	
	98178 1127 06-02	15	18	A.A	SP	N/A	H_{NU} = 0 PPM α = 0 CPM $B\gamma$ = 160-180 CPM
19	98179 1127 06-02	15		A.A	SP	N/A	
	98180 1127 06-02	19		MEDIUM DENSE, BROWN (10YR 5/3) WELL ~~SORTED~~ GRADED SAND, TRACE GRAVEL (.25-.50 in) WET	SW	N/A	
	98181 1505 06-02	11	18	A.A.	SW	N/A	H_{NU} = 0 PPM α = 0 CPM $B\gamma$ = 160-180 CPM
20	98182 1505 06-02	17		A.A.	SW	N/A	
21	98183 1505 06-02	24		A.A.	SW	N/A	
	98184 1520 06-02	11	18	A.A.	SW	N/A	H_{NU} = 0 PPM α = 0 CPM $B\gamma$ = 160-180 CPM
22	98185 1520 06-02	12		A.A.	SW	N/A	
	98186 1520 06-02	14		A.A.	SW	N/A	

NOTES:

A.A. = AS ABOVE

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~PI~~ 1408 WAH 6-28-89	COORDINATES:	DATE: 06-02-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 06-02-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 06-02-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 4 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
23	98187 1540 06-02	12		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25-.50 in) WET	SW	N/A	HNU = 0 PPM α = 0 CPM
	98188 1540 06-02	14	18	A.A.	SW	N/A	BG = 160-180 CPM
24	98189 1540 06-02	16		A.A. 24.0	SW	N/A	
				BOTTOM OF BORING @ 24.0 FT.			

NOTES: BOREHOLE COLLAPSED UPON ITSELF FROM 0.0 FT TO 24.0 FT. WHEN AUGER BITS WERE PULLED FROM BOREHOLE

A.A = AS ABOVE

FERNALD RI/FS

Date	6-7-89			
Initial	HAC			
	Field Check	1st Key In	2nd Key In	Validation

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: PZ 1409 HAH 6-28-89	COORDINATES: N 478,062.7 E 1,378,708.6	DATE: 05-31-89	
ELEVATION: 530.6 Ground Level	GWL: Depth Date/Time	DATE STARTED: 05-31-89	
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 05-31-89	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98116 1026 05-31	2	6	LOOSE, BROWN (10YR 5/3) WELL GRADED GRAVEL-SAND MIXTURE, GRAVEL RANGING FROM (.25-1.5 IN) WET	GW	N/A	HNU: 0 PPM α: 0 CPM Bγ: 60 CPM
	— 1026 05-31	3	—	NO RECOVERY OVER INTERVAL 0.5-1.0 FT...	—	—	
1	— 1026 05-31	4	—	NO RECOVERY OVER INTERVAL 1.0-1.5 FT	—	—	
	98117 1029 05-31	7		MEDIUM DENSE, BROWN (10YR 5/3) CLAYEY GRAVEL, GRAVEL RANGING FROM (.25-1.5 IN) WET	GC	N/A	HNU: 0 PPM α: 0 CPM Bγ: 60 CPM
2	98118 1029 05-31	10	12	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-1.0 IN) WET	SW	N/A	
	— 1029 05-31	11	—	NO RECOVERY OVER INTERVAL 2.5-3.0 FT.	—	—	
3	98119 1042 05-31	8		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-.75 IN) WET	SW	N/A	HNU: 0 PPM α: 0 CPM Bγ: 60 CPM
	98120 1042 05-31	9	12	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) WET	SW	N/A	
4	— 1042 05-31	11	—	NO RECOVERY OVER INTERVAL 4.0-4.5 FT.	—	—	
	98121 1045 05-31	9		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-.50 IN) WET	SW	N/A	HNU: 0 PPM α: 0 CPM Bγ: 60 CPM
5	98122 1045 05-31	11	18	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) WET	SW	N/A	
	98123 1045 05-31	14		A.A.	SW	N/A	
6	98124 1114 05-31	6		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	HNU: 0 PPM α: 0 CPM Bγ: 40-60 CPM
	98125 1114 05-31	10	18	A.A.	SW	N/A	
7	98126 1114 05-31	12		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-.50) WET	SW	N/A	

NOTES: CONTRACTOR: PENNDRILL
RIG: MOBILE B-53
DRILLER: J. BACCANI
ASSISTANT: W. KELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TE
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
Bγ = 60 CPM
LEL/O_2: LEL = 0 PPM
O_2 = 20.6%

000057

* A.A. = AS ABOVE

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~P-2~~ 1409 WAH 6-28-16	COORDINATES:		DATE: 05-31-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05-31-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth	Date/Time	DATE COMPLETED: 05-31-89
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 2 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98127 1117 05-31	6	18	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98128 1117 05-31	10		A.A.	SW	N/A	
9	98129 1117 05-31	12		A.A.	SW	N/A	
10	98130 1120 05-31	7	18	A.A	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98131 1120 05-31	11		A.A	SW	N/A	
	98132 1120 05-31	18		A.A	SW	N/A	
11	98133 1404 05-31	5	18	MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND (.25-.50 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98134 1404 05-31	10		A.A.	SW	N/A	
12	98135 1404 05-31	20		A.A.	SW	N/A	
13	98136 1411 05-31	15	18	DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98137 1411 05-31	22		A.A.	SW	N/A	
	98139 1411 05-31	22		A.A	SW	N/A	
14	98139 1432 05-31	4	18	LOOSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98140 1432 05-31	4		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	
	98141 1432 05-31	7		A.A.	SW	N/A	

NOTES:

*A.A. = AS ABOVE

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~P2~~ 1409 WAN 6-28-89	COORDINATES:	DATE: 05-31-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05-31-89	
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 05-31-89	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98142 1441 05-31	3		MEDIUM DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-60 CPM
	98143 1441 05-31	4	18	A.A.	SW	N/A	
16	98144 1441 05-31	7		A.A.	SW	N/A	
	98145 1605 05-31	1		VERY LOOSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE GRAVEL (.25 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-60 CPM
17	98146 1605 05-31	2	18	VERY LOOSE, BROWN (10YR 5/3) POORLY GRADED FINE SAND, WET	SP	N/A	
	98147 1605 05-31	4		A.A.	SP	N/A	
18	98148 1645 05-31	21		DENSE, BROWN (10YR 5/3) WELL GRADED SAND, TRACE FINE GRAVEL (.25 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-60 CPM
	98149 1645 05-31	18	18	A.A.	SW	N/A	
19	98150 1645 05-31	15		A.A.	SW	N/A	
	98151 1645 05-31	19	6	A.A. 20.0	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-60 CPM
20				BOTTOM OF BORING 20.0 FT.			

NOTES:

BOREHOLE COLLAPSED UPON ITSELF FROM 0.0 FT TO 20.0 FT WHEN AUGERS WERE REMOVED. BOREHOLE P&A.

* AA = As Above

FERNALD RI/FS

5711

Date	6-29-89			
Initial	MBS			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: PADDY'S RUN (P3) 1410	COORDINATES: 4478, 536.76 1,279,624.2 STREAM BED LEVEL	DATE: 5-16-89
ELEVATION: 526.3 Ground level / WAH 6-28-89	GWL: Depth 1.5 FT Date/Time 5-16-89 1355	DATE STARTED: 5-16-89
ENGINEER/GEOLOGIST: E. TOOLINGER	Depth Date/Time	DATE COMPLETED: 5-16-89
DRILLING METHODS: Mobile Drill 8 in HSA.		PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	98029 1355 5-16	1	6	VERY LOOSE, BROWN (10YR 4/4) WELL GRADED, SANDY GRAVEL (.5-1.5 in), WET	GW	N/A	Hnu = 0.4 ppm
	1355 5-16	2		NO RECOVERY			α = 0 cpm
	1355 5-16	2					βγ = 40 cpm
2	98030 1400 5-16	5	6	MEDIUM DENSE, YELLOWISH BROWN (10YR 4/3) SANDY WELL GRADED GRAVEL, WET.	GW	N/A	Hnu = 0.4-0.6 ppm
	98031 1400 5-16	6	5	MEDIUM DENSE, YELLOWISH BROWN (10YR 4/4) SILTY GRAVEL, TRACE OF CLAY, WET.	GM	N/A	α = 0 cpm
3	1400 5-16	9		NO RECOVERY			βγ = 40-60 cpm
4	98032 1410 5-16	9	6	MEDIUM DENSE, YELLOWISH BROWN, (10YR 5/4) SANDY-WELL GRADED GRAVEL, WET.	GW	N/A	Hnu = 0.4-0.6 ppm
	98033 1410 5-16	11	6				α = 0 cpm
	1410 5-16	16		NO RECOVERY			βγ = 40-60 cpm
5	98034 1420 5-16	8	6	MEDIUM DENSE, BROWN, (10YR 4/3) CLAYEY GRAVEL (.5-1.0 in), WET.	GC	N/A	Hnu = 0.4 ppm
	98035 1420 5-16	10	5	MEDIUM DENSE, BROWN (10YR 4/3) WELL GRADED GRAVEL-SAND MIXTURE, WET.	GW	N/A	α = 0 cpm
6	1420 5-16	13		NO RECOVERY			βγ = 40-60 cpm
7				AUGER STOPPED AT 6.0 FT SAMPLING ENDED AT 6.0 FT. *BORING CONTINUED FROM 6.0 FT TO 20.0 FT BY MARK SLUSARSKI ON 5-22-89.			

NOTES:

DRILLER: JIM SACCANI
HELPER: GARY DYE

*BORING ADVANCED TO DEEPER ELEVATION TO ENCOUNTER AQUIFER WATER TABLE.

INSTRUMENT BACKGROUND
Hnu = 0.4-0.8 ppm
α = 0 cpm
βγ = 40 cpm

4G2-11-8t

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~P-3~~ 1410 WAH 6-1-88	COORDINATES:	DATE: 05-22-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05-22-89	
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 05-22-89	
DRILLING METHODS: AUGER		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1							
2							
3							
4							
5							
6	98036 1025 05-22	7		NO SAMPLE RECOVERY FROM 6.0-6.5 FT.			HNU = 0PPM
7	98037 1025 05-22	7	6	MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25-.50) WET	SW	N/A	α = 0 CPM β = 40-50 CPM
	* 1025 05-22	6		NO SAMPLE RECOVERY FROM 7.0-7.5 FT.			

NOTES: DRILLING & SAMPLING BY M. SLUSARSKI COMMENCED @ 6.0 FT.
BORING P3 PREVIOUSLY DRILLED & SAMPLED BY E. TROLLINGER FROM 0.0 TO 6.0 FT
UPON COMPLETION BORING P3 WAS PLUGGED & ABANDONED USING 2-50 SACKS OF VOLCLAY GROUT (FROM 0.0 TO 20.0 FT.)

* NO SAMPLE NUMBER ASSIGNED FOR INTERVAL 7.0 TO 7.5 FT.

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~T-3~~ 1410 WAR 6-28-89	COORDINATES:	DATE: 05-22-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05-22-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 05-22-89
DRILLING METHODS: AUGER		PAGE 2 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	98038 1028 05-22	7	18	MEDIUM DENSE, YELLOW-BROWN (10YR 4/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25 - .50) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98039 1028 05-22	9		A.A.	SW	N/A	
9	98040 1028 05-22	14		A.A.	SW	N/A	
	98041 1030 05-22	6	12	A.A	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
10	98042 1030 05-22	4		A.A.	SW	N/A	
	~~98043~~ 1030 05-22	4		NO SAMPLE RECOVERY FROM 10.0-10.5 FT.	N/A	N/A	
11	98043 1110 05-22	1	12	NO SAMPLE RECOVERY FROM 10.5-11.0 FT.	N/A	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98044 1110 05-22	2		MEDIUM DENSE, YELLOW-BROWN (10YR 4/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25 - 1.0 IN) WET	SW	N/A	
12	98045 1110 05-22	9		A.A.	SW	N/A	
	98046 1114 05-22	3	18	A.A.	SW	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
13	98047 1114 05-22	8		A.A	SW	N/A	
	98048 1114 05-22	14		MEDIUM DENSE, YELLOW-BROWN (10YR 4/3) POORLY GRADED FINE SAND, TRACE FINE GRAVEL (.25 IN) WET	SP	N/A	
14	98049 1120 05-22	10	18	A.A.	SP	N/A	HNU = 0 PPM α = 0 CPM Bγ = 40-60 CPM
	98050 1120 05-22	12		MEDIUM DENSE, YELLOW-BROWN (10YR 4/3) WELL GRADED GRAVELLY SAND, SOME GRAVEL (.25 - .75 IN) WET	SW	N/A	
	98051 1120 05-22	13		A.A.	SW	N/A	

NOTES: * A.A - AS ABOVE

** NO SAMPLE NUMBER ASSIGNED FOR INTERVAL 10.0 FT TO 10.5

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: ~~P3~~ 1410 WALL 6-28-89	COORDINATES:		DATE: 05-22-89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05-22-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth	Date/Time	DATE COMPLETED: 05-22-89
DRILLING METHODS: AUGER			PAGE 3 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	98052 1320 05-22	7		MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, SOME FINE GRAVEL (.25-.50 in) WET	SW	N/A	HNU = 0 PPM
	98053 1320 05-22	20	18	MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, SOME FINE GRAVEL (.25-.50 in), TRACE COARSE GRAVEL (.50-1.5 in) WET	SW	N/A	α = 0 CPM BG = 40-50 CPM
16	98054 1330 05-22	22		A.A.	SW	N/A	
	98055 1340 05-22	4		MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, TRACE FINE GRAVEL (.25-.50 in) WET	SW	N/A	HNU = 0 PPM
17	98056 1340 05-22	7	18	A.A.	SW	N/A	α = 0 CPM BG = 40-60 CPM
18	98057 1340 05-22	12		A.A	SW	N/A	
	98058 1351 05-22	20		A.A	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 40-60 CPM
19	98059 1351 05-22	21	24	MEDIUM DENSE, YELLOW-BROWN (10YR4/2) WELL GRADED GRAVELLY SAND, TRACE FINE GRAVEL (.25-.50 in), TRACE COARSE GRAVEL (1.0-1.5 in) WET	SW	N/A	
	98060 1351 05-22	22		A.A	SW	N/A	
	98061 1351 05-22	32		A.A	SW	N/A	
20				20.0 FT			
				BOTTOM OF BORING 20.0 FT			

NOTES:

FERNALD RI/FS

	Date	Initial	Field Check	1st Key In	2nd Key In	Hard Copy Work Sheet
	11/2/89					

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~1252~~ (REDRILL)	COORDINATES:	DATE: 06-20-89
ELEVATION: 1411	GWL: Depth Date/Time	DATE STARTED: 06-20-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 06-20-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	54991 1432 06-20	4	6	VERY STIFF, OLIVE-BROWN (2.5Y 4/2) SILTY CLAY, TRACE SAND, DAMP	CL	2.5	HNU = 60 PPM α = BACKGROUND Bδ = BACKGROUND
	54992 1432 06-20	5	6	A.A.	CL	2.5	
9	54993 1432 06-20	6	3	A.A	CL	2.5	
	54994 1440 06-20	3	18	A.A	CL	2.5	HNU = 100-200 PPM * α = BACKGROUND Bδ = BACKGROUND
	54995 1440 06-20	3		A.A 10.0	CL	2.5	
10	54996 1440 06-20	4		LOOSE, OLIVE-BROWN (10YR 4/2) WELL GRADED SAND, WET	SW	N/A	
	54997 1445 06-20	6	18	LOOSE, OLIVE-BROWN (10YR 4/2) WELL GRADED SAND, SOME GRAVEL (.25-.50 IN) WET	SW	N/A	HNU = 100-200 PPM * α = BACKGROUND Bδ = BACKGROUND
11	54998 1445 06-20	3		A.A.	SW	N/A	
	54999 1445 06-20	4		11.8			
12				VERY STIFF, YELLOW-BROWN (10YR 4/6) TRACE GRAVEL (.25-.50 IN) DAMP 12.0	CL	2.5	HNU = α = Bδ =
				BOTTOM OF BORING 12.0 FT			
13							
				NOTE: THIS WAS a redrill of original location 1252 (Moved off well 2 FT. DUE TO VOCS)			HNU = α = Bδ =
14				A.A = AS ABOVE			

NOTES: CONTRACTOR: PENNDRILL
RIG: MOBILE B-53
DRILLER: J. SACCANI
ASSISTANT: W. FELTY

SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
Bδ = 1000-2000 (AIR), 16000-18000 (SURFACE)
α = 5 CPM (AIR), 6000-10000 CPM (SURFACE)

LEL/O_2: LEL = 0 PPM
O_2 = 20.6%

* INTERVAL FROM 0.0 FT TO 7.5 FT HAD PREVIOUSLY BEEN DRILLED. SAMPLING IN BORING 1252 (REDRILL) COMMENCED @ 7.5 FT.

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
FIELD ENG./GEO. M. SLUSARSKI DATE 06-20-89
PROJECT NO. 602 3.7.1
CHECKED BY B.V. DATE 7/2/89
BORING NO. 1411 ~~1252~~ (REDRILL) OF 1852)
PIEZOMETER NO. 1252 (REDRILL)
DATE OF INSTALLATION 06-20-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT 8.0 in HOLLOW STEM AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM — TO —	SIZE 4.25 in ID FROM 0.0 TO 12.0
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE PIEZOMETER	RISER PIPE MATERIAL PVC
DIAMETER OF PERFORATED SECTION 2.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 in. I.D. 2.0 in
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS .4 FT, 4.8 FT, 8.8 FT
AVERAGE SIZE OF PERFORATIONS .020	JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 4.8 FT	JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.	OTHER PROTECTION HINGED LOCKING COVER
PROTECTIVE PIPE O.D. 4 5/8 in.	W/ PADLOCK

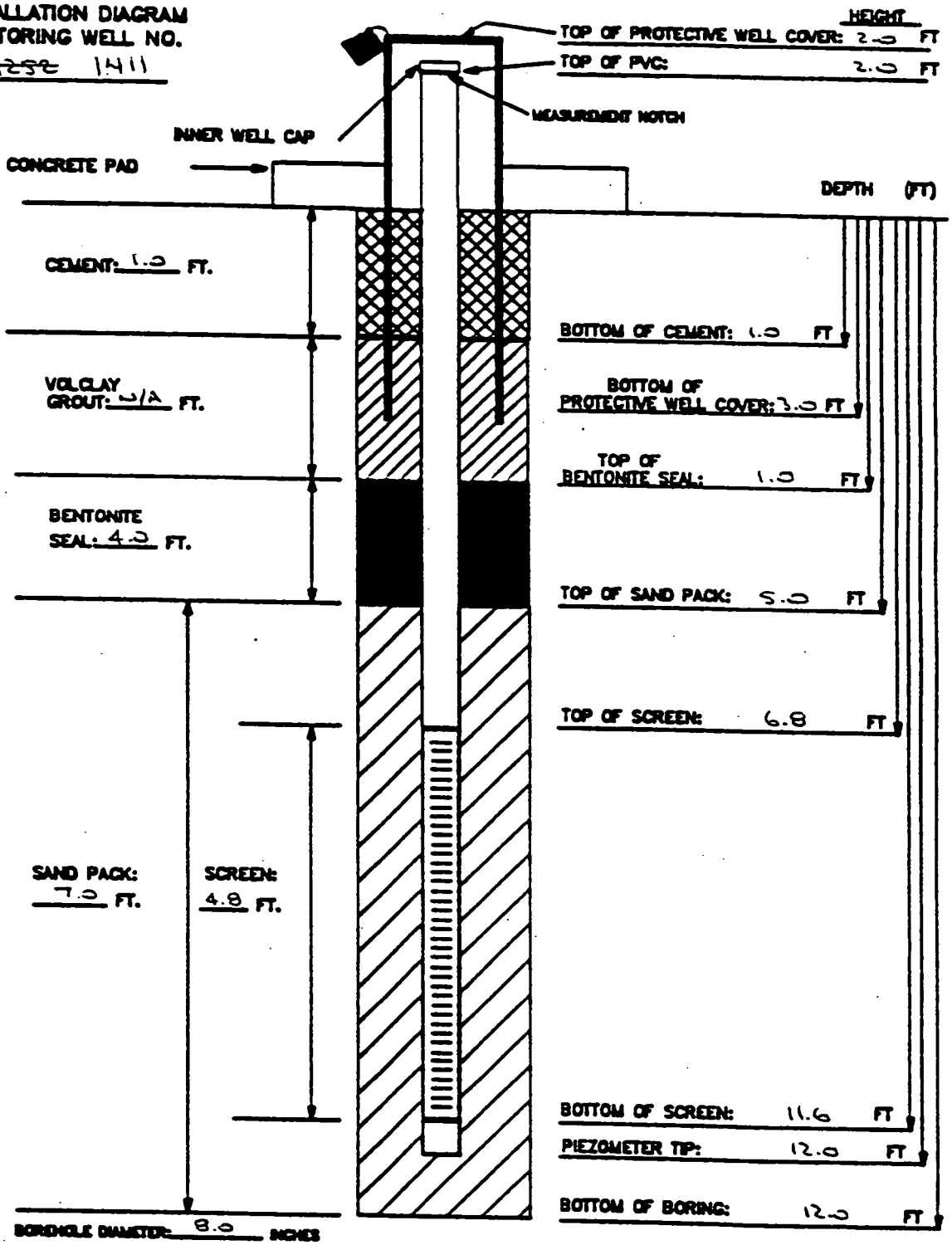
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.0			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (CEMENT)	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 12.0	TOP	BOTTOM
GRAVEL N/A	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 6.8	BOTTOM 11.6	TOP	BOTTOM
PIEZOMETER TIP	12.0			
BOTTOM OF BOREHOLE	12.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS Approximate Water Zone 10.25' - 12.0 Ft.

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
BO. ~~1252~~ 1411
6/30/89

INSTALLATION DATE: 06-20-89



MATERIALS USED:
SAND TYPE AND QUANTITY: 10-20 : 3-80LB SKS
BENTONITE PELLETS (5-GALLON BUCKETS): 2 - 5GAL. BUCKETS
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: 1/2-94 LB BAG.
AMOUNT OF WATER USED: 10 GAL
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602 3.7.1

GEOLOGIST/ENGINEER: M. SLUSARSKI

FERNALD RI/FS

Date	9/12/89			
Initial				
	Field Clerk	1st Rev In	2nd Rev In	Final Copy

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1412 (Redrill of #1184)	COORDINATES:	DATE: 6/30/89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/30/89	
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 6/30/89	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55078 1430 6-30	5	6	LOOSE (10YR 5/6) yellowish brown clayey gravel, some sand, slightly moist	GC	NA	HNU: 0 ppm α: 0 cpm Bγ: 100-110 cpm
1	55079 1430 6-30	5	3	SAA	GC	NA	
	55080 1430 6-30	2	0	NR	NA	NA	
2	55081 1434 6-30	5	0	NR	NA	NA	HNU: α: Bγ: NA
	55082 1434 6-30	3	0	NR	NA	NA	
3	55083 1434 6-30	4	0	NR	NA	NA	
	55084 1437 6-30	4	4	SOFT (10YR 5/3) Brown clay, some sand, medium plastic, moist	CL	.25	HNU: 0 ppm α: 0 cpm Bγ: 70-80 cpm
4	55085 1437 6-30	4	0	NR	NA	NA	
	55086 1437 6-30	6	0	NR	NA	NA	
	55087 1440 6-30	4	6	Soft (5Y 5/3) olive, silty clay, some sand, medium plasticity, moist	CL	.25	HNU: 20-50 ppm α: 0 cpm Bγ: 70-80 cpm
5	55088 1440 6-30	5	6	Stiff (5Y 4/3) olive silty clay, trace sand, low plasticity, moist	CL	1.50	
6	55089 1440 6-30	6	6	Stiff (5Y 4/3) olive, silty clay, some sand, low plasticity, moist	CL	1.75	
	55090 1443 6-30	5	6	Soft (5Y 4/3) olive, silty clay, some sand, medium plasticity, moist	CL	.5	HNU: 30-40 ppm α: 0 cpm Bγ: 140-150 cpm
7	55091 1443 6-30	5	6	Very stiff (5Y 4/3) olive silty clay, low plasticity, moist	CL	3.0	
	55092 1443 6-30	5	5	Loose (5Y 4/3) olive silt, moist	ML	NA	

NOTES: CONTRACTOR: PENNDRILL
RIG: Mobile Rig
DRILLER: Craig Coulter
ASSISTANT: Bill Anderson
Geo Assistant: Andy Melroy

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION T
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
Bγ = 100-120 CPM

SAA = Same As Above
NR = No Recovery

LEL/O_2: LEL = 0% ~~[illegible]~~ 6/29/89
O_2 = 20.6 %

HNU# 00221

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1412 (Redrill of 1184)	COORDINATES:		DATE: 6/30/89
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/30/89
ENGINEER/GEOLOGIST: C. Grube	Depth	Date/Time	DATE COMPLETED: 6/30/89
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
Top of water bearing zone 7.5ft							
8	55093 1530 6-30	4	6	medium Dense (5Y5/4) olive sandy silt, very moist	ML	NA	HNU = 20-30 ppm α = 0 cpm Bγ = 90-100 cpm
	55094 1530 6-30	5	6	SAA	ML	NA	
9	55095 1530 6-30	7	6	medium Dense (5Y5/3) olive sandy silt very moist	ML	NA	
	55096 1535 6-30	6	6	medium Dense (5Y4/4) olive silty sand some clay wet	SM	NA	HNU = 3-10 ppm α = 0 cpm Bγ = 100-120 cpm
10	55097 1535 6-30	8	6	medium Dense (5Y5/3) olive sandy silt, trace clay, very moist	ML	NA	
Bottom 10.3ft water bearing zone	55098 1535 6-30	8	6	SAA	ML	NA	
				med. stiff 5Y5/2 olive gray silty clay, some sand moist	CL	.75	
11	55099 1550 6-30	4	6	medium stiff (5Y4/3) olive silty clay, some sand, low plasticity moist	CL	.75	HNU = 0-2 ppm α = 0 cpm Bγ = 100-110 cpm
	55100 1550 6-30	6	6	med. Dense (5Y5/3) olive, clayey sand, some silt, very moist	SC		
12	55101 1550 6-30	7	6	med. Dense (5Y5/4) olive, silty clay, some sand, low plasticity, very moist	CL	1.0	
				Bottom of Boring Sampling at 12.0 ft			HNU = α = Bγ =
13							
14							HNU = α = Bγ =

NOTES:

SAA = Same As Above
NR = No Recovery

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. C. Grube DATE 6/30/89
PROJECT NO. 6023.7 CHECKED BY B.D. DATE 7/2/89
BORING NO. 1412
PIEZOMETER NO. 1412 (Redrill of 1184) DATE OF INSTALLATION 6/30/89

BOREHOLE DRILLING

DRILLING METHOD 8.0 in Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT 8.0 in Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 2.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 5.0 FT

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 3/8 in I.D. 2.0 in
LENGTH OF PIPE SECTIONS 9.0 FT
JOINING METHOD screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 in

OTHER PROTECTION Hinged protective cover with installed padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.9			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/Cement	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 12.0	TOP	BOTTOM
GRAVEL-NA	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 7.0 Ft.	BOTTOM 12.0 Ft.	TOP	BOTTOM
PIEZOMETER TIP	12.0			
BOTTOM OF BOREHOLE	12.0			
GWL AFTER INSTALLATION	To be taken at a later date			

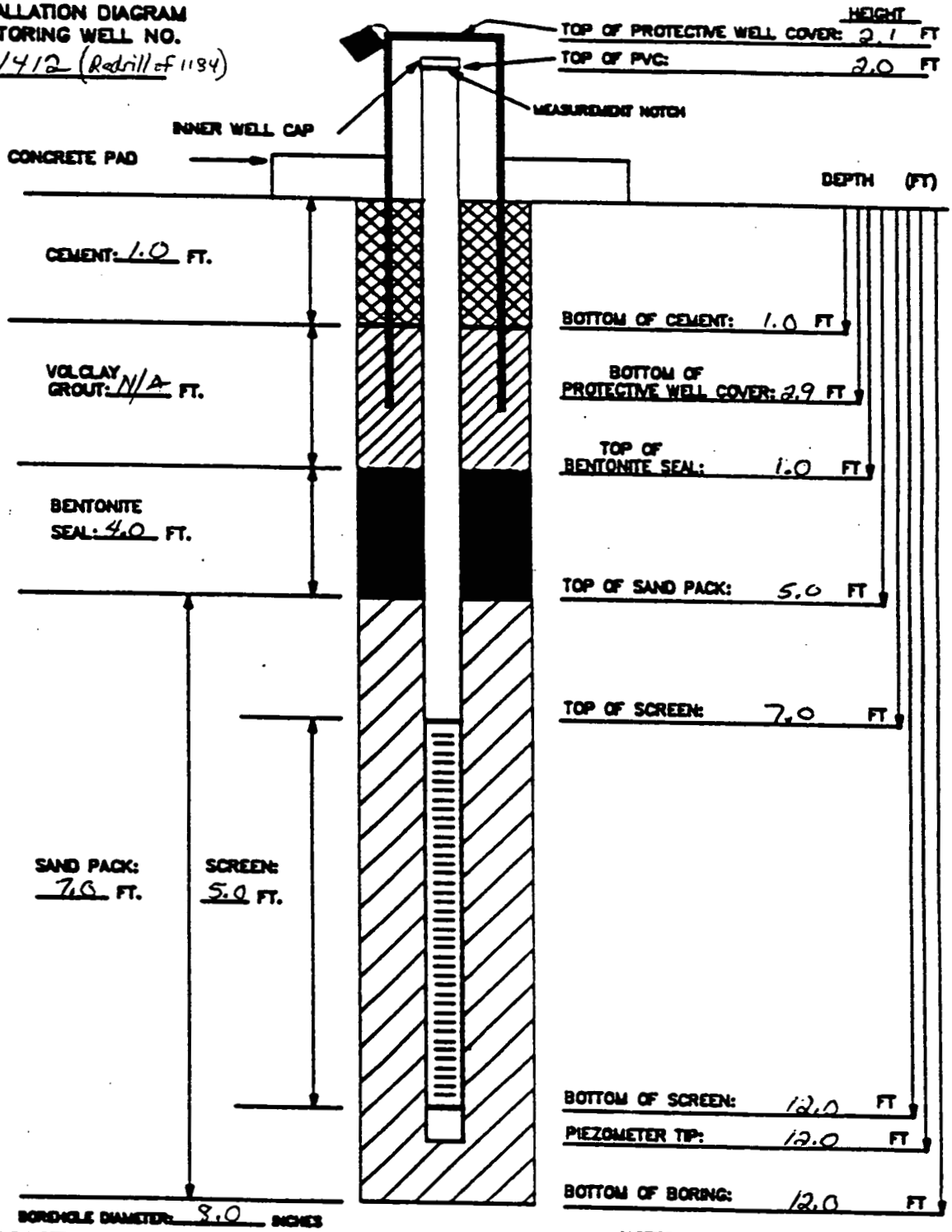
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS Top of water bearing zone at 7.5 FT
Bottom of water bearing zone at 10.3 FT

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1412 (Redrill of 1184)

INSTALLATION DATE: 6/30/89



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 10/20 Sand - 3 (80#) sacks
BENTONITE PELLETS (5-GALLON BUCKETS): 2 buckets
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 sack (94#)
AMOUNT OF WATER USED: 10 gal
OTHER: 5.0 FT protective casing

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602 3.7

GEOLOGIST/ENGINEER: C. Grube

FERNALD
RI/FS

Date	8/3/89	B-22		
Initial	RW	RW		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1162 8 (1413)	COORDINATES:	DATE: 7-12-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-11-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 7-13-89	
DRILLING METHODS: MOBILE DRILL HSA		PAGE 1 OF 2	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
Concrete	55121	5		Concrete slab on floor grade ~6-8" THICK,			H_{nu} = 0.2 ppm
1	55122 1800 7-12	6	6	V. STIFF BROWN 10YR (4/2) SILTY CLAY, LOW PLASTICITY, TRACE OF COARSE SAND, MOIST.	CL	2.5	α = 0-10 cpm
	55123 1800 7-12	12	6				βγ = 1000-1200 cpm
2	55124 1815 7-12	6	6	BROWN, (10YR 4/3) CLAY, TRACE OF GRAVEL (.5-.75 IN), MOIST TO SLIGHTLY MOIST, MED. PLASTICITY.	CL	1.5	H_{nu} = 0.2 ppm
	55125 1815 7-12	8	6			2.5	α = 0-10 cpm
3	55126 1815 7-12	10	4			3.5	βγ = 600-800 cpm
	55127 1823 7-12	4	5	BROWN 10YR 5/3) ~~CLAY~~, SILTY CLAY, LOW PL, MOIST.	CL	3.5	H_{nu} = 0.2 ppm
4	55128 1823 7-12	10	0	NR			α = 0-5 cpm
	55129 1823 7-12	10	0	NO RECOVERY			βγ = 600-800 cpm
5	55130			BORING WAS PLUGGED WITH 2 BUCKETS BENTONITE PELLETS AND WATER, THEN SEALED WITH CEMENT PLUG 12 inches THICK.			H_{nu} =
	55131						α =
6	55132						βγ =
7	55133						H_{nu} =
	55134						α =
	55135						βγ =

NOTES: DRILLING CO.:
DRILLER: DAVE NEWMAN
HELPER: CHRIS COLTER

MATERIALS USED:
1/2 bag cement
2 buckets pellets bentonite
10 gals WATER

SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART. SAMPLES TAKEN FOR WMCO AT INTERVALS 0.0-.5 FT., 2-2.5 FT., 5-5.5 FT, 10-10.5 FT., 15-15.5 FT.

INSTRUMENT BACKGROUND
H_{nu} = 0.2 ppm
α = 10-20 air
βγ = 1500-2500 cpm
LEL = 0
O_2 = 21.0%

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject _____ Sheet No. ____ of ____

Chkd. By ____ Date _____ _____ Proj. No. _____

BORING NUMBER (1162), 3rd ATTEMPT CHANGE OF NUMBER TO BORING 1413 WAS SAMPLED TO A DEPTH OF 3.5 FT. AND AUGERS STOPPED AT 4.5 FT. . LARGE OBSTACLE, PIPE, WAS ENCOUNTERED AT A DEPTH OF 4.5 TO 5.0 FT. LOCATION WAS ABORTED AND BOREHOLE WAS PLUGGED WITH BENTONITE PELLETS AND FINISHED WITH A CEMENT PLUG OF 12 INCHES THICK.

MAT'LS USED:

1/2 BAG TYPE I CEMENT

2 BUCKETS BENTONITE PELLETS

≈10 GALS WATER.

108-10-85

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: [illegible] 14 [illegible]	COORDINATES:	DATE. [illegible]	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-12-89	
ENGINEER/GEOLOGIST: E. Trell [illegible]	Depth Date/Time	DATE COMPLETED: [illegible]	
DRILLING METHODS: MOBILE DRILL HSA [illegible]		PAGE 1 OF 2	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	[illegible]	[illegible]	[illegible]	CONCRETE FLOOR SLAB 6 IN - 8 IN.			
1	55173 2059 7-18	3	6	VERY STIFF, YELLOWISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5-.75 in), MOIST.	CL	30	H_{nu} = 0.0 ppm α = 0-10 ppm $\beta\gamma$ = 800 cpm
	55174 2059 7-18	5	6				
2	55175 2059 7-18	9	3	SAME AS ABOVE	CL	25	H_{nu} = 0.0 ppm α = 0-10 ppm $\beta\gamma$ = 800-900 cpm
	55176 2059 7-18	12	8	NR			
3				BORING ABORTED DUE TO PIPE AT DEPTH OF ~4.0 FT.			
				MOVED LOCATION ~2.0 FT EAST OF THIS LOCATION.			
4				BORING [illegible] WITH BENTONITE PELLETS AND FINISHED WITH A CEMENT PLUG 12 inches THICK.			
5							
6							
7							

NOTES: DRILLING CO.:
DRILLER: Dave Heuman
HELPER: Chris Cutler
MATERIALS USED:
[illegible] bag cement
1 1/2 [illegible] bentonite pellets
[illegible] gals water

SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART. SAMPLES TAKEN FOR WMCO AT INTERVALS 0.0-.5 FT., 2-2.5 FT., 5-5.5 FT, 10-10.5 FT., 15-15.5 FT.

INSTRUMENT BACKGROUND
H_{nu} = 0.2 ppm
α = 10-20 cpm
$\beta\gamma$ = 1500-2000 cpm
LEL = 0
O_2 = 21.6%

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date _____ Subject _____ Sheet No. ____ of ____

Chkd. By ____ Date _____ _____ Proj. No. _____

BORING NUMBER (1112). 4TH ATTEMPT CHANGED NUMBER TO BORING 1414 WAS SAMPLED TO A DEPTH OF 3.0 FT. WITH AUGERS STOPPED AT 3.5 FT. ANOTHER OBSTACLE HIT AT APPROXIMATELY 4.0 FT., CONCRETE PIPE. LOCATION MOVED 2.0 FT. EAST AND RE-DRILLED. THIS LOCATION WAS PLUGGED WITH BENTONITE AND FINISHED WITH A CONCRETE PLUG 12 inches THICK.

MAT'LS USED:

1/2 bag ~~[illegible]~~ cement
1 1/2 buckets bentonite pellets
5 gals water

FERNALD RI/FS

Date	8/8/90	7-24-90		
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1415 (1162 5th Attempt)	COORDINATES:	DATE: 7-19-89 / 7-24-8	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-19-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 7-24-89	
DRILLING METHODS: MOBILE DRILL HSA 8 in		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				CONCRETE FLOOR SLAB BASE COARSE UNDERLIES			Hnu = 0.4 ppm
1	55176 1846 7-19	5	6	VERY STIFF, YELLOWISH BROWN (10YR 4/3) SILTY CLAY, LOW TO MEDIUM PLASTICITY, TRACE OF FINE GRAVEL (.5 in), MOIST.	CL	2.5	α = 0-10 CPM
	55177 1846 7-19	6	6				βγ = 600-800 CPM
2	55178 1846 7-19	13	Ø	NR 2 ATTEMPTS			Hnu = 0.4 ppm
	55179 1846 7-19	15	Ø				α = 0-10 CPM
3	55180 1852 7-19	6	4	STIFF, YELLOWISH BROWN (10YR 4/3) CLAY, MEDIUM PLASTICITY, MOIST.	CL	1.5	βγ = 600 CPM
4	55181 1852 7-19	6		2 ATTEMPTS NO RECOVERY			Hnu = 0.4 ppm
	55182 1852 7-19	8					α = 0-10 CPM
	55183 1907 7-19	8	6	STIFF, BROWN (10YR 4/2) CLAY MEDIUM PLASTICITY, MOIST.	CL	1.5	βγ = 600 CPM
5	55184 1907 7-19	9	Ø	NO RECOVERY			Hnu = 0.4 ppm
	55185 1907 7-19	12	Ø	3 ATTEMPTS LARGE OBSTACLE IN HOLE			α = 0-10 CPM
6	55186 1741 7-24	9	6	VERY STIFF, GRAYISH BROWN (10YR 4/3) GRAVELLY CLAY, MED. PLASTICITY, MOIST	CL	3.0	βγ = 500-600 CPM
7	55187 1741 7-24	12	6	SAME SOIL COMPOSITION AS ABOVE.	CL	3.25	Hnu = 0.6 ppm
	55188 1741 7-24	12	3				α = 0 CPM
	55189 1748 7-24	9	6	VERY STIFF, GRAYISH BROWN (10YR 4/3) CLAY, TRACE OF GRAVEL (.25-.5 in) MED. PLASTICITY, MOIST.	CL	2.5	βγ = 500 CPM

NOTES: DRILLING CO.:
DRILLER: Dave Newman
HELPER: Chris Colter

MATERIALS USED:
Vaclay - 2 bags.
WATER - 20 gals
BENTONITE - 1 bucket (5 gal)
CEMENT - 1/2 bag. (50 lb)

SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART. SAMPLES TAKEN FOR WMCO AT INTERVALS 0.0-.5 FT., 2-2.5 FT., 5-5.5 FT, 10-10.5 FT., 15-15.5 FT.

INSTRUMENT BACKGROUND
Hnu = 0.4 ppm Mod.#002
α = 0-10 CPM
βγ = 800 CPM
LEL = 0
O_2 = 21.6%

FERNALD RI/FS

5711

	In	Date
1st Key In	JHY	8-22
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: (1162) New # 1415	COORDINATES:	DATE: 7-24-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-19-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 7-24-89
DRILLING METHODS: Mobile Drill HSA		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55190 1748 7-24	10	6	SAME MATERIAL AS ABOVE	CL	2.5	Hnu = 0.4 ppm
	55191 1748 7-24	11	0	NO RECOVERY			α = 0 CPM
9	55192 1755 7-24	13	6	STIFF, DARK BROWN (10YR 3/2) CLAY, TRACE OF COARSE SAND, LOW PLASTICITY, MOIST.	CL	2.0	βγ = 500-550 CPM
	55193 1755 7-24	14	6	VERY STIFF, BROWN (10YR 4/3) CLAY, TRACE TO SOME GRAVEL (1/4 TO .5 IN), MEDIUM PLASTICITY, MOIST.	CL	3.0	Hnu = 0.4 ppm
10	55194 1755 7-24	21	5				α = 0 CPM
	55195 1906 7-24	8	6	VERY STIFF, GRAYISH BROWN (10YR 4/3) CLAY, TRACE OF GRAVEL MEDIUM PLASTICITY, MOIST.	CL	2.75	βγ = 500-600 CPM
11	55196 1906 7-24	10	6	VERY STIFF, GRAY (10YR 5/2) CLAY, MEDIUM PLASTICITY, MOIST.	CL	3.5	Hnu = 0.4 ppm
	55197 1906 7-24	11	2				α = 0 CPM
12	55198 1910 7-24	12	6	VERY STIFF, GRAYISH BROWN (10YR 4/2) TO GRAY (10YR 5/2), GRAVELLY CLAY, MEDIUM PLASTICITY, MOIST.	CL	2.5	βγ = 500 CPM
	55199 1910 7-24	14	6	SAME COMPOSITION AS ABOVE	CL	2.5	Hnu = 0.4 ppm
13	55200 1910 7-24	18	0	NO RECOVERY			α = 0 CPM
	55201 1925 7-24	11	6	VERY STIFF, GRAY (10YR 5/2) CLAY, TRACE OF GRAVEL (.5 IN), MEDIUM PLASTICITY, MOIST	CL	2.5	βγ = 500 CPM
14	55202 1925 7-24	12	6	SAME COMPOSITION AS ABOVE	CL	2.5	Hnu = 0.4 ppm
	55203 1925 7-24	24	6				α = 0 CPM
	55204 1929 7-24	21	6				βγ = 500 CPM

NOTES:

DRILLER: Dave Newman
HELPER: Chris Cotter

Hnu Mod. # 00222 (Air)

INSTRUMENT BACKGROUND
Hnu = 0.4 ppm
α = 0-10 CPM
βγ = 500-650 CPM

FERNALD RI/FS

	Initial	Date
1st Key In	JH	8-22-89
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: (1162) NEW # 1415	COORDINATES:	DATE: 7-24-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-19-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 7-24-89	
DRILLING METHODS: MOBILE DRILL HSA 8 in		PAGE 3 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	55205 1946 7-24	6	6	STIFF, GRAYISH BROWN (10YR 4/2) CLAY, TRACE OF GRAVEL (.5 in), MEDIUM PLASTICITY, MOIST.	CL	2.0	Hnu = 0.4 ppm α = 0 CPM βγ = 500 CPM
	55206 1946 7-24	6	4				
	55207 1946 7-24	8	0	NO RECOVERY			
55208 → 17	55208 1952 7-24	13	6	VERY STIFF, GRAY, (10 YR 5/1) CLAY, TRACE OF COARSE SAND TO FINE GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	3.5	Hnu = 0.4 ppm α = 0 CPM βγ = 500 CPM
	55209 1952 7-24	18	6				
18	55210 1952 7-24	50/3in	3				
19	55211 2055 7-24	24	6	HARD, GRAYISH BROWN (10YR 5/3) GRAVELLY CLAY, MOIST, MEDIUM PLASTICITY, VERY HARD AT TIP.	CL	74.0	Hnu = 0.4 ppm α = 0 CPM βγ = 500 CPM
	55212 2055 7-24	30	6				
	55213 2055 7-24	32	6				
20	55214 2055 7-24	18	6	SAME AS ABOVE	CL	74.0	Hnu = 0.4 ppm α = 0 CPM βγ = 500 CPM
				BOTTOM OF BORING. NOT TO EXCEED 20.0 FT FROM GROUND SURFACE. * BORING WAS PLUGGED WITH GROUT, NO WATER BEARING ZONE WAS ENCOUNTERED TO DRILLED DEPTH OF 20.0 FT. SAMPLING ENDED AT 20.0 FT.			

NOTES:

DRILLER: DAVE NEWMAN
HELPER: Chris Cotter

INSTRUMENT BACKGROUND
Hnu = 0.4 ppm
α = 0-10 CPM
βγ = 500-600 CPM

INTERNATIONAL TECHNOLOGY CORPORATION

5711

4/4

By_____ Date_____ Subject_____ Sheet No.____ of____

Chkd. By____ Date_____ Proj. No._____

BORING 1415 (5th ATTEMPT ON BORING 1162) WAS DRILLED TO A DEPTH OF 20.0 FT., SAMPLING ENDED AT 20.0 FT. NO WATER BEARING ZONE ENCOUNTERED TO 20.0 FT.

MAT'LS USED:

2 bags VOLCLAY GROUT (50 lbs ea.)
20 gals. WATER
1/2 bucket BENTONITE PELLETS
1/2 bag. CEMENT.

108-10-85

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1416	COORDINATES:	DATE: 8-1-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-31-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 8-1-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				VISUAL CLASSIFICATION OF SOILS DESCRIPTION FOR INTERVAL 0.0 - 10.5 FT MAY BE OBTAINED FROM LOG OF BORING #1334. SAMPLING IN BORING #1416 COMMENCED @ 10.5 FT. * THIS WAS A REPLACEMENT boring FOR original Boring LOCATION # 1334. COULD NOT DRILL BELOW 12 FT. DUE TO CONCRETE RUBBISH AT original LOCATION 1334. BD. 8/3/89			HNU = α = BZ =
2							HNU = α = BZ =
3							HNU = α = BZ =
4							HNU = α = BZ =
5							HNU = α = BZ =
6							HNU = α = BZ =
7							HNU = α = BZ =

NOTES: CONTRACTOR: PENN DRILL
RIG: MOBILE B-53
DRILLER: J. SACCANI
ASSISTANT: W. FELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CH
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BZ = 100-200 PM
LELO2: LEL = 0 PPM
O2 = 20.6 %

FERNALD RI/FS

5711

Top		
Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1416	COORDINATES:	DATE: 07-31-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-31-89
ENGINEER/GEOLOGIST: M. SLWARZIKI	Depth Date/Time	DATE COMPLETED: 8-1-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8							HNU = α = Bγ =
9							HNU = α = Bγ =
10							
11	55220 1338 07-31	13	6	STIFF, YELLOW-BROWN (2.5Y 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25-.75) DAMP	CL	1.5	HNU = 0 PPM α = 0 CPM Bγ = 80-160 CPM
	55221 1338 07-31	14	6	A.A.	CL	1.5	
12	55222 1338 07-31	11	6	A.A	CL	1.5	
	55223 1341 07-31	7	6	A.A.	CL	1.5	HNU = 0 PPM α = 0 CPM Bγ = 100-140 CPM
13	55224 1341 07-31	10	6	STIFF, OLIVE-GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25-.50 in) DAMP	CL	2.0	
	55225 1341 07-31	12	6	A.A.	CL	2.0	
14	55226 1350 07-31	13	6	A.A.	CL	2.0	HNU = 0 PPM α = 0 CPM Bγ = 80-160 CPM
	55227 1350 07-31	14	6	A.A.	CL	2.0	
	55228 1350 07-31	16	6	A.A	CL	2.0	

NOTES:

A.A = AS ABOVE

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1416	COORDINATES:	DATE: 07-31-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-31-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 08-1-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55229 1408 07-31	6	6	STIFF, OLIVE-GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25-50.0) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-180 CPM
16	55230 1408 07-31	8	6	A.A.	CL	2.0	
	55231 1408 07-31	10	6	A.A	CL	2.0	
17	55232 1421 07-31	11	6	A.A.	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-180 CPM
	55233 1421 07-31	12	6	A.A	CL	2.0	
18	55234 1421 07-31	12	6	A.A	CL	2.0	
	55235 1426 07-31	14	6	A.A.	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-180 CPM
19	55236 1426 07-31	15	6	A.A	CL	2.0	
	55237 1426 07-31	12	6	A.A	CL	2.0	
20	55238 1426 07-31	13	6	A A 20.0 ft	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-180 CPM
				BOTTOM OF BORING 20.0 FT. BOREHOLE P&A 08-01-89			

NOTES: MATERIALS USED DURING P&A ON 08-01-89:
2 - 50 LB BAGS OF VOLCLAY GROUT FROM 20.0 FT TO 1.0 FT
1/2 - 94 LB BAG OF CEMENT FROM 1.0 FT TO 0.0 FT.
WATER - 50 GAL

000081

A.A = AS ABOVE

5711

FERNALD RI/FS

Initial	Date
BD.	9/1/89

	Field Check	1st Key In	2nd Key In	Hold Copy

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1417	COORDINATES:	DATE: 8-30-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-30-89
ENGINEER/GEOLOGIST: E Trollinger	Depth Date/Time	DATE COMPLETED: 8-30-89
DRILLING METHODS: MOBILE DRILL HSA		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
55284							
1	55242 1415 8-30	7	6	MEDIUM DENSE, BLACK (5Y 3/1) WELL GRADED GRAVELLY SAND, SOME FILL MAT'L CONTAINING COAL DUST., MOIST.	SW	N/A	Hnu = 0.5 ppm α = 0 CPM βγ = 250 CPM
	55243 1415 8-30	14	6				
	55244 1415 8-30	11	Ø	NO RECOVERY			
2	55245 1418 8-30	8	4	STIFF, BROWN (10YR 4/3) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	2.0	Hnu = 0.6 ppm α = 0 CPM βγ = 200 CPM
	55246 1418 8-30	8	Ø	NO RECOVERY WITH TRAPS			
3	55247 1418 8-30	9	Ø				
	55248 1420 8-30	10	3	VERY STIFF, BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (5 in), MOIST, LOW PLASTICITY.	CL	2.5	Hnu = 0.6 ppm α = 0 CPM βγ = 200 CPM
4	55249 1420 8-30	10	Ø	NO RECOVERY WITH TRAPS			
	55250 1420 8-30	12	Ø				
5	55251 1423 8-30	12	6	VERY STIFF, BROWN (10YR 4/2) CLAY, LOW PLASTICITY, DRY TO MOIST.	CL	2.5	Hnu = 0.6 ppm α = 0 CPM βγ = 250 CPM
	55252 1423 8-30	13	Ø	NO RECOVERY			
6	55253 1423 8-30	11	Ø				
	55254 1438 8-30	4	6	VERY STIFF, BROWN (10YR 4/3), CLAY, SOME SILT, LOW PLASTICITY, MOIST.	CL	2.5	Hnu = 0.4 ppm α = 0 CPM βγ = 180-200 CPM
7	55255 1438 8-30	3	6				
	55256 1438 8-30	6	4				

NOTES: DRILLING CO.:
DRILLER: Jim Saccani
HELPER: Charles Elkowitz

MATERIALS USED:
2 BAGS VOLCLAY
25 gals water
1/2 SACK CEMENT

SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART. SAMPLES TAKEN FOR WMCO AT INTERVALS 0.0-.5 FT.; 2-2.5 FT.; 5-5.5 FT, 10-10.5 FT., 15-15.5 FT.

INSTRUMENT BACKGROUND
Hnu = 0.4-0.8 ppm
α = 0-10 CPM
βγ = 200-300 CPM
LEL = 0
O_2 = 20%

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 662 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1417	COORDINATES:	DATE: 8-30-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-30-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 8-30-89
DRILLING METHODS: MOBILE DRILL HSA		PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55257 1440 8-30	7	6	VERY STIFF, BROWN (10YR 4/3) CLAY, TRACE OF COARSE SAND, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.5	Hnu = 0.4 ppm α = 0 cpm βγ = 300 cpm
	55258 1440 8-30	8	6				
9	55259 1440 8-30	8	6				
	55260 1443 8-30	9	6		CL	2.5	Hnu = 0.4 ppm α = 0 cpm βγ = 250 cpm
10	55261 1443 8-30	12	6				
	55262 1443 8-30	14	4				
11	55263 1450 8-30	9	6	HARD, GRAYISH BROWN (10YR 4/2) TO GRAY (10YR 4/1) SANDY CLAY TRACE OF FINE GRAVEL, MOIST.	CL	>4.0	Hnu = 0.6 ppm α = 0 cpm βγ = 200 cpm
	55264 1450 8-30	10	6				
12	55265 1450 8-30	11	4				
	55266 1455 8-30	11	6	VERY STIFF, GRAY, (10YR 5/1) GRAVELLY CLAY .5IN-.75IN ROUNDED GRAVEL, LOW PLASTICITY, MOIST.	CL	2.5	Hnu = 0.6 ppm α = 0 cpm βγ = 200 cpm
13	55267 1455 8-30	17	3				
	55268 1455 8-30	12	0	NO RECOVERY			
14	55269 1500 8-30	14	6	STIFF, GRAY (10YR 5/1) CLAY, MEDIUM PLASTICITY, TRACE OF FINE GRAVEL, MOIST.	CL	2.0	Hnu = 0.2 ppm α = 0 cpm βγ = 220 cpm
	55270 1500 8-30	14	6				
	55271 1500 8-30	12	6				

NOTES:

DRILLER: Jim Saccani
HELPER: Charles Elkowitz

INSTRUMENT BACKGROUND
Hnu = 0.4-0.8 ppm
α = 0-10 cpm
βγ = 200-300 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1417	COORDINATES:	DATE: 8-30-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-30-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED. 8-30-89	
DRILLING METHODS: MOBILE DRILL HSA		PAGE 3 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	55272 1509 8-30	8	6	STIFF, GRAYISH BROWN (10YR 5/2) TO GRAY (10YR 4/1) CLAY TRACE OF COARSE SAND, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0	Hnu = 0.2 ppm α = 0-10 CPM βγ = 200 CPM
	55273 1509 8-30	8	6				
	55274 1509 8-30	10	6				
17	55275 1515 8-30	5	6		CL	2.25	Hnu = 0.4 ppm α = 0 CPM βγ = 200 CPM
	55276 1515 8-30	8	6				
18	55277 1515 8-30	10	6				
19	55278 1520 8-30	10	6	STIFF, GRAY, (10YR 5/1) GRAVELLY CLAY, MEDIUM PLASTICITY, MOIST TO VERY MOIST	CL	1.5	Hnu = 0.6 ppm α = 0 CPM βγ = 200 CPM
	55279 1520 8-30	11	6				
	55280 1520 8-30	12	6				
20	55281 1520 8-30	15	6		CL	2.0	Hnu = 0.6 ppm α = 0 CPM βγ = 200 CPM
				BOTTOM OF BORING. NOT TO EXCEED 20.0 FT FROM GROUND SURFACE. BOTTOM OF BORING @ 20.0 FT. SAMPLED TO 20.0 FT. DRY HOLE, NO WATER ENCOUNTERED			

NOTES

DRILLER: Jim Socconi
HELPER: Charles Elkowitz

INSTRUMENT BACKGROUND

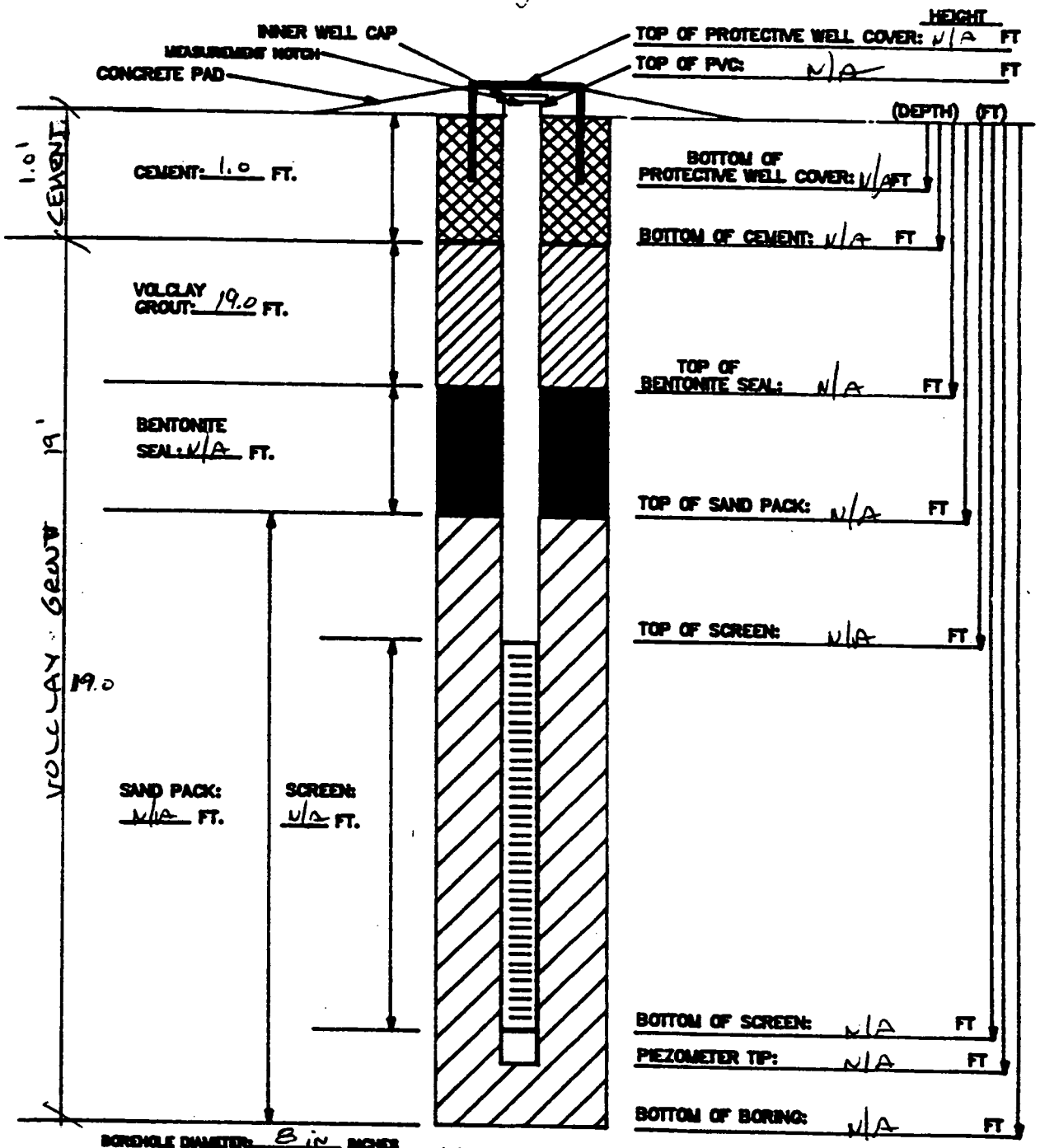
Hnu = 0.4-0.8 ppm
α = 0-10 CPM
βγ = 200-300 CPM

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. _____

INSTALLATION DATE: 8-30-89

DRY HOLE



BOREHOLE DIAMETER: 8 in INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2 SACK
AMOUNT OF WATER USED: 25 gals
OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.7.1

GEOLOGIST/ENGINEER: E. Trollinger

FERNALD RI/FS

57115/5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fmpc RI/FS
PROJECT NO. 1602
BORING NO. 1417
PIEZOMETER NO. 1417

FIELD ENG./GEO. E. Trollinger DATE 8-30-89
CHECKED BY RJL DATE 9/1/89
DATE OF INSTALLATION 8-30-89

BOREHOLE DRILLING

DRILLING METHOD Auger Hollow Stem
DRILLING FLUID (S) USED:
FLUID N/A FROM — TO —
FLUID N/A FROM — TO —

TYPE OF BIT Auger
CASING SIZE (S) USED:
SIZE N/A FROM — TO —
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE ~~[illegible]~~ N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION CEMENT PLUG

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP: 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 20.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	20.0 FT.			
GWL AFTER INSTALLATION	—			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS DRY HOLE, PLUGGED WITH VOLCLAY AND ABANDONED.

409-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.23	PROJECT NAME: FEMP RI / FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 2-28-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92/1605	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth . Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	38081 1045 2-28-92	3 5 3	10	Loose olive brown (2.5Y, 4/4) CLAYEY SILT with organic matter, slightly moist	ML	N/A	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
1.5	38082 1050 2-28-92	3 5 7	11	Stiff light olive brown (2.5Y, 5/4) SILTY CLAY with trace organic matter, high plasticity, slightly moist	CL	1.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
3.0	38083 1055 2-28-92	7 9 10	15	Stiff light olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	2.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
4.5	38084 1100 2-28-92	10 11 11	18	Very stiff light olive brown (2.5Y, 5/4) SILTY CLAY with some light brownish gray (2.5Y, 6/2) mottling and some sand and gravel, low plasticity, slightly moist	CL	3.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
6.0	38085 1105 2-28-92	11 13 13	9	Very stiff light olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, ~~and~~ trace light brownish gray (2.5Y, 6/2) mottling and very dark grayish brown (10YR, 3/2) staining, low plasticity, moist (EM 2-28-92)	CL	2.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
7.5							

NOTES

Drilling Company: Pennsylvania Drilling

Driller: Dave Newman

Assistant Driller: Bob Johnson

Samples Collected per ASTM Standard Penetration Test

Colors Identified using Munsell Color Chart

000087

Hnu S/N: 1185 — 0 ppm

Bγ S/N: 50760 — 40 cpm

α S/N: 50768 — 0 cpm

} Background Levels

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 2-28-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92/1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 2 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	38086 1110 2-28-92	13 15 16	14	Stiff olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, low plasticity, moist	CL	2.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
9.0	38087 1120 2-28-92	15 17 21	18	Stiff olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	3.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
10.5	38088 1625 3-2-92	3 10 21	15	Very stiff light olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, some light gray (5Y, 6/1) and yellowish brown (10YR, 5/6) mottling; low plasticity, slightly moist	CL	3.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
12.0	38089 1634 3-2-92	6 13 25	15	Same as above	CL	3.25	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
13.5	38090 1653 3-2-92	1 5 7	10	Stiff gray (2.5Y, 5/0) SILTY CLAY with sand and gravel, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
15.0							

NOTES

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 607.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-2-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92 / 1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	38091 1701 3-2-92	5 5 11	16	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, trace dark olive brown (2.5Y, 3/3) staining, low plasticity, slightly moist	CL	3.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
16.5	38092 1715 3-2-92	5 8 12	16	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	2.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
18.0	38093 1724 3-2-92	7 13 15	18	Same as above	CL	2.25	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
19.5	38094 0844 3-3-92	17 18 21	15	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, low plasticity, ~~moist~~ K.M. 3-3-92 slightly moist	CL	3.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
21.0	38095 0854 3-3-92	10 13 17	12	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
22.5							

NOTES

See p. 1

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-3-92
ELEVATION:	GWL: Depth 7.90 Date/Time 3-9-92/1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 4 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	38096 0910 3-3-92	6 9 15	12	Stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, medium plasticity, moist	CL	1.75	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
24.0	38097 0953 3-3-92	9 13 20	14	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, low plasticity, moist	CL	3.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
25.5	38098 1005 3-3-92	13 16 22	14	Same as above	CL	3.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
27.0	38099 1027 3-3-92	16 25 27	14	Same as above	CL	3.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
28.5	38100 1315 3-3-92	5 7 13	13	Very stiff gray (5Y, 5/1) SILTY CLAY with sand and gravel, medium plasticity, moist	CL	3.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
30.0							

NOTES

see p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-3-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92/1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	38101 1335 3-3-92	7 11 16	14	Hard gray (5Y,5/1) SILTY CLAY with sand and gravel, low plasticity, moist	CL	4.0	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
31.5	38102 1347 3-3-92	10 10 13	16	Stiff gray (5Y,5/1) SILTY CLAY with sand and gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
33.0	38103 1410 3-3-92	7 13 21	16	Dense ~~very fine~~ K.M. 3-3-92 gray (5Y,5/1) ~~SILTY CLAY~~ poorly graded very fine K.M. 3-3-92 sand, slightly moist	SC	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm Aquifer met Base of till at 34.5 ft
34.5	38104 1430 3-3-92	12 22 25	16	Dense yellowish brown (10YR,5/6) ~~met~~ poorly graded medium sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
36.0				No sample collected Samples will be collected at 5.0 ft intervals.			Hnu = 0 ppm Br = 40 cpm α = 0 cpm
37.5							

NOTES

See p. 1

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-3-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92/1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5							
				No Samples collected			
40.0							
	38105 1500 3-3-92	18 36 48	14	Very dense light yellowish brown (2.5Y, 6/4) ~~sandy~~ poorly graded medium sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
41.5							
				Samples will be collected at 5 ft. intervals			
45.0							
	38106 1637 3-3-92	23 50	13	Very dense light yellowish brown (2.5Y, 6/4) SANDY GRAVEL, dry	GW	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
46.5							
50.0							
	38107 1733 3-3-92	5 11 26	17	Dense light yellowish brown (2.5Y, 6/4) well graded SAND with a little gravel, dry	SW	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
51.5							
52.5							

NOTES

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-4-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92/1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth · Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 7 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0	38108 0920 3-4-92	20 50/4	14	Very dense light yellowish brown (2.5Y, 6/4) poorly graded medium SAND, dry	SP	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
56.5							
60	38109 0940 3-4-92	12 25 48	18	Very dense light yellowish brown (2.5Y, 6/4) GRAVELLY SAND, dry	SW	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
61.5							
65.0	38110 1110 3-4-92	33 50/4	17	Very dense light yellowish brown (2.5Y, 6/4) GRAVELLY SAND, dry	SW	N/A	Hnu = 0 ppm Br = 40 cpm α = 0 cpm
66.5							
67.5							

NOTES

see p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-4-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92 / 1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth · Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 8 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67.5							
70.0							
71.5	38111 1445 3-4-92	45 50/4	10	Very dense light yellowish brown (2.5Y, 6/4) SANDY GRAVEL, dry	GW	N/A	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
75.0							
76.5	38112 1545 3-4-92	3 5 12	12	Medium dense light brownish gray (10YR, 6/2) well graded SAND with trace gravel	SW	N/A	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
				▽ W.L. = 76.90 Ft.			The water level was Measured 3-9-92 at 1615.
80.0	38113 1647 3-4-92	16 23 23	15	Dense grayish brown (2.5Y, 5/2) well graded sand with a little fine gravel, wet	SW	N/A	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
82.5							

NOTES

See p. 1

W.L. = water level

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2417	COORDINATES:	DATE: 3-5-92
ELEVATION:	GWL: Depth 76.90 Date/Time 3-9-92 1615	DATE STARTED: 2-28-92
ENGINEER/GEOLOGIST: Ken Marion	Depth . Date/Time	DATE COMPLETED: 3-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 9 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82.5							
85.0	38114 0840 3-5-92	3 5 5	13	Loose grayish brown (2.5Y, 5/2) GRAVELLY SAND, wet	SW	N/A	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
86.5							
90.0	38115 0930 3-5-92	3 3 5	13	Loose grayish brown (2.5Y, 5/2) Coarse SAND, wet	SW	N/A	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
91.5				Bottom of Bore Hole Drilled to a depth of 90.0 ft. Split spoon sampled to a depth of 91.5 ft.			

NOTES

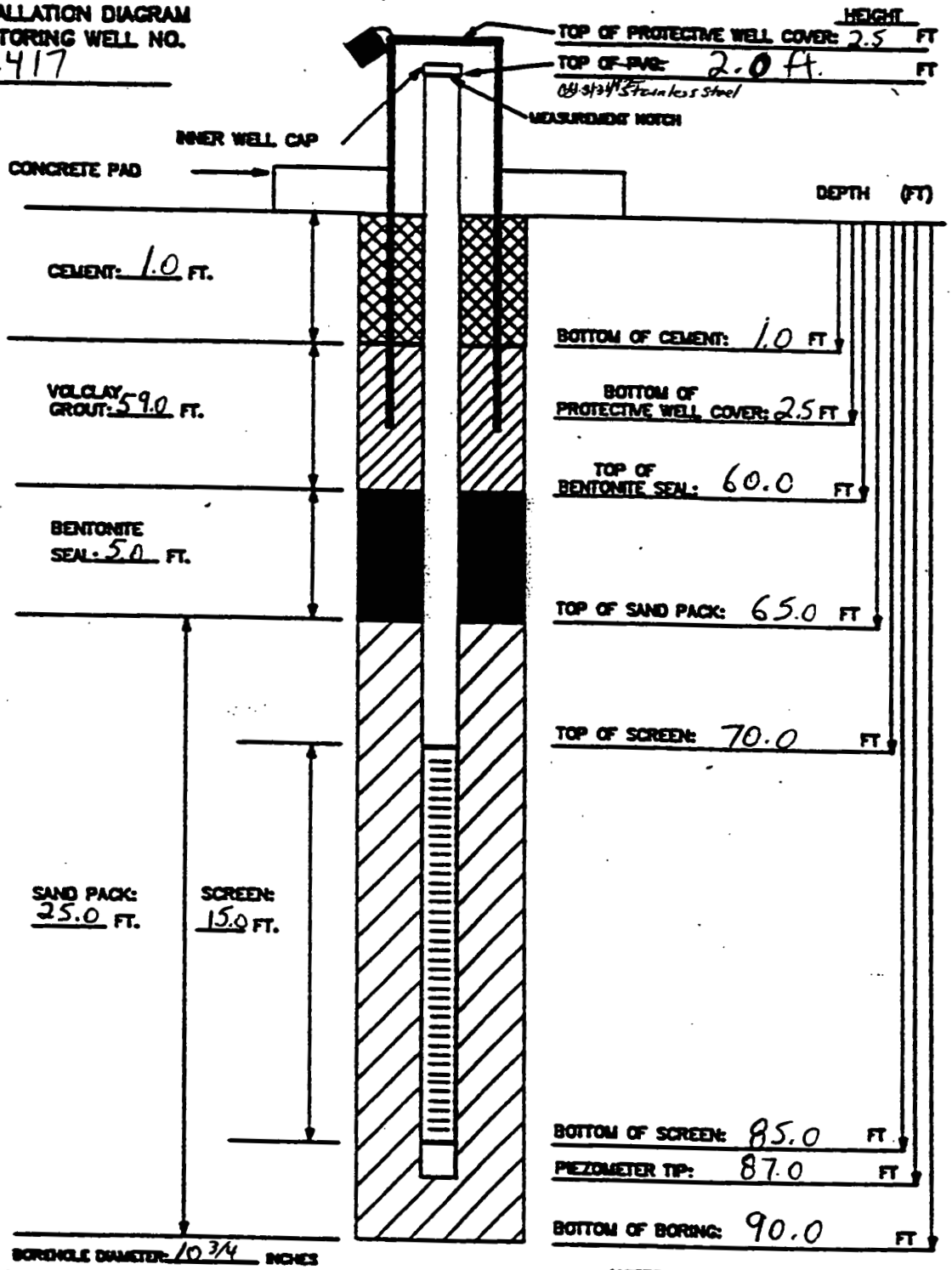
See p. 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 2417

Stickups

INSTALLATION DATE: 3-9-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 Sand, 16 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 11
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 800 gallons
OTHER:

K.M.
3-11-92

NOTES:
1) RISER PIPE IS 6-INCH SCHEDULE-40-PVC PIPE, FLUSH-THREADED JOINTS. 4 in. stainless steel
2) SCREEN IS 6-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS. 4 in. I.D. .010 in. slotted
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 76.90 / 3-9-92

TASK: 602.3.23

GEOLOGIST/ENGINEER: Ken Marion

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 3-10-92
PROJECT NO. 602.3.23 CHECKED BY _____ DATE _____
BORING NO. 2417
PIEZOMETER NO. N/A DATE OF INSTALLATION 3-9-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO 90.0
FLUID N/A FROM N/A TO N/A

TYPE OF BIT 10 inch drill bit (churn bit)
CASING SIZE (S) USED:
SIZE 10 3/4 in FROM 0.0 TO 90.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Cable Tool
DIAMETER OF PERFORATED SECTION 4.0 in. I.D
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in.
TOTAL PERFORATED AREA 15.0 ft.

RISER PIPE MATERIAL 316 Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 67 ft.
JOINING METHOD flush-Joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Steel well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 60.0	TOP	BOTTOM
BENTONITE	TOP 60.0	BOTTOM 65.0	TOP	BOTTOM
SAND	TOP 65.0	K.M. 3-10-92 BOTTOM ~~87.0~~ 90.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 70.0	BOTTOM 85.0	TOP	BOTTOM
PIEZOMETER TIP	87.0			
BOTTOM OF BOREHOLE	90.0			
GWL AFTER INSTALLATION	76.90			

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
RKS The temporary casing was removed during the installation of the well.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/3/92
ELEVATION:	GWL: Depth 76.60 Date/Time 11/11/92 1250	DATE STARTED 11/3/92
ENGINEER/GEOLOGIST Ken Geiger	Depth 73.70 Date/Time 12/4/92 8:15	DATE COMPLETED 12/4/92
DRILLING METHODS Cable Tool		PAGE 1 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	105000 1030 11/3/92	3 5 7	13	med ~~Stiff~~ Dense Olive Brown (2.5Y 4/4) Clayey Silt with some organic material, moist (CB 12/30/92)	ML	N/A	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
1.5	105001 1040 11/3/92	7 9 11	14	Very stiff Light Olive Brown (2.5Y, 5/4) Silty Clay with some organic matter, med plasticity moist	CL	2.5	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
3.0	105002 1045 11/3/92	6 8 12	7	med stiff, Light Olive Brown (2.5Y 5/4) Silty Clay with Trace of Gravel, low plasticity slightly moist	CL	1.0	Hnu = 0 ppm Bγ = 40-60 cpm α = 0 cpm
4.5	105003 1050 11/3/92	6 8 12	16	Stiff Light Olive Brown (2.5Y 5/4) Silt Clay with some Light Brownish gray (2.5Y, 6/2) mottling with some Gravel Low Plasticity, Slightly moist	CL	1.5	Hnu = 0 ppm Bγ = 40-60 cpm α = 0 cpm
6.0	105004 1105 11/3/92	9 10 12	18	Very Stiff Light Olive Brown (2.5Y, 5/4) Silty Clay with Trace of Sand + Gravel Some light Brownish Gray (2.5Y, 6/2) mottling low Plasticity, Slightly moist	CL	2.0	Hnu = 0 ppm Bγ = 40 cpm α = 0 cpm
7.5							

NOTES
Drilling company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Jeff Bentley

Samples collected per ASTM standard Penetration Test. Colors Identified using Munsell Color Chart

Background Levels
Hnu = 0 ppm
Bγ = 40 cpm
α = 0 cpm

CB 2/10/93

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 502 54 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3017	COORDINATES:	DATE 11/3/92
ELEVATION:	GWL: Depth Scap / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Scap. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	105005 1350 11/3/92	12 13 12	18	Very Stiff Light Olive Brown (2.5Y 5/4) Silty Clay with Some Light Brownish gray (2.5Y, 6/2) mottling Low Plasticity Slightly moist	CL	2.5	HNu = 0 ppm Bγ = 40 cpm α = 0 cpm
9.0	105006 1400 11/3/92	14 18 21	18	Very Stiff Olive Brown (2.5Y 4/4) Silty Clay with Some Sand and gravel Low Plasticity, Slightly moist	CL	3.0	HNu = 0 ppm Bγ = 40 cpm α = 0 cpm
10.5	105007 1405 11/3/92	21 24 28	18	Very Stiff Olive Brown (2.5Y 4/4) Silty Clay with Some Sand and Gravel Low Plasticity, Slightly moist	CL	3.0	HNu = 0 ppm Bγ = 40-60 cpm α = 0 cpm
12.0	105008 1400 11/6/92	6 21 35	12	Very Stiff Gray (2.5Y 5/1) Silty Clay with Some Sand + Gravel, medium plasticity Slightly moist	CL	3.0	HNu = .2 ppm Bγ = 40 cpm α = 0 cpm
13.5	105009 1420 11/6/92	10 8 21	9	Very Stiff Gray (2.5Y 5/1) Silty Clay with Some Sand + Gravel Med Plasticity Slightly moist	CL	3.0	HNu = .2 ppm Bγ = 40 cpm α = 0 cpm
15.0							

NOTES

See Page 1

Background Levels 11/3/92
HNu = 0 ppm
Bγ = 40 cpm
α = 0 cpm

Background Levels 11/6/92
HNu = .2 ppm
Bγ = 40 cpm
α = 0 cpm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth Seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 3 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	105010 0950 11/6/92	6 8 12	12	Stiff Gray (2.5Y 5/1) ~~with~~ AG 11/6/92 Silty Clay with Some Sand + Gravel medium plasticity slightly moist	CL	1.0	Hva = .2ppm Bg = 40cpm α = 0cpm
16.5	105011 1005 11/6/92	7 9 12	13	Stiff Gray (2.5Y, 5/1) Silty Clay with Some Sand + Gravel Med plasticity, slightly moist	CL	1.5	Hva = .2 ppm Bg = 40 cpm α = 0 cpm
18.0	105012 1025 11/6/92	12 14 15	11	Stiff Gray (2.5Y, 5/1) Silty Clay with Some Sand + Gravel Medium Plasticity, slightly moist	CL	1.5	Hva = .2ppm Bg = 40cpm α = 0 cpm
19.5	105013 1400 11/6/92	8 12 15	12	Very Stiff Gray (2.5Y, 5/1) Silty Clay ~~with~~ AG 11/6/92 with Some Sand and Gravel medium plasticity, slightly moist	CL	2.0	Hva = .2ppm Bg = 40 cpm α = 0 cpm
21.0 22.5	105014 1415 11/6/92	8 8 12	1	Same As Above	CL	2.0	Hva = .2ppm Bg = 40cpm α = 0cpm

NOTES
See Page 1

Background Levels
Hva = .2ppm
Bg = 40cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth see p. 1 / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST Ken Geiger	Depth see p. 1 / Date/Time	DATE COMPLETED: 12/4/93
DRILLING METHODS Cable Tool		PAGE 4 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	105015 1430 11/6/92	8 10 11	9	medium Stiff Gray (2.5Y, 5/1) Silty Clay with Sand + Gravel medium plasticity, moist	CL	0.5	HNU = .2 ppm BZ = 40 cpm α = 0 cpm
24.0	105016 1440 11/6/92	8 11 12	11	Stiff Gray (2.5Y, 5/1) Silty clay with Sand + Gravel medium plasticity, moist	CL	1.0	HNU = .2 ppm BZ = 40 cpm α = 0 cpm
25.5	105017 1545 11/6/92	6 8 12	12	Very Stiff Gray (2.5Y, 5/1) Silty Clay with Sand + Gravel medium plasticity, moist	CL	2.5	HNU = .2 ppm BZ = 40 cpm α = 0 cpm
27.0	105018 1605 11/6/92	8 10 12	14	Stiff Gray (2.5Y, 5/1) Silty clay with Sand + Gravel medium Plasticity slightly moist	CL	2.0	HNU = .2 ppm BZ = 40 cpm α = 0 cpm
28.5	105019 1700 11/6/92	10 12 9	15	Very Stiff Gray (2.5Y, 5/1) Silty Clay with Sand and Gravel medium plasticity slightly moist	CL	2.5	HNU = .2 ppm BZ = 40 cpm α = 0 cpm
30.0							

NOTES

See Page 1

Background Levels
HNU = .2 ppm
BZ = 40 cpm
α = 0 cpm

000101

S:00003

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VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/9/92
ELEVATION:	GWL: Depth Seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	105020	8		~~RG~~ 11/9/92 Very Stiff Gray (2.5Y 5/1) Silty clay with Sand and Gravel Low plasticity Slightly moist	CL	2.25	HNU = .2 ppm Bg = 40 cpm α = 0 cpm
	0940	10	17				
31.5	11/9/92	13					
	105021	12		medium Stiff Gray (2.5Y, 5/1) Silty Clay with Sand and Gravel medium plasticity slightly moist	CL	1.0	HNU = .2 ppm Bg = 40-60 cpm α = 0 cpm
	0955	17	13				
33.0	11/9/92	19					
	105022 RG 11/9/92	19		Very Dense Dark Yellow Brown (10YR 4/4) Poorly Graded Very fine Sand, with a Trace of Gravel, Dry	SP ~~SC~~ CJB 12/30/92	N/A	HNU = .2 ppm Bg = 40 cpm α = 0 cpm
	1025	28	12				
34.5	11/9/92	42					
	105023	19		Very Dense Yellowish Brown (10YR 5/6) Poorly Graded medium Sand with Trace of Gravel, Dry	SP	N/A	HNU = .2 ppm Bg = 40-60 cpm α = 0 cpm
	1045	25	13				
36.0	11/9/92	45					
37.5				No Sample Collected, Samples To Be Collected AT 5.0 ft intervals.			

NOTES

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Background Levels
HNU = .2 ppm
Bg = 40-60 cpm
α = 0 cpm

3/10/93

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602 04 27	PROJECT NAME. RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/9/92
ELEVATION:	GWL: Depth Seep. / Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST. Ken Geiger	Depth Seep. / Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 6 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
39.5				No Sample Collected			
40.0	105024 1105 11/9/92	35 38 49	12	Very Dense Yellowish Brown (10YR 5/4) Poorly Graded medium Sand with Some Gravel, Dry	SP	N/A	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
41.5							
45.0	105025 1510 11/9/92	32 50/2	6	Very Dense Yellowish Brown (10YR, 5/4) Poorly Graded medium Sand with Some Gravel, Dry	SP	N/A	HNU = .2 ppm Bγ = 40-60 cpm α = 0 cpm
46.5							
50.0	105026 1600 11/9/92	17 25 32	14	Very Dense Yellowish Brown (10YR, 5/4) Well Graded medium Sand with Some Gravel, Dry	SW	N/A	HNU = .2 ppm Bγ = 40-60 cpm α = 0 cpm
51.5							
52.5							

NOTES See page 1

Background Levels
HNU = .2 ppm
Bγ = 40-60 cpm
α = 0 cpm

2/10/93

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5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/9/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Gasper	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 7 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0	105027 1700 11/9/92	Hole 11/9/92 30 28 41	13	Very Dense Yellowish Brown (10YR, 5/4) Well Graded Gravelly Sand Dry	SW	N/A	HNU = .2ppm Bγ = 40cpm α = 0cpm
56.5							
60.0	105028 0900 11/10/92	10 17 32	7	Dense Yellowish Brown (10YR, 5/4) Well Graded Sand with Some Gravel, Dry	SW	N/A	HNU = .2ppm Bγ = 60cpm α = 0cpm
61.5							
65.0	105030 1400 11/10/92	24 32 50	10	Very Dense Yellowish Brown (10YR, 5/4) Well Graded Sand with Some Gravel, Dry	SW	N/A	HNU = .2ppm Bγ = 40-60cpm α = 0cpm
66.5							
67.5							

NOTES

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Back Ground Levels 11/9/92
HNU = .2ppm
Bγ = 40-60cpm
α = 0cpm

Background Levels 11/10/92
HNU = .2ppm
Bγ = 60cpm
α = 0cpm

402-1-86

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 P4.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/10/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 8 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0	105031 1500 11/10/92	32 39 50	16	Very Dense Yellowish Brown (10YR 5/4) well Graded Gravelly Sand, Dry	SW	N/A	HNU = .2 ppm Bγ = 40-60 cpm α = 0 cpm
71.5							
75.0	105032 1645 11/10/92	10 17 42	16	Very Dense Light Brownish Gray (10YR 6/2) Poorly Graded Sand with some Gravel, wet	SP	N/A	HNU = .2 ppm Bγ = 40 cpm α = 0 cpm
76.5				▽ Water Level 76.0 ft			
80.0	105033 0935 11/11/92	17 25 32	6	Very Dense Grayish Brown (2.5Y 5/2) well Graded medium Sand with some Gravel, wet	SW	N/A	HNU = .1 ppm Bγ = 40 cpm α = 0 cpm
81.5							
82.5							

NOTES

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Background Levels 11/10/92
HNU = .2 ppm
Bγ = 60 cpm
α = 0 cpm

Background Levels 11/11/92
HNU = .1 ppm
Bγ = 40-60 cpm
α = 0 cpm

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME. RCRA Phase 2	
BORING NUMBER: 3417	COORDINATES:	DATE 11/11/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 9 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82.5							
85.0	105034 1340 11/11/92	17 24 33	13	Very Dense Dark Grayish Brown (2.5Y, 4/2) Poorly Graded Gravelly Sand, wet	SP	N/A	HNU = .1 ppm βγ = 40 cpm α = 0 cpm
86.5							
90.0	105036 0930 11/12/92	5 17 32	18	Dense Gray (2.5Y 5/1) Poorly Graded coarse sand with some Gravel, wet	SP	N/A	HNU = .2 ppm βγ = 40 cpm α = 0 cpm
91.5							
95.0	105037 1445 11/13/92	12 19 32	12	Dense Gray (2.5Y, 5/1) Poorly Graded Gravelly Sand wet	SP	N/A	HNU = .2 ppm βγ = 40 cpm α = 0 cpm
96.5							
97.5							

NOTES

See Page 1

Background Levels 11/11/92
HNU = .1 ppm
βγ = 40-60 cpm
α = 0 cpm

Background Levels 11/12/92
HNU = .2 ppm
βγ = 40-60 cpm
α = 0 cpm

3/10/93

402-22-86

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/13/92
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth See p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 10 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97.5							
100.0	105038 1345 11/13/92	16 24 35	18	Very Dense Gray (2.5Y 5/1) Poorly Graded Gravelly Sand wet	SP	N/A	HNU = .2ppm Bγ = 40 cpm α = 0 cpm
101.5							
105.0	105039 1365 11/13/92	32 42 45	13	Very Dense Gray (2.5Y 5/1) Poorly Graded Coarse Gravelly Sand wet	SP	N/A	HNU = .2ppm Bγ = 40 cpm α = 0 cpm
106.5							
110.0	105041 1415 11/16/92	12 15 17	12	Dense Grayish Brown (2.5Y 5/2) well graded medium sand with some Gravel, wet	SW	N/A	HNU = 0ppm Bγ = 40 cpm α = 0 cpm
111.5							
112.5							

NOTES

See Page 1

Background Levels
HNU = .2ppm
Bγ = 40-60 cpm
α = 0 cpm

Background Levels
HNU = 0ppm
Bγ = 40 cpm
α = 0 cpm

3/10/93

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 402.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE 11/6/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 11 OF 16

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112.5	~~105641~~ 11/6/92						
115.0	105642 1545 11/6/92	25 37 45	18	Very Dense, Gray (2.5Y 5/1) Poorly Graded Sand with Some Gravel, WET	SP	N/A	HNu = 0 ppm βγ = 40 cpm α = 0 cpm
116.5							
120.0	105643 1540 11/6/92	9 12 14	18	Medium Dense Gray (2.5Y 5/1) well Graded Sand with Some Gravel WET	SW	N/A	HNu = 0 ppm βγ = 40-60 cpm α = 0 cpm
121.5							
125.0	105644 1410 11/17/92	12 15 19	18	Dense Dark Grayish Brown (2.5Y 4/2) well Graded medium Sand with Some Gravel WET	SW	N/A	HNu = 0 ppm βγ = 40 cpm α = 0 cpm
126.5							
127.5							

NOTES
See Page 1

Background Levels
HNu = 0 ppm
βγ = 40 cpm
α = 0 cpm

Background Levels
HNu = 0 ppm 11/6/1992
βγ = 40 cpm
α = 0 cpm

Date 12/10/92

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04 27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3417	COORDINATES:	DATE: 11/17/92
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth See p. 1 Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS: Cable Tool		PAGE 12 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
127.5							
130.0	105045 1435 11/17/92	9 14 18	15	Dense Dark Grayish Brown (2.5Y 4/2) well Graded medium Sand with Trace of Gravel, wet	SW	N/A	HNU = 0 ppm BY = 40 cpm α = 0 cpm
131.5							
135.0	105046 1600 11/17/92	12 16 21	16	Dense Dark Grayish Brown (2.5Y 4/2) Poorly Graded medium sand with some Gravel, wet	SP	N/A	HNU = 0 ppm BY = 40 cpm α = 0 cpm
136.5							
138.0	105045 1445 11/18/92	8 13 16	16	Medium Dense Dark Grayish Brown (2.5Y 4/2) well Graded medium sand with some Gravel, wet	SW	N/A	HNU = 0 ppm BY = 40 cpm α = 0 cpm
139.5	105049 1705 11/18/92	6 9 12	12	Medium Dense Grayish Brown (2.5Y 5/2) well Graded medium sand with a Trace of Gravel wet	SW	N/A	HNU = 0 ppm BY = 40 cpm α = 0 cpm
141.0	105050 915 11/19/92	32 50 50/5	18	Very Dense Grayish Brown (2.5Y 5/2) well Graded medium sand with a Trace of Gravel wet	SW	N/A	HNU = 0 ppm BY = 40 cpm α = 0 cpm
142.5							

NOTES:

See Page 1

Background Levels 11/17/92
HNU = 0 ppm
BY = 40 cpm
α = 0 cpm

Background Levels 11/18/92
HNU = 0 ppm
BY = 40 cpm
α = 0 cpm

Background Levels 11/19/92
HNU = 0 ppm
BY = 40 cpm
α = 0 cpm

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402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.24.27	PROJECT NAME: RCRA Phase 2	
BORING NUMBER: 3417	COORDINATES:	DATE 11/19/92
ELEVATION:	GWL: Depth Seep. Date/Time	DATE STARTED: 11/3/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Seep. Date/Time	DATE COMPLETED: 12/4/92
DRILLING METHODS:		PAGE 13 OF 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
142.5	105051 0940 11/19/92	9 13 17	18	Medium Dense Grayish Brown (2.5Y, 5/2) well Graded Medium Sand with a Trace of Gravel, wet	SW	N/A	HNU = 0 ppm Br = 40 cpm α = 0 cpm
144.0	105052 1010 11/19/92	13 21 32	18	Very Dense Grayish Brown (2.5Y, 5/2) Poorly Graded Medium Sand with Some Gravel, wet	SP	N/A	HNU = 0 ppm Br = 40 cpm α = 0 cpm
145.5	105053 1110 11/19/92	14 19	9	Very Soft Dark Greenish Gray (5GY, 4/1) Silty Clay with Sand and Gravel Medium Plasticity, moist	CL	.25	HNU = 0 ppm Br = 40 cpm α = 0 cpm
146.5				Pushed Shelby Tube - No Recovery			
147.5	105055 1110 11/20/92	Shelby Tube	16	Very Soft Dark Greenish Gray (5GY, 4/1) Silty Clay with Sand and Gravel Medium Plasticity, moist	CL	.25	HNU = 0 ppm Br = 40 cpm α = 0 cpm
149.5				Bottom of Sampling at 148.5 ft Bottom of Boring at 149.0 ft			

NOTES

See Page 2

Background levels 11/19/92
HNU = 0 ppm
Br = 40-60 cpm
α = 0 cpm

Background levels 11/20/92
HNU = 0 ppm
Br = 40 cpm
α = 0 cpm

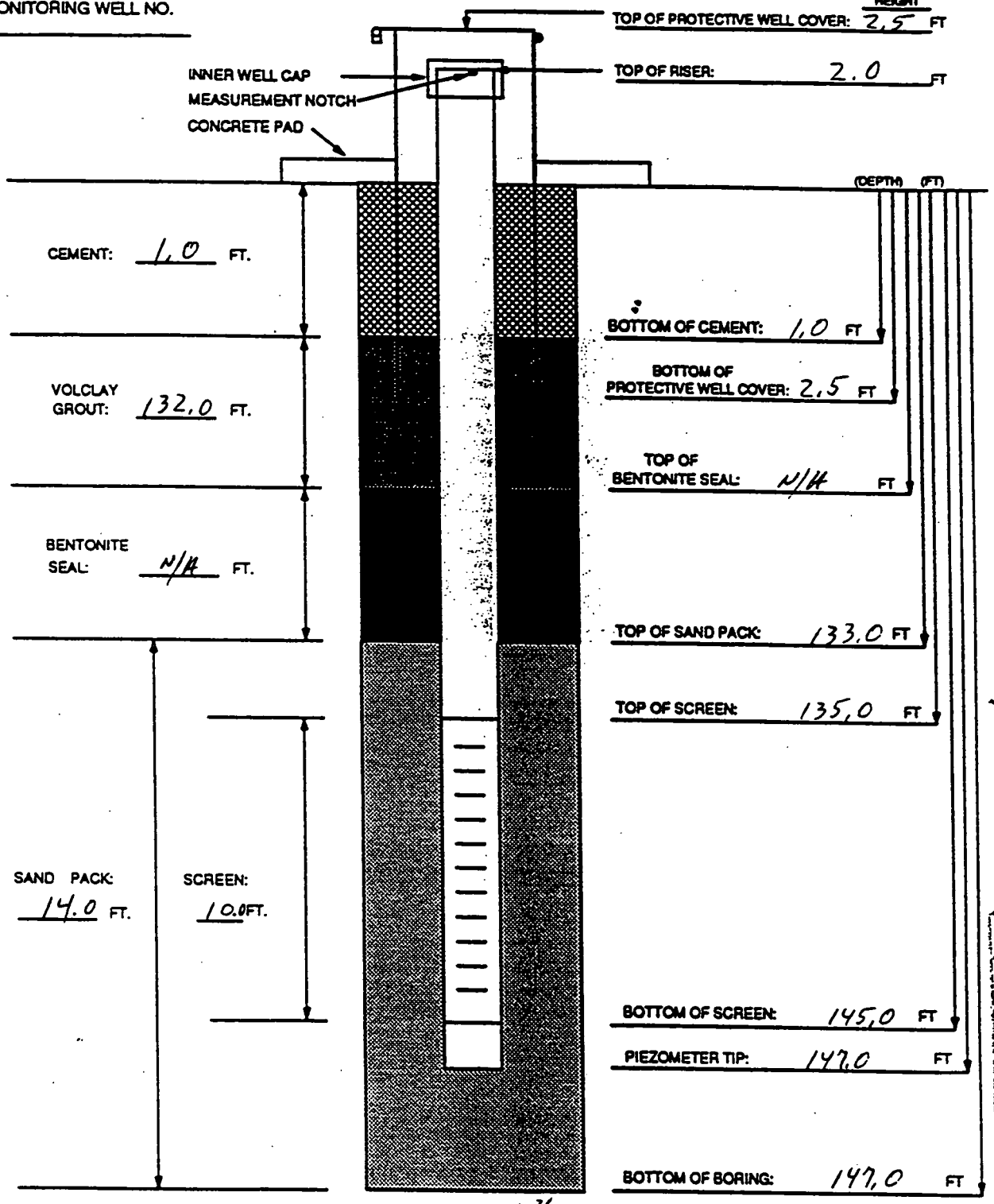
* Sieve analysis sample # 105054 collected from 135.5 to 145.5 ft

2/10/93

402-11-A

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. _____

INSTALLATION DATE: 12/4/92



MATERIALS USED

SAND TYPE AND QUANTITY: 480 Sand / 17-50lb Bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 32 - 50lb Bags
AMOUNT OF CEMENT: 1.5 Bags
AMOUNT OF WATER USED: 889 Gallons
OTHER: 24 Drums Soil ; 20 Drums Decon water
TASK: 602 04 27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 76.60 FT / 11/11/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: KEN GEIGER

ASI FORM 0157 REV. (0)

Length of Pipe Sections
20 ~~10 13 ft~~ 13-10 ft
10/30/92 1 - 5 ft
1 - 2 ft
1 - 12 ft Screen with 2' Sump

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Geiger DATE 12/4/92
PROJECT NO. 602.04.27 CHECKED BY C. Brien DATE 12/30/92
BORING NO. 3417
~~PIEZOMETER~~ monitoring well NO. 3417 DATE OF INSTALLATION 12/4/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 74.60 ft
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 147.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 13-10ft ~~10-13ft~~, 1-5ft, 1-2ft 1-10ft screen with 2' sump
JOINING METHOD Screw Type - flush joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT/SLURRY	TOP 1.0	BOTTOM 133.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 133.0	BOTTOM 147.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 135.0	BOTTOM 145.0	TOP	BOTTOM
PIEZOMETER TIP	147.0			
BOTTOM OF BOREHOLE	147.0			
GWL AFTER INSTALLATION	73.90			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

Field Geol. CB 2/10/9

409-1

Sieve Analysis 11/23/92 Page

Well # 3417

Retained Values

90% = .006

50% = .019

40% = .025

$\frac{.025}{.006} = 4.1$ 4.1 > 3 use a factor of 4

4X .019 = .076

.076 most closely fits the coarse grain sand and

.020 screen size

CB 2/10/93

MW-3417

5711

Customer Number _____

MATERIAL: C-15 Sieve SAMPLE NUMBER: _____

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 111.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	22.4	20.07 20.1	20.07 20.1	78.7
20	7.7	6.89 6.9	26.96 27.0	33.5
40	32.8	29.39 29.5	56.35 56.5	16.7
60	29.5	26.43 26.5	82.78 83.0	9.8
100	10.4	9.32 9.4	92.10 92.4	5.9
200	4.6	4.12 4.1	96.22 96.5	3.0
Pan	4.2	3.76 3.8	99.98 100.3	
	111.6			

$\frac{W_2 \times 100\%}{W_1}$ = R

$\frac{\text{Original - Duplicate}}{\text{Average}} \times 100\%$ = RPD

Analyzed by: Thomas O. McCullough

Checked by: [signature]

Date analyzed: 11/20/92

GRAIN SIZE 10% RETAINED 25 .001 inch

50% 19

90% 6

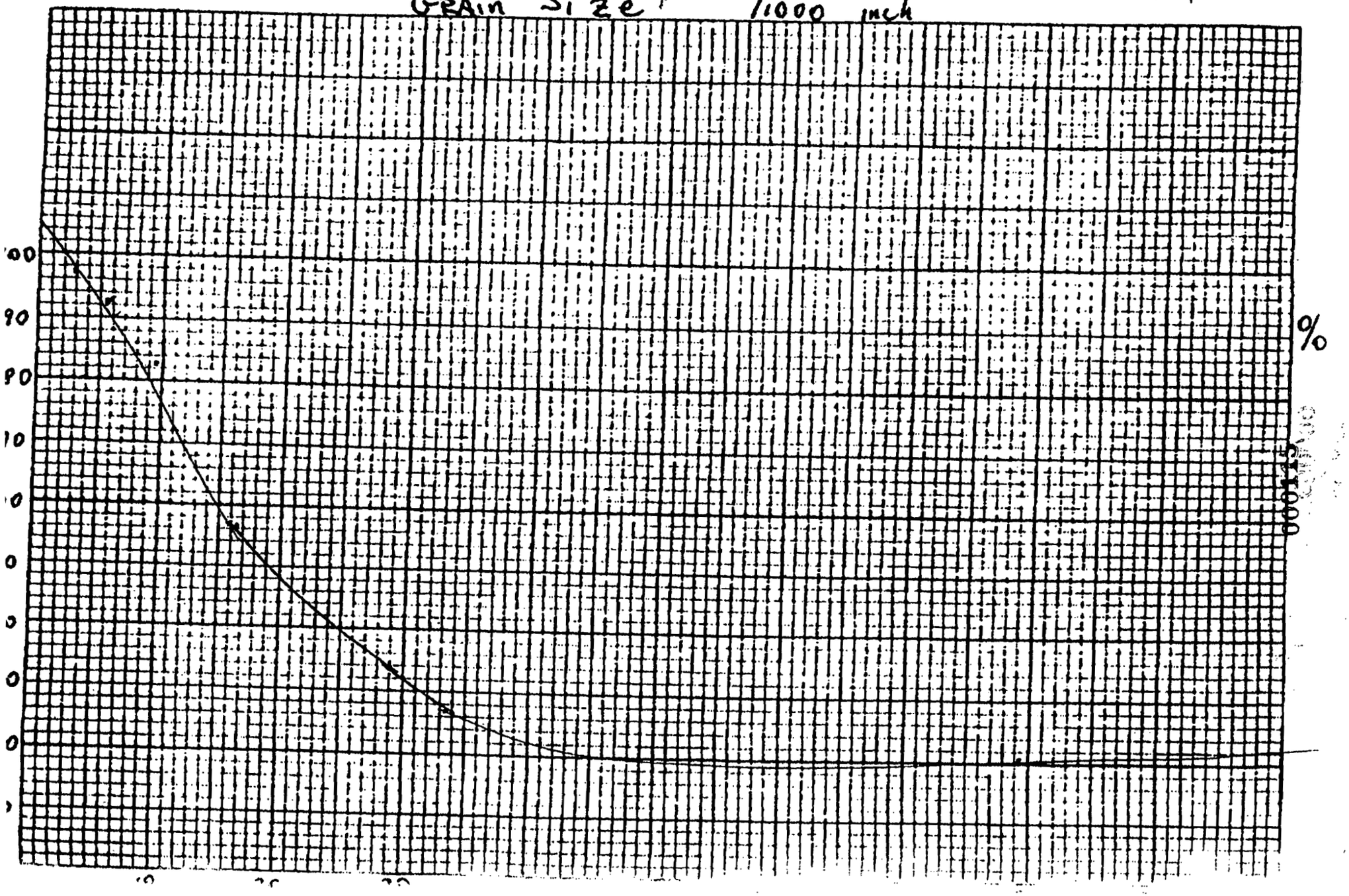
CB 2/10/92

10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

MW-3417

Grain Size: 1/1000 inch



FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1418 (REPLACEMENT 4/17)	COORDINATES:	DATE: 08-14-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-14-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 08-14-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 2

BD 8/21/8

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	SS285 1556 08-14	5	6	LOOSE, BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, DRY	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 100-160 CPM
	SS286 1556 08-14	3	4	STIFF, BROWN-GREY (10YR 4/2) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	
	SS287 1556 08-14	2	—	NO RECOVERY 1.0-1.5 FT	—	—	
2	SS288 1558 08-14	4	6	STIFF, BROWN-GREY (5Y 5/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 80-120 CPM
	SS289 1558 08-14	7	6	A.A.	CL	2.0	
	SS290 1558 08-14	10	—	NO RECOVERY 2.5-3.0 FT	—	—	
4	SS291 1600 08-14	8	6	MEDIUM DENSE, BROWN (10YR 5/4) WELL GRADED GRAVELLY SAND, DRY	SW	N/A	HNU = 0 PPM α = 0 CPM BG = 80-120 CPM
	SS292 1600 08-14	8	6	STIFF, GREY-BROWN (5Y 5/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	
	SS293 1600 08-14	10	—	NO RECOVERY 4.0-4.5 FT	—	—	
5	SS294 1604 08-14	4	6	STIFF, BROWN (10YR 4/6) SILTY CLAY TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 80-120 CPM
	SS295 1604 08-14	7	6	A.A.	CL	2.0	
6	SS296 1604 08-14	7	—	NO RECOVERY 5.5-6.0 FT.	—	—	
7	SS297 1620 08-14	5	6	STIFF, BROWN (10YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 80-120 CPM
	SS298 1620 08-14	4	—	~~A.A~~ NO RECOVERY 6.5-7.0 FT.	—	—	
	SS299 1620 08-14	2	—	NO RECOVERY 7.0-7.5 FT.	—	—	

NOTES: CONTRACTOR: PENN DRILL
RIG: MOBILE RIG B-53
DRILLER: J. SACCANI
ASSISTANT: W. FELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION T
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BG = 100-200 CPM
LEL/O2: LEL = 0 PPM
O2 = 20.6 %

A.A = AS ABOVE

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1418 (Replace of #1133)	COORDINATES:	DATE: 08-14-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-14-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 08-14-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 2

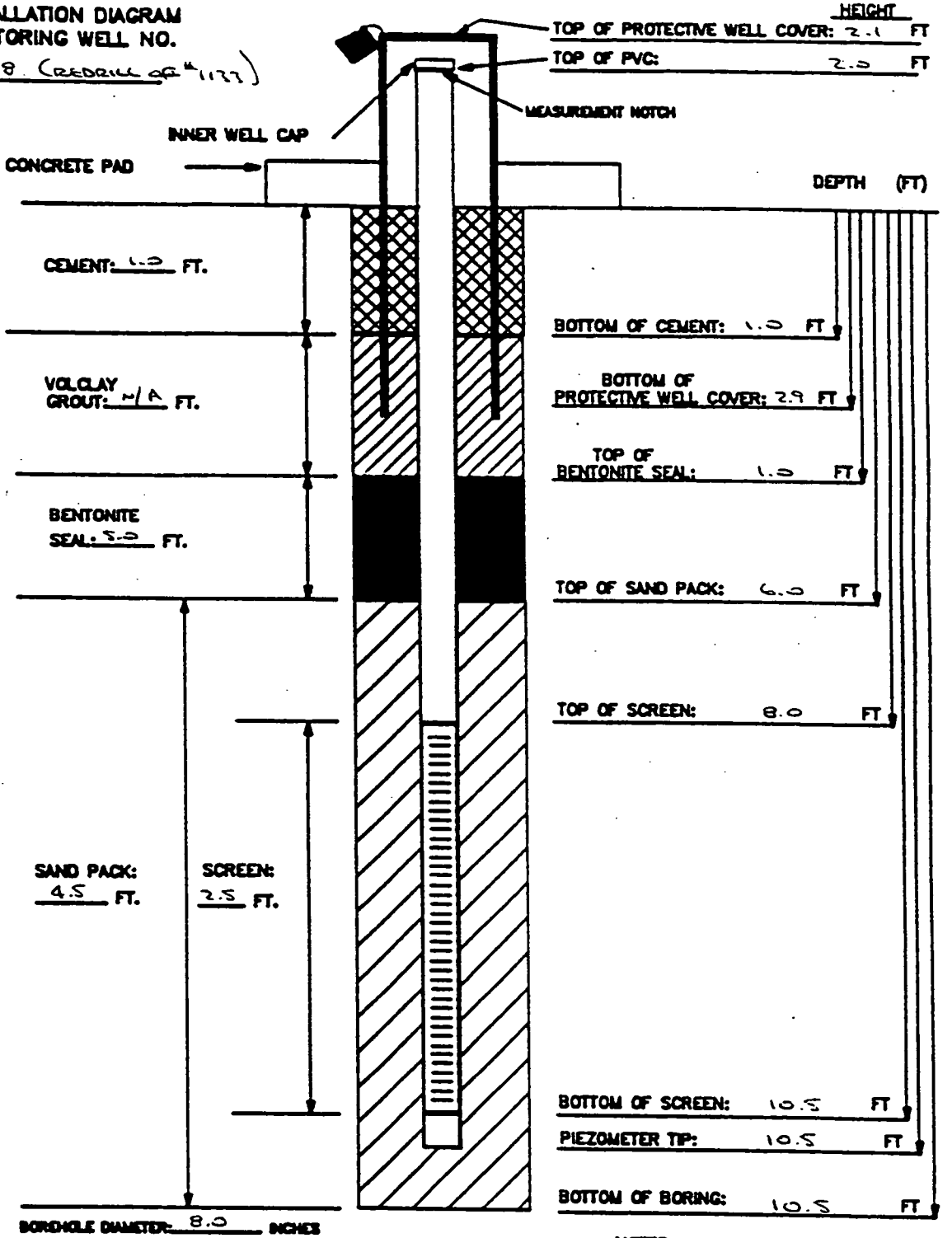
DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	SS300 1623 08-14	4	6	STIFF, BROWN (10YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 in) DAMP	CL	2.0	HNU = 0 PPM
	SS301 1623 08-14	5	6	STIFF, BROWN-GREEN (5Y 4/3) SILTY CLAY, TRACE GRAVEL (.25 in) MOIST	CL	2.0	α = 0 CPM BG: 80-120 CPM
9	SS302 1623 08-14	7	—	NO RECOVERY 8.5-9.0 FT.	—	—	
	SS303 1626 08-14	6		MEDIUM DENSE, GREEN-BROWN (5Y 4/3) WELL GRADED GRAVELLY SAND, WET 9.3	SW	N/A	HNU = 0 PPM
10	SS304 1626 08-14	8		STIFF, BROWN-GREEN (5Y 4/3) SILTY CLAY TRACE SAND, TRACE GRAVEL (.25 in) MOIST 9.8	CL	2.0	α = 0 CPM BG: 80-120 CPM
	SS305 1626 08-14	10	—	MEDIUM DENSE, GREEN-BROWN (5Y 4/3) WELL GRADED GRAVELLY SAND, WET NO RECOVERY 10.0 - 10.5 FT.	SW —	N/A —	
11	SS306			BOTTOM OF BORING @ 10.5 FT			HNU =
	SS307						α =
	SS308						BG =
12	SS309						HNU =
	SS310						α =
13	SS311						BG =
	SS312						HNU =
14	SS313						α =
	SS314						BG =

NOTES: P&A BORING #1133 w/: 1.5 - 50 LB SACKS VOLCLAY GROUT FROM 10.5 FT TO 0.5 FT
~~40 GAL WATER~~
.5 - 94 LB BAG CEMENT FROM 0.5 - 0.0 FT
40 GAL WATER

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1418 (REDRILL OF #1133)

INSTALLATION DATE: 08-14-89



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 10-20 : 3 - 80 LB BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 3 - 5 GAL BUCKETS
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: .5 - 94 LB BAG
AMOUNT OF WATER USED: 10 GAL
OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602 3.7.1

GEOLOGIST/ENGINEER: M. SLUSARSKI

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. H. SLUSARSKI DATE 08-14-89
PROJECT NO. 602 3.7.1 CHECKED BY RW DATE 8/17/89
BORING NO. 1418 (REDRILL OF #1133)
PIEZOMETER NO. 1418 DATE OF INSTALLATION 08-14-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT 8.0 in HOLLOW STEM AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM — TO —	SIZE 4.25 in ID FROM 0.0 FT TO 10.5 FT
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE PIEZOMETER	RISER PIPE MATERIAL PVC
DIAMETER OF PERFORATED SECTION 2.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 in I.D. 2.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 2.5, 10.0 FT.
AVERAGE SIZE OF PERFORATIONS .020	JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 2.5	JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT	OTHER PROTECTION HINGED LOCKING
PROTECTIVE PIPE O.D. 4 5/8 in	COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.9			
BOREHOLE FILL MATERIALS:				
~~GROUT~~/~~SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP	BOTTOM
SAND (10-20)	TOP 6.0	BOTTOM 10.5	TOP	BOTTOM
GRAVEL N/A	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 10.5	TOP	BOTTOM
PIEZOMETER TIP	10.5			
BOTTOM OF BOREHOLE	10.5			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1419	COORDINATES:	DATE: 12-15-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-15-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-15-89	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-inches	RECOVERY (inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5				SEE VISUAL CLASSIFICATION OF SOILS FOR BORING # 1307			Hnu = α = γB =
1.0							
1.5							
2.0							Hnu = α = γB =
2.5							
3.0							
3.5							Hnu = α = γB =
4.0							
4.5	55328 12-15-89 1401	8	6	STIFF (2.5Y 5/4) LIGHT OLIVE BROWN SILTY CLAY, MOIST. LOW PLASTICITY	CL	1.75	Hnu = 10 ppm - 18 ppm α = 0 γB = 80 cpm
5.0	55329 12-15-89 1401	7	6	SAA	CL	1.75	
5.5	55330 12-15-89 1401	5	6	STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. LOW PLASTICITY. MOIST.	CL	1.75	
6.0	55331 12-15-89 1418	5	0	NO RECOVERY	NA	NA	Hnu = NA α = NA γB = NA
6.5	55332 12-15 1418	5	0	NO RECOVERY	NA	NA	
7.0	55333 12-15 1418	8	0	NO RECOVERY	NA	NA	
7.5							

NOTES: Contractor : Pennsylvania Drilling
Driller : JIM SACLANI
Drillers Assistant: CHRIS COULTER
All Samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Chart

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 ppm
Gamma-Ray = 60-80

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1419	COORDINATES:	DATE: 12-15-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-15-89	
ENGINEER/GEOLOGIST: M.GARMAN	Depth Date/Time	DATE COMPLETED: 12-15-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	55334 12-15 1420	5	6	STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. LOW PLASTICITY MOIST.	CL	1.5	Hnu = 2-4 ppm α = 0 β = 80-100 cpm.
8.5	55335 12-15 1420	7	4	SAA	CL	1.5	
9.0	55336 12-15 1420	9	0	NO RECOVERY	NA	NA	
9.5	1423	12	6	STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. LOW PLASTICITY. MOIST.	CL	1.5	Hnu = 2 ppm α = 0 β = 80-100 cpm
10.0	1423	15	6	SAA	CL	1.5	
10.5	1423	11	6	SAA	CL	1.5	
11.0	1433	2	6	LOOSE (5Y, 4/1) DARK GRAY CLAYEY SILT. TRACE OF FINE SAND. MOIST	ML	NA	Hnu = 3 ppm α = 0 β = 80-100 cpm
11.5	1433	5	6	SAA	ML	NA	
12.0	1433	3	36	12-15-89 SAA	ML	NA	
12.5	1437	7	6	SAA	ML	NA	Hnu = 5 ppm α = 0 β = 80-100 cpm
13.0	1437	9	6	VERY STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. TRACE OF FINE SAND AND GRAVEL. LOW PLASTICITY MOIST	CL	2.5	
13.5	1437	10	6	SAA	CL	2.5	
14.0	1442	5	6	SAA	CL	2.5	Hnu = 9 ppm α = 0 β = 80-100 cpm
14.5	1442	9	6	SAA	CL	2.5	
15.0	1442	10	6	SAA	CL	2.5	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1419	COORDINATES:	DATE: 12-15-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-15-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-15-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 3	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	1449	7	0	NO RECOVERY	NA	NA	Hum = NA α = NA βB = NA
16.0	1449	12	0	NO RECOVERY	NA	NA	
16.5	1449	11	0	NO RECOVERY	NA	NA	
17.0	1454	5	6	STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. TRACE OF FINE GRAVEL. MOIST. HIGH PLASTICITY.	CL	1.5	Hum = 0 α = 0 βB = 100 cpm
17.5	1454	10	6	VERY STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. TRACE OF FINE GRAVEL. MEDIUM PLASTICITY. MOIST.	CL	2.0	
18.0	1454	12	6	SAA	CL	2.5	
18.5	1507	10	6	STIFF (5Y, 4/1) DARK GRAY SILTY CLAY. TRACE OF FINE GRAVEL. MEDIUM PLASTICITY. MOIST.	CL	1.0	Hum = ~~0~~ NA 1 ppm α = 0 βB = 80-100 cpm
19.0	1507	11	6	SAA	CL	2.0	
19.5	1507	9	6	SAA	CL	1.5	
20	1507	10	6	SAA	CL	1.5	Hum = 1 ppm α = 0 βB = 80-100 cpm
				DRY BORING - BACKFILLED NO INSTALLATION OF PIEZOMETER. PNA			

NOTES:

SEE PAGE 1

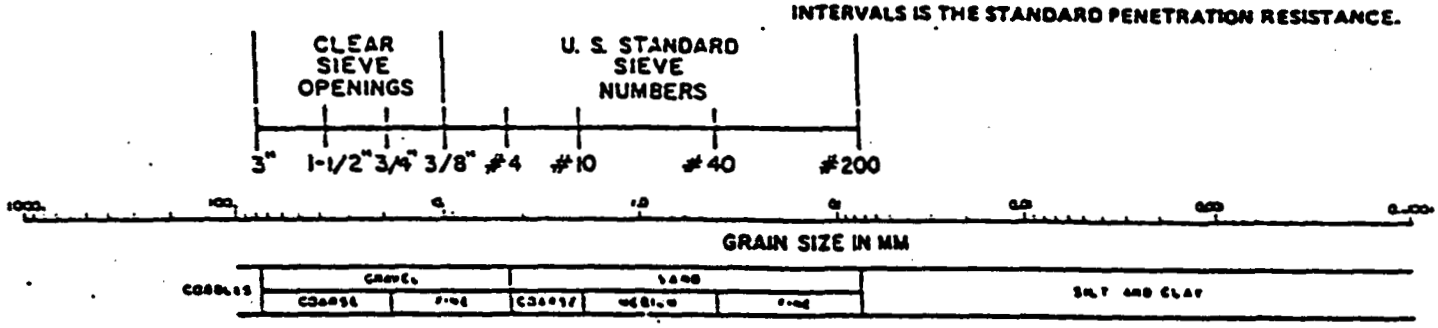
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
MEDIUM STIFF	0.50 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE (1)
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

(1) STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

FERNALD RI/FS

Date	2/6/90		
Initial	C.T.		
Check			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1420 Redrill (1191)	COORDINATES:	DATE: 1/18/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1/18/90	
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 1/20/90	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1-18	NA	6	Acid Brick & Cement	NA	NA	HNU = 0 ppm α = 0 cpm Bγ = 280-300 cpm
1	1-18		6	Cement	NA	NA	
	15517 1542 1-18	5	6	Stiff (2.5Y5/4) light olive brown silty clay, trace of sand & fine gravel, medium plasticity, very moist	CL	2.0	
2	15518 1542 1-18	7	6	Hard (5Y5/1) gray silty clay, trace of fine gravel, low plasticity, moist	CL	4.5	HNU = 0 ppm α = 0 cpm Bγ = 60-70 cpm
	15519 1542 1-18	8	0	NR	NA	NA	
3	15520 1542 1-18	13	0	NR	NA	NA	
	15521 1547 1-18	9	6	Very stiff (2.5Y4/4) olive brown silty clay, trace of sand & fine gravel, medium plasticity moist	CL	2.25	HNU = 0 ppm α = 0 cpm Bγ = 80-90 cpm
4	15522 1547 1-18	13	6	Very stiff (5Y5/1) gray silty clay, trace of fine gravel, low plasticity, moist	CL	3.0	
	15523 1547 1-18	18	6	Hard. SAA Hard (5Y3/2) dark olive gray clay, trace of silt, low plasticity moist	CL	>4.5	
5	15524 1553 1-18	13	6	Very stiff (5Y3/2) dark olive gray clay, trace of silt, low plasticity, moist	CL	3.0	HNU = 0 ppm α = 0 cpm Bγ = 80-90 cpm
	15525 1553 1-18	15	6	Stiff SAA	CL	1.75	
6	15526 1553 1-18	19	0	NR	NA	NA	
	15527 1608 1-18	3	6	Stiff (2.5Y4/2) dark gray & brown, clay trace of silt, medium plasticity moist	CL	1.0	HNU = 0 ppm α = 0 cpm Bγ = 90-100 cpm
7	15528 1608 1-18	4	6	SAA	CL	1.25	
	15529 1608 1-18	4	0	NR	NA	NA	

NOTES: CONTRACTOR: PENN DRILL
RIG: CME-45
DRILLER: Dave Newman
ASSISTANT: Bob Johnson
GeoAssistant: Ben Brier
H&S Officer
HNU # 1105 & 1104 on 1/19/90

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU 0 ppm
α 110-140 cpm
Bγ = 1400-1600 cpm w/o lead bricks
SAA = Same As Above
NR = No Recovery
LEL/O2: LEL = 0%
O2 = 20.6 %

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1420	COORDINATES:		DATE: 1/18/90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1/18/90
ENGINEER/GEOLOGIST: C. Grube	Depth	Date/Time	DATE COMPLETED: 1/20/90
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	15530 1612 1-18	6	6	Stiff (2.5Y 5/4) light olive brown clay, trace of silt, low plasticity, moist	CL	1.25	HNU = 0 ppm α = 0-10 cpm Bγ = 100-120 cpm
	15531 1612 1-18	8	6	Very St. Stiff (2.5Y 5/4) light olive brown silty clay low plasticity, moist	CL	3.0	
9	15532 1612 1-18	10	2	SAA	CL	2.75	
	15533 1618 1-18	15	3	SAA	CL	2.0	HNU = 0 ppm α = 0 cpm Bγ = 90-100 cpm
10	15534 1618 1-18	15	0	NR	NA	NA	
	15535 1618 1-18	15	0	NR	NA	NA	
11	15536 1000 1-19	4	6	Medium Dense (2.5Y 5/4) light olive brown clayey silt, moist	ML	NA	HNU = 0 ppm α = 0 cpm Bγ = 100-110 cpm
Top of water bearing zone at 11.0 ft	15537 1000 1-19	5	6	SAA plus very moist	ML	NA	
12	15538 1000 1-19	7	2	SAA plus very moist	ML	NA	
	51135 1007 1-19	7	6	Medium dense (5Y 5/4) olive clayey silt, some sand, wet	ML	NA	HNU = 0 ppm α = 0 cpm Bγ = 90-100 cpm
13	51136 1007 1-19	7	6	SAA	ML	NA	
	51137 1007 1-19	7	6	SAA	ML	NA	
14	51138 1015 1-19	13	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm Bγ = 100-110 cpm
	51139 1015 1-19	7	6	SAA Medium dense (10YR 4/6) dark yellowish brown silty sand trace of fine gravel, wet	ML SM	NA NA	
	51140 1015 1-19	13	6	SAA Medium dense (5Y 5/4) olive silty sand, trace of fine gravel, wet	SM SM	NA NA	

NOTES:

SAA = Same As Above
NR = No Recovery

000125

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1420	COORDINATES:	DATE: 1/19/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1/18/90	
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 1/20/90	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	51141 1033 1-19	7	6	Dense (5Y 4/3) olive clayey to sandy silt, wet	ML	NA	HNU = 0 ppm α = 0 cpm BG = 100-120 cpm
16	51142 1033 1-19	17	6	Dense (5Y 4/3) olive silt to silty sand, wet	ML to SM	NA	
	51143 1033 1-19	21	5	Dense (2.5Y 4/4) olive brown well graded sand. some fine to coarse gravel, wet	SW	NA	
17	51144 1040 1-19	17	6	Dense (2.5Y 4/4) olive brown, poorly graded sand trace of fine gravel, wet	SP	NA	HNU = 0 ppm α = 0 cpm BG = 90-100 cpm
	51145 1040 1-19	18	6	Dense (2.5Y 4/4) olive brown poorly to well graded sand, trace of fine to medium gravel, wet	SP to SW	NA	
18	51146 1040 1-19	19	6	Dense (2.5Y 4/4) olive brown well to poorly graded sand trace of fine gravel, wet	SW to SP	NA	
	51147 1050 1-19	7	6	Dense (2.5Y 4/4) olive brown poorly graded sand, trace of fine gravel, wet	SP	NA	HNU = 0 ppm α = 0 cpm BG = 80-95 cpm
19	51148 1050 1-19	9	6	SAA	SP	NA	
	51149 1050 1-19	18	6	SAA	SP	NA	
20	51150 1050 1-19	20	6	SAA	SP	NA	HNU = 0 ppm α = 0 cpm BG = 80-90 cpm
				Bottom of Boring + Sampling at 20.0 ft			

Bottom of Boring zone at 20.0 FT

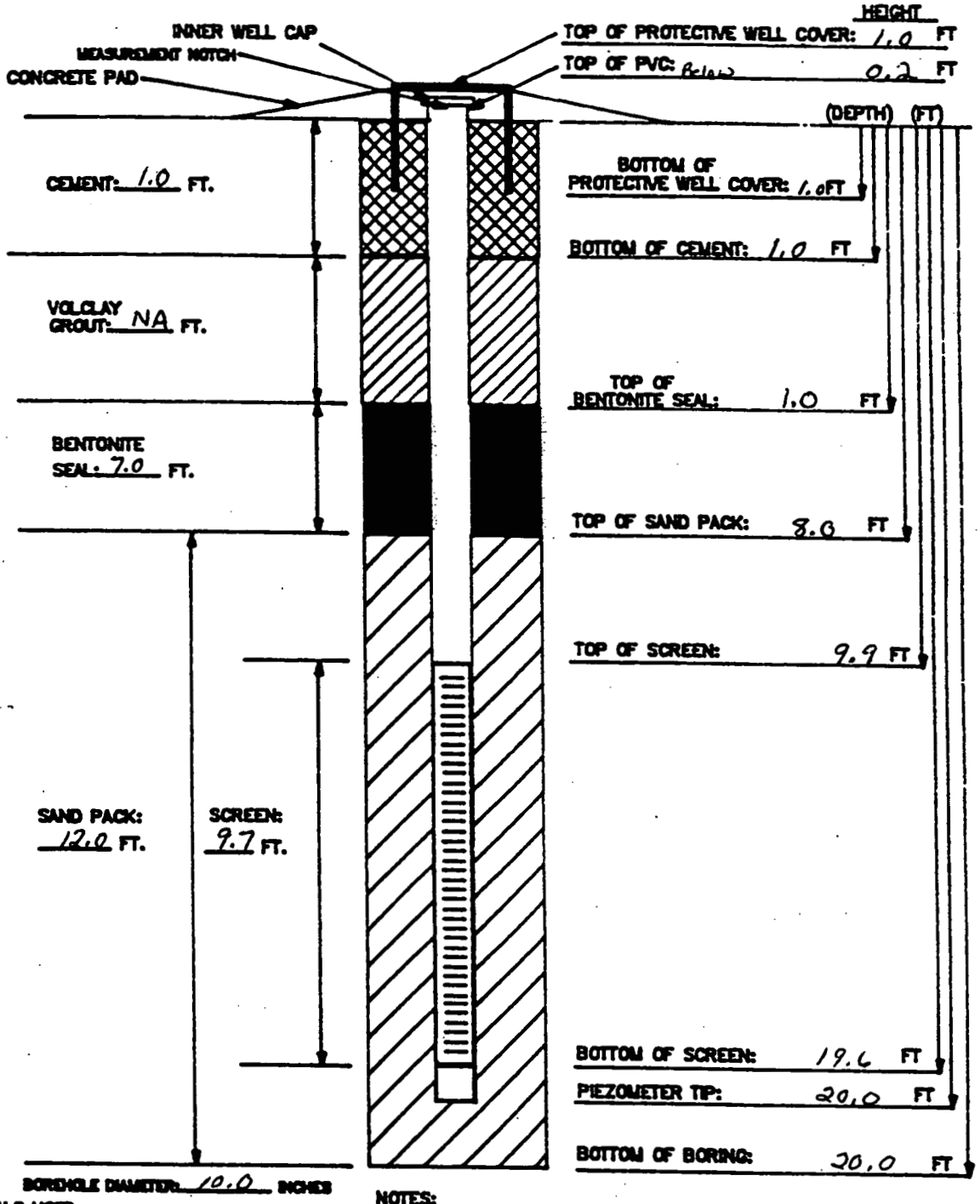
NOTES:

SAA = Same As Above
NR = No Recovery

FERNALD RI/FS

INSTALLATION DATE: 1/20/90

INSTALLATION DIAGRAM
MONITORING WELL NO.
1420



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 10/20 Sand - 6 - 80 lb sks
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 (94#) sk
AMOUNT OF WATER USED: 10 gal
OTHER: 1.0 FT Flush mount cover

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602 3.7

GEOLOGIST/ENGINEER: C. Grube

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. C. Grube DATE 1/20/90
PROJECT NO. 602 3,7 CHECKED BY _____ DATE _____
BORING NO. 1420
PIEZOMETER NO. 1420 DATE OF INSTALLATION 1/20/90

BOREHOLE DRILLING

DRILLING METHOD 10.0 in Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT 10 1/4 Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 9.7 FT

RISER PIPE MATERIAL 4.0 in PVC-Schedule 40
RISER PIPE DIAMETERS:
O.D. 4 1/2 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 9.7 FT
JOINING METHOD Screw type - flush joint threaded.

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT
PROTECTIVE PIPE O.D. 8 1/4 in

OTHER PROTECTION Protective Flush mount Cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	0.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.0			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY / cement	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 8.0	TOP	BOTTOM
SAND	TOP 8.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.9	BOTTOM 19.6	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	To be taken at a later date.			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS Top of water bearing zone at 11.0 FT
Bottom of water bearing zone at 20.0 FT

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2420	COORDINATES:	DATE 12-21-91	
ELEVATION:	GWL: Depth 74.18 Date/Time 1/10/92/0952	DATE STARTED: 12-21-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92	
DRILLING METHODS: Cable Tool	10" drill bit	PAGE	OF 8/11

K.M. 1-16-92

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 1.0 1.5	12-21-91 CB 5/11/92 ~~53690~~ 038690 1654	3 3 5	12	Stiff Yellowish brown (10YR, 5/4) CLAYEY SILT with organic matter, damp	ML	1.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
2.4 3.0	12-21-91 CB 5/11/92 ~~53691~~ 038691 1658	3 12 13	11	Very Stiff Yellowish brown (10YR, 5/4) SILTY CLAY with dark brown (10YR, 4/3) staining, trace organic matter, damp, non plastic	CL	2.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
4.0 4.5	12-21-91 CB 5/11/92 ~~53692~~ 038692 1705	10 22 25	12	Hard olive yellow (2.5Y, 6/6) SILTY CLAY with a little sand and gravel, dry, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
5.5 6.0	12-21-91 CB 5/11/92 ~~53693~~ 038693 1710	25 25 30	12	Hard olive yellow (2.5Y, 6/6) SILTY CLAY with a little sand and gravel, dry, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
7.2 7.5	12-21-91 CB 5/11/92 ~~53694~~ 038694 1712	5 27 28	14	Hard light olive brown (2.5Y, 5/4) SILTY CLAY with a little gravel, trace dark brown (10YR, 4/3) staining, damp, low plasticity	CL	>4.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm

NOTES: Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples collected per ASTM Standard Penetration Test
colors Identified using Munsell Color Chart

Hnu S/N: 1185 .2 ppm
Bγ S/N: 73937 20 cpm
γ S/N: 50745 0 cpm
} Background Levels

402-11-66

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2420	COORDINATES:	DATE 12-21-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92	
DRILLING METHODS: Cable Tool 10" drill bit.		PAGE 2 OF 9 11	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	12-21-91 038695 53695 KM ~~1720~~ 1720	27 12-21-91 30 22	15	Very Stiff Light olive brown (2.5Y, 5/4) SILTY CLAY with coarse sand and fine gravel, trace (10YR, 4/3) weathering, moist, low plasticity	CL	3.0	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
8.75 9.0	12-21-91 038696 ~~53696~~ KM 12-21-91 ~~1725~~ 1725	13 15 19	18	~~Very Stiff yellowish brown (10YR, 5/4) SILTY CLAY with dark brown (10YR, 4/3) weathering and trace organic matter, damp non plastic~~ KM 12-21-91 As above but with some yellowish brown (10YR, 5/6) weathering	CL	3.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
10.5	12-22-91 ~~53697~~ 038697 1050	5 6 11	12	Very Stiff Light olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, some yellowish brown (10YR, 5/6) dark grayish brown (10YR, 4/2) and light gray (2.5Y, 7/0) weathering, moist, low plasticity	CL	3.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
11.5 12	12-22-91 038698 ~~53698~~ 1057	15 18 21	14	Same as above	CL	3.5	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
13.2 13.5	12-22-91 ~~53699~~ 038699 1115	5 7 13	12	Very Stiff Light olive brown (2.5Y, 5/3) SILTY CLAY with sand and gravel, some yellowish brown (10YR, 5/6) and dark grayish brown (10YR, 4/2) weathering, moist, low plasticity	CL	3.6	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
14.5 15							

NOTES

See p. 1

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RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3-23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2420	COORDINATES:	DATE 12-22-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91	
ENGINEER/GEOLOGIST: Ken Marlon	Depth Date/Time	DATE COMPLETED: 1-9-92	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF ~~2~~ 11	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	K.M. 1-16-92 REMARKS
15							
15.3	12-22-91 CB 5/12/92 ~~53700~~ 038700 1120	13 17 17	8	~~Hard~~ K.M. 12-22-91 Same As above but Hard. Hard gray (2.5Y, 6/0) SILTY CLAY with sand and gravel and yellowish brown (10YR, 5/6) weathering, moist, ~~med~~ K.M. 12-22-91 low plasticity.	CL	4.25	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
16.5							
17.2	12-22-91 038701 CB 5/12/92 ~~53701~~ 1430	3 5 7	8	Stiff gray (2.5Y, 5/0) SILTY CLAY with a little sand and gravel, moist, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
18							
	12-22-91 038702 CB 5/12/92 ~~53702~~ 1435	7 12 13	18	Stiff gray (2.5Y, 5/0) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm
19.5							
	12-22-91 038703 ~~53703~~ CB 5/12/92 1542	5 10 11	0	No Recovery	N/A	N/A	N/A
21							
22.2 22.5	12-22-91 038704 CB 5/12/92 ~~53704~~ 1555	3 7 13	14	Stiff gray (2.5Y, 5/0) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	2.0	K.M. 1-23-92 Hnu = .2 ppm Bγ = 20 cpm α = 0 cpm

NOTES:

See p. 1

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RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.323	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2420	COORDINATES:	DATE 12-22-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 4 OF 9/11

K.M. 1-16-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	12-22-91 1620 CB 5/10/92 ~~53705~~ 038705	6 21 10	12	very stiff gray (2.5Y, 5/0) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	2.25	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
23.5 24	12-22-91 1650 CB 5/10/92 ~~53706~~ 038706	3 8 7	12	Same as Above	CL	2.0	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
25 25.5	12-22-91 1700 CB 5/7/92 ~~53707~~ 038707	5 16 50	8	Same as Above	CL	2.0	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
26.2 27	12-22-91 1710 CB 5/12/92 ~~53708~~ 038708	5 10 17	15	Same as Above	CL	2.5	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
28.25 28.5	12-22-91 1720 CB 5/12/92 ~~53709~~ 038709	11 13 15	14	Same as Above	CL	2.75	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
29.7 30							

NOTES:

See p. 1

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RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2420	COORDINATES:	DATE 12-23-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF ~~8~~ 11	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
CB 5/2/92	12-23-91 ~~53710~~ 038710 0955	3 8 25	12	K.M. 12-23-91 ~~Very~~ Stiff gray (2.5Y, 5/0) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	1.5	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
31							
31.5							
CB 5/2/92	12-23-91 ~~53711~~ 038711 1005	15 11 10	14	Medium dense gray (2.5Y, 6/1) vfine sand, wet	SM	N/A	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm * Top of Aquifer or Bottom of till at approx. 33 ft
32.7							
33							
CB 5/2/92	12-23-91 ~~53712~~ 038712 1015	3 6 12	12	Medium dense grayish brown (2.5Y, 5/2) SAND, moist	SW	N/A	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
34.0							
34.5							
				Split spoon samples will be taken at 5 ft. intervals			
37.5							

NOTES

See p. 1

12-23-91

Hnu S/N: 1185	0 ppm	Background Levels
Bγ S/N: 73937	20 cpm	
α S/N: 50745	0 cpm	

402-11-88

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2420	COORDINATES:	DATE 12-23-91 K.M. 1-16-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-31-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF 8 11

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5							
40							
41 41.5	12-23-91 CB 5/12/92 ~~53715~~ 038713 1035	29 46 50	12	Medium dense grayish brown (2.5Y, 5/2) SAND, dry	SW	N/A	Hnu = 0 ppm Bγ = 20 cpm α = 0 cpm
45							K.M. 1-23-92
46.4 46.5	1-4-92 0922 038714 ~~53714~~ CB 5/12/92	15 36 33	17	Very dense grayish brown (2.5Y, 5/2) SAND with gravel, dry	SW	N/A	Hnu = 1.2 ppm Bγ = 20 cpm α = 0 cpm
50							
51.3 51.5	1-4-92 1018 038715 ~~53715~~ CB 5/12/92	6 15 19	16	Dense grayish brown (2.5Y, 5/2) medium SAND with trace fine gravel, dry	SP	N/A	Hnu = 1.2 ppm Bγ = 20 cpm α = 0 cpm
52.5							

NOTES

See p. 1

1-4-92

Hnu S/N: 711083	1.2	Background Levels
Bγ S/N: 50760	20	
α S/N: 50768	0	

402-11-68

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2420	COORDINATES:		DATE: 1-4-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: Ken Marion	Depth	Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: Cable Tool 10" drill bit			PAGE 7 OF ~~8~~ 11

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
~~52.5~~							
55							
56	1-4-92 1110 038716 ~~53716~~	76 79	12	Very dense grayish brown (2.5Y,5/2) SANDY Gravel, dry	GW ~~SW~~	N/A	Hnu = 1.2 ppm Br = 20 cpm α = 0 cpm
56.5	CB 5/12/92						
60							
61	1-4-92 1345 038717 ~~53717~~	53 59	12	Very dense grayish brown (2.5Y,5/2) SANDY Gravel, dry	GW	N/A	Hnu = 1.2 ppm Br = 20 cpm α = 0 cpm
61.5	CB 5/12/92						
65							
66.2	1-4-92 1500 038718 ~~53718~~	25 36 33	14	Very dense GRAY (5Y,5/1) GRAVEL with trace sand, wet	GW	N/A	Hnu = 1.2 ppm Br = 20 cpm α = 0 cpm
66.5	CB 5/12/92						
67.5							

NOTES:

See p. 1

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME. FEMP RI/FS	
BORING NUMBER: 2420	COORDINATES:	DATE. 1-5-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: CABLE Tool 10" DRILL BIT		PAGE 8 OF ~~8~~ 11

KM 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67.5							
70							
71.3	1-5-92 1436 CB 5/1/92 ~~53719~~ 038719	9 15 19	16	Dense grayish brown (2.5Y, 5/2) SANDY GRAVEL, wet	GW	N/A	Hnu = 620 ppm Bγ = 20 cpm α = 0 cpm
71.5							
				Water Level ▽			
74.18							The water level was 74.18 ft. below ground surface on 1-10-92
75							
75.5	1-5-92 1528 938720 ~~53720~~ CB 5/1/92	19 16 13	6	Medium dense grayish brown (2.5Y, 5/2) GRAVELLY SAND, wet	SW	N/A	Hnu = 62 ppm Bγ = 20 cpm α = 0 cpm
76.5							
80							
KM 1-5-92 81.3	1-5-92 ~~1720~~ 1645 CB ~~53721~~ 038721	3 6 ~~4~~	16	Medium dense grayish brown (2.5Y, 5/2) SAND with trace gravel, wet	SW	N/A	Hnu = 1.2 ppm Bγ = 20 cpm α = 0 cpm
81.5							
82.5							

NOTES

See p. 1

1-5-92

Hnu S/N: 711083	1.2	Background Levels
Bγ S/N: 50760	20	
α S/N: 50768	0	

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2420	COORDINATES:	DATE: 1-5-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: CABLE Tool 10" drill bit		PAGE 9 OF 9 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (Ken 1-16-92)
~~82.5~~							
85							
85.8	1-5-92 1728 038722 ~~53722~~	3 7 9	10	Medium dense grayish brown (2.5Y, 5/2) SAND with trace gravel, wet	SW	N/A	Hnu = 1.2 ppm Br = 20 cpm α = 0 cpm
86.5	~~CA~~ 5/12/92						
90							
91	1-6-92 0955 038723 ~~53723~~	5 6 9	12	Medium dense grayish brown (2.5Y, 5/2) SAND and GRAVEL, wet	SW	N/A	Hnu = 1.2 ppm Br = 20 cpm α = 0 cpm
91.5	~~CA~~ 5/12/92			Bottom of Bore Hole Drilled to a depth of 90 ft. Sampled to a depth of 91.5 ft.			

NOTES:

See p. 1

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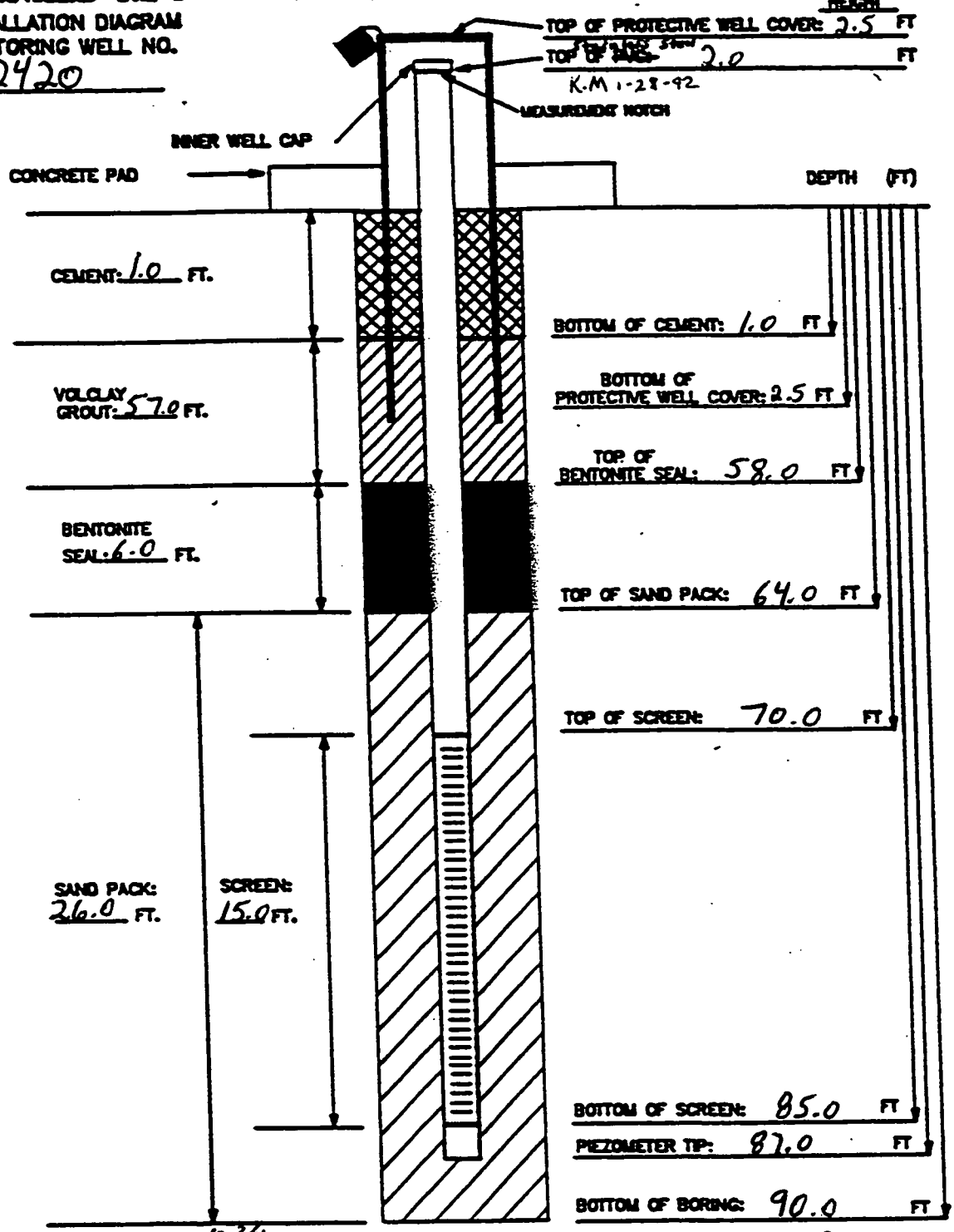
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 2420

Stickups

INSTALLATION DATE: 1-9-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 SAND, 17 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: 13
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 800 gallons
OTHER: NA

NOTES: 4in 316 Stainless Steel
1) RISER PIPE IS 6-INCH-SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 316 Stainless Steel
2) SCREEN IS 6-INCH-LB-SCHEDULE-40 PVC PIPE WITH 0.020-INCH-SLOTS. 4.0 in. I.D. .010 in. Slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. or welded sump
4) WATER DEPTH/DATE: 74.18 ft/1-10-92

K.M. 1-28-92

TASK: 602 ~~3.24~~ 3.23 CB 5/25/92 GEOLOGIST/ENGINEER: Ken Macier

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 1-9-92
PROJECT NO. 602.3.23 CHECKED BY C. Grube DATE 3/25/92
BORING NO. 2420
PIEZOMETER NO. N/A DATE OF INSTALLATION 1-9-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO 90.0
FLUID N/A FROM — TO —

TYPE OF BIT 10" Chuck bit
CASING SIZE (S) USED:
SIZE 10 3/4 FROM 0.0 TO 90.0
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Stainless Steel-Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. ID
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in
TOTAL PERFORATED AREA 15 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. ~~10 3/8~~ 4 3/8 I.D. 4.0 in
K.M. 1-9-92
LENGTH OF PIPE SECTIONS 72 ft. (7-10 ft. section, 1-2 ft. section)
JOINING METHOD Flush-Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Steel Well Cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	Top 0.0	Bottom 1.0		
CEMENT2 GROUT/SLURRY	TOP 1.0	BOTTOM 58.0	TOP	BOTTOM
BENTONITE	TOP 58.0	BOTTOM 64.0	TOP	BOTTOM
SAND	TOP 64.0	BOTTOM 90.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 70.0	BOTTOM 85.0	TOP	BOTTOM
PIEZOMETER TIP	87.0			
BOTTOM OF BOREHOLE	90.0			
GWL AFTER INSTALLATION	74.18 ft.			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS The temporary casing was removed during the installation of the well

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.4.23 (4 of 1472)	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE: 11/5/91	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth / Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 8 10	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (K.M. 1-16-92)
0	11-5-91 1005	2	12	Stiff olive brown (2.5Y, 4/3) CLAYEY SILT with organic matter, damp, low plasticity	ML	1.25	Hnu = .2 ppm
.5		9		Hard light olive brown (2.5Y, 5/4) SILTY CLAY with sand and gravel, a little gray (5Y, 6/1) mottling, trace organic matter, dry, non plastic	CL	>4.5	Bγ = 60 cpm
1.0		15		No Recovery			α = 0 cpm
1.5	11-5-91 1020	10	12	Hard light olive brown (2.5Y, 5/4) SILTY CLAY with sand and a little gravel, a little gray (5Y, 6/1) mottling, trace organic matter, dry, non plastic	CL	>4.5	Hnu = .2 ppm
2.5		13					Bγ = 60 cpm
3.0		25		No Recovery			α = 0 cpm
	11-5-91 1025	12	14	Hard light olive brown (2.5Y, 5/4) SILTY CLAY with sand and a little gravel, a little gray (5Y, 6/1) mottling, damp, non plastic	CL	>4.25	Hnu = .2 ppm
		15					Bγ = 60 cpm
4.2		18		No Recovery			α = 0 cpm
4.5	11-5-91 ~~1040~~ K.M. 11-5-91 1035	15	16	Hard olive (5Y, 4/3) SILTY CLAY with sand and gravel, a little gray (5Y, 5/1) mottling and black staining, damp, non plastic	CL	>4.5	Hnu = .2 ppm
		23					Bγ = 60 cpm
5.8		36		No Recovery			α = 0 cpm
6.0	11-5-91 1040	33	16	Very stiff olive gray (5Y, 5/2) to gray (5Y, 5/1) SILTY CLAY with sand and gravel, damp, non plastic	CL	4.0	Hnu = .2 ppm
		38					Bγ = 60 cpm
7.3		35		No Recovery			α = 0 cpm
7.5							

NOTES

Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu S/N: A01345	.2 ppm	Background Levels
Bγ S/N: 86112	60 cpm	
α S/N: 55361	0 cpm	

402-11-88

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.24.23 (Mo/10/92)	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE	11/5/91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	11/5/91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED:	11/13/91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 2	OF 8/10

Km. 4-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	11-5-91 1410	25 25 22	18	Very stiff gray (5Y, 5/1) SILTY CLAY with a little sand and gravel, damp, low plasticity	CL	4.0	Hnu = 0 ppm Bγ = 60 cpm α = 0 cpm
9.0	11-5-91 1435	18 21 23	18	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, trace fossils, damp, low plasticity	CL	3.5	Hnu = 0 ppm Bγ = 60 cpm α = 0 cpm
10.5	11-6-91 0840	5 5 11	18	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
12.0	11-6-91 0845	8 9 11	16	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.75	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
13.3				No Recovery			
13.5	11-6-91 0905	3 5 8	16	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.5	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
14.8				No Recovery			
15.0							

NOTES

Notes

11/6/91

Hnu = .2 ppm
Bγ = 80 cpm
α = 0 cpm
} Background Levels

402-11-66

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3-11.23 (Marion)	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE: 11/6/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF 8/10	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	11-6-91 0912	8 12 12	18	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.75	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
16.5	11-6-91 0930	12 30 33	12	stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, damp, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
17.0				light gray (5Y, 7/1) limestone cobble	N/A	N/A	
17.5				No Recovery			
18	11-6-91 1010	8 31 30	14	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, trace greenish gray mottling, moist, medium plasticity	CL	2.5	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
19.2				No Recovery			
19.5	11-6-91 1343.	3 4 5	13	Stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, moist, medium plasticity	CL	1.25	Hnu = .2 ppm Bγ = 80 cpm α = 0 cpm
20.6				No Recovery			
21	11-6-91 1347	6 9 12	11	Medium stiff gray (5Y, 5/1) SILTY clay with sand and a little gravel, trace greenish gray mottling, moist, medium plasticity	CL	.75	Hnu = 17 ppm Bγ = 80 cpm α = 0 cpm
21.9				No Recovery			
22.5							

NOTES:

N/A

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.H.23 (Wa/14/92)	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE 11/6/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit.		PAGE 4 OF 8/10	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	11-6-91 1415	6 16 30	18	stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, moist, medium plasticity	CL	2.00	Hnu = 70 ppm Bγ = 80 cpm α = 0 cpm
24.0	11-6-91 1430	2 3 5	16	stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, fossils, moist, medium plasticity	CL	1.0	Hnu = 50 ppm Bγ = 80 cpm α = 0 cpm
25.3				NO Recovery			
25.5	11-6-91 1600	2 3 5	6	Medium stiff olive gray (5Y, 4/2) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	1.0	Hnu = The meter is malfunctioning the previous readings may not be accurate Bγ = 80 α = 0
27.0				No Recovery			
27	11-6-91 1607	5 8 8	15	Medium stiff olive gray (5Y, 4/2) SILTY CLAY with sand and a little fine gravel, moist, medium plasticity	CL	.75	Hnu = N/A Bγ = 80 cpm α = 0 cpm
28.25				NO Recovery			
28.5	11-6-91 1620	1 3 5	0	No Recovery	N/A	N/A	
30.0							

NOTES

N/A

402-11-88

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.4.33	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE 11-6-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-5-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF 10	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	11-6-91 1630	5 5 12	18	Stiff olive gray (5Y, 5/2) SILTY CLAY with a little sand and trace gravel, moist, medium plasticity. 31.5 FT – Bottom of till	CL	60	Hnu = N/A Bγ = 80 cpm α = 0 cpm
31.5	11-7-91 0925	31 18 17	12	Medium dense light brownish gray (2.5Y, 6/2) medium sand, dry. No Recovery	SM	N/A	Hnu = Meter is malfunctioning Bγ = 60 cpm α = 0 cpm
32.5 33	11-7-91 0950	15 13 18	10	Medium dense light brownish gray (2.5Y, 6/2) medium sand, dry. No Recovery	SM	N/A	Hnu = N/A Bγ = 60 α = 0
34.5	11-7-91 1015	12 20 22	12	Medium dense light brownish gray (2.5Y, 6/2) medium sand and trace gravel, dry. No Recovery	SW	N/A	Hnu = N/A Bγ = 60 cpm α = 0 cpm
35.5 36	11-7-91 1105	16 25 25	12 K.M. 11-7-91	No samples taken here			
37.5							

NOTES

Notes

11/7/91

Hnu = 0 ppm
Bγ = 60 cpm
α = 0 cpm
} Background Levels

402-11-88

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11.23 (Ch 01/14/92)	PROJECT NAME: FEMP RI/FS		
DRILLING NUMBER: 2421	COORDINATES:	DATE: 11/7/91	
ELEVATION:	GWL: Depth: Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth: Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF ~~8~~ 10	

K.M. HMS

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5				No Samples taken here			
40							
41	11-7-91 1105	16 25 25	12	Medium dense light brownish gray (2.5Y, 6/2) medium sand and trace gravel, dry	SW	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm
41.5				NO Recovery			
				split spoon samples will be collected at 5 ft. intervals			
45							
46	11-7-91 1350	25 70	12	~~Medium~~ very dense light brownish gray (2.5Y, 6/2) medium sand and trace gravel, dry	SW	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm
46.5				NO Recovery			
				Split spoon samples will be collected at 5 ft. intervals			
50							
51.25	11-7-91 1420	3 9 15	15	Medium dense light gray (10YR, 7/2) medium sand with with trace fine gravel, dry	SW	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm
51.5				NO Recovery			
52.5				split spoon samples will be taken at 5 ft. intervals			

NOTES:

N/A

000145

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 6023.H.23 (Dayton)	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE: 11/7/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Morton	Depth Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 7 OF 8 10	

KM. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5				Split Spoon samples will be taken at 5 ft. intervals			
55	11-7-91 1538	31 49 52	14	Very dense light gray (10YR, 7/2) pea size gravel with sand, dry	GW	N/A	Hnu= N/A Br= 60 cpm α= 0 cpm
56.2 56.5				No Recovery			
				Split spoon samples will be taken at 5 ft. intervals			
60	11-7-91 1630	33 46 50	12	Very dense light gray (10YR, 7/2) coarse gravel with sand, dry	GW	N/A	Hnu= N/A Br= 60 cpm α= 0 cpm
61 61.5				No Recovery			
				Split spoon samples will be taken at 5 ft. intervals			
65	11-11-91 1600	5 20 37	12	Very dense light gray (10YR, 7/2) medium SAND, dry	SP	N/A	Hnu= .2 ppm Br=60 cpm α=0 cpm
66 66.5				No Recovery			
67.5				Split spoon samples will be taken at 5 ft. intervals			

NOTES

11/11/91
Hnu= .2ppm
Br= 60 cpm
α= 0 cpm
} Background Levels

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11.23	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2421	COORDINATES:	DATE: 11/11/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 11/13/91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 8 OF 8/10	

K.M. 1-16-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67.5				Split Spoon Samples will be taken at 5 ft. intervals ▽			The water level is 68.80 feet below the ground surface
70	11-11-91 1646	5 17 18	12	Dense light olive brown (2.5Y, 5/4) gravelly sand, wet	SW	N/A	Hnu = 170 ppm Bγ = 60 cpm α = 0 cpm The Hnu reading is questionable
71				No Recovery			
71.5				Split spoon Samples will be taken at 5 ft. intervals			
75	11-11-91 1730	3 4 13	18	Medium dense light olive brown (2.5Y, 5/4) gravelly sand, wet	SW	N/A	Hnu = 120 ppm Bγ = 60 cpm α = 0 cpm The Hnu reading is questionable
76.5				Split Spoon Samples will be taken at 5 ft. intervals			
80	11-12-91 0930	5 7 10	16	Medium dense light olive brown (2.5Y, 5/4) gravelly SAND, wet	SW	N/A	*Hnu = 2 ppm Bγ = 60 cpm α = 0 cpm
81.3				No Recovery			
81.5				Bottom of bore hole is at 85 ft.			

NOTES:

11/12/91
W.L. is 68.80 at 0815

Hnu = 2 ppm
Bγ = 60 cpm
α = 0 cpm
} Background Levels

* Note: The Hnu is connected to an air dryer

402-11-88

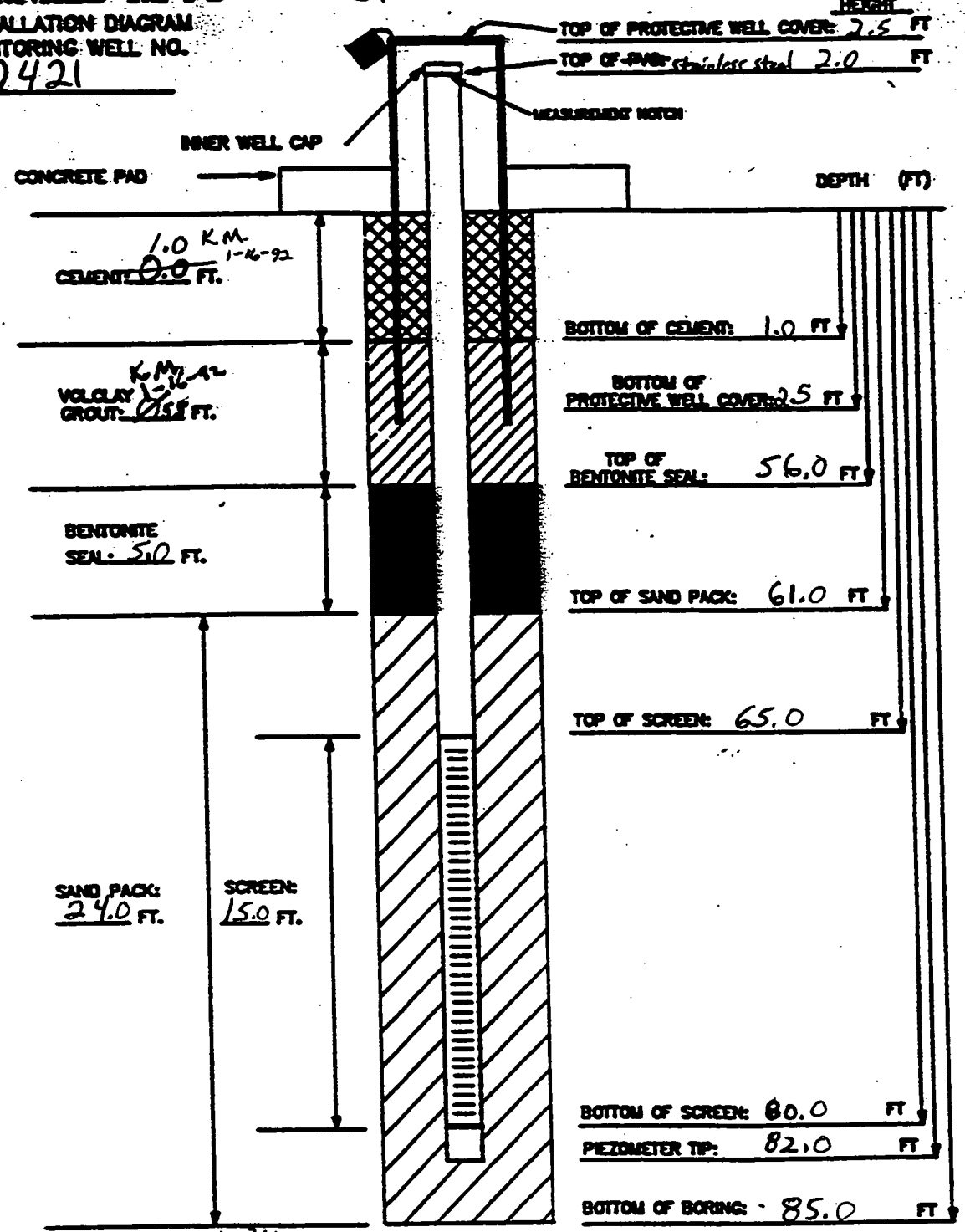
5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 2421

Stickups

INSTALLATION DATE: 11-13-91



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 sand, 17 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: 14 bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 750 gallons
OTHER:

NOTES: KM 1/16/92
1) RISER PIPE IS ~~2-INCH-DIAMETER 40~~ 4" Stainless Steel ~~PVC PIPE, FLUSH-THREADED JOINTS.~~
2) SCREEN IS ~~2-INCH-I.D. DIAMETER 40~~ 4 in. I.D. ~~PVC PIPE WITH 0.020-INCH SLOTS~~ .010 in. slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 68.30 / 11-14-91

TASK: 602.3.H.23 CB 01/16/92 GEOLOGIST/ENGINEER: Ken Marion

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 11-13-91
PROJECT NO. 602.3.11.23 CB 01/16/92 CHECKED BY C. Gruber DATE 01-16-92
BORING NO. 2421
PIEZOMETER NO. ~~N/A~~ 2421 DATE OF INSTALLATION 11-13-91

BOREHOLE DRILLING KM 11-13-91

DRILLING METHOD Cable Tool	TYPE OF BIT 10" Churn bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0 TO 85.0	SIZE 10 3/4 in. FROM 0.0 TO 85 ft.
FLUID ____ FROM ____ TO ____	SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Cable Tool - monitoring well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 67 ft. (6-10 ft Section, 1-5 ft Section, 1-2 ft Section)
AVERAGE SIZE OF PERFORATIONS .010 in	JOINING METHOD flush-Joint threaded
TOTAL PERFORATED AREA 15 ft.	

PROTECTION SYSTEM

SER PROTECTIVE PIPE LENGTH 5 ft.	OTHER PROTECTION Steel well cover with lock
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	Bottom 1.0		
CEMENT GROUT/SLURRY	TOP 1.0	BOTTOM 56.0	TOP	BOTTOM
BENTONITE	TOP ~~61.0~~ 56.0	BOTTOM ~~56.0~~ 61.0	TOP	BOTTOM
SAND	TOP ~~85.0~~ 61.0	BOTTOM ~~61.0~~ 85.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 65.0	BOTTOM 80.0	TOP	BOTTOM
PIEZOMETER TIP	82.0			
BOTTOM OF BOREHOLE	85.0			
GWL AFTER INSTALLATION	~~70.~~ K.M. 11-14-91	68.30		

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
S NSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
MARKS The temporary casing was removed during the installation of the well

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3421	COORDINATES:	DATE: 11-14-91
ELEVATION:	GWL: Depth 69.7 Date/Time 12-4-91 1100	DATE STARTED: 11-14-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 15/15

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 .4	11-14-91 1452 33532	3 5 5	5	Stiff olive brown (2.5Y, 4/3) CLAYEY SILT with organic matter, damp, low plasticity	ML	1.25	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
1.5 2.5	11-14-91 1456 33533	5 8 9	12	Hard light olive brown (2.5Y, 5/4) SILTY CLAY with sand and a little gravel, a little gray (5Y, 6/1) mottling trace organic matter, dry, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
3.0	11-14-91 1500 33534	9 10 13	18	Hard light olive brown (2.5Y, 5/4) SILTY CLAY with sand and a little gravel, a little gray (5Y, 6/1) mottling, damp, non plastic	CL	4.25	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
4.5	11-14-91 1506 33535	15 23 26	18	Hard olive (5Y, 4/3) SILTY CLAY with sand and gravel, a little gray (5Y, 5/1) mottling and black staining, damp, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
6.0 7.5	11-14-91 1513 33536	29 31 27	18	Very stiff olive gray (5Y, 5/2) to gray (5Y, 5/1) SILTY CLAY with sand and gravel, damp, non plastic	CL	4.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm

NOTES

Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu S/N: A01345	.2 ppm	Background Levels
Bγ S/N: 55339	60 cpm	
α S/N: 50767	0 cpm	

402-11-66

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11
BORING NUMBER: 3421
ELEVATION:
ENGINEER/GEOLOGIST: Ken Marion
DRILLING METHODS: Cable Tool 10" drill bit

PROJECT NAME: FEMP RI/FS
COORDINATES:
GWL: Depth 69.7 Date/Time 11-11-91/1100
Depth Date/Time

DATE: 11-14-91
DATE STARTED: 11-14-91
DATE COMPLETED: 12-10-9
PAGE 2 OF 13

K.M. 1-16-

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	11-14-91 1527 33537	19 19 26	14	Very Stiff gray (5Y, 5/1) SILTY CLAY with a little sand and gravel, damp, low plasticity.	CL	4.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
8.7 9.0							
	11-14-91 1600 33538	19 17 15	12	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, trace fossils, damp, low plasticity	CL	3.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
10.0 10.5							
	11-15-91 0923 33539	3 6 10	0	No Recovery	N/A	N/A	Hnu = N/A Bγ = N/A α = N/A
12.0							
	11-15-91 0930 33540	11 16 17	14	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.75	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
13.3 13.5							
	11-15-91 0945 33541	12 15 18	12	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
14.5 15.0							

NOTES:

11/15/91

Hnu S/N: A01345	.2 ppm	Background Levels
Bγ S/N: 55339	60 cpm	
α S/N: 50769	0 cpm	

000151

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RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE: 11-15-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 / 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth: Date/Time:	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF 15	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	11-15-91 0950 33542	12 ~~21~~ 16	13	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, wet, medium plasticity	CL	1.75	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
16.25 16.5	11-15-91 1024 33543	3 6 9	10	Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and a little gravel, damp, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
17.3 18.0	11-15-91 1030 33544	9 10 13	18	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, trace greenish gray mottling, moist medium plasticity	CL	2.5	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
19.5 20	11-18-91 0925 33545	5 3 5	6	Stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, moist, medium plasticity	CL	1.25	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
21 22.3 22.5	11-18-91 0940 33546	6 6 6	16	Medium stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel; trace greenish gray mottling, moist, medium plasticity	CL	.75	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm

NOTES

11/18/91

Hnu S/N: A01345	.2 ppm	Background Levels
Bγ S/N: 55339	60 cpm	
α S/N: 50767	0 cpm	

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE 11-18-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 4 OF 15	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	33547 11-18-91 0950	5 5 8	18	Stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, moist, medium plasticity	CL	2.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
24.0	11-18-91 1000 33548	2 3 5	17	Stiff gray (5Y, 5/1) SILTY CLAY with sand and a little gravel, fossils, moist, medium plasticity	CL	1.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
25.4 25.5	11-18-91 1012	2 3 5	11	Medium stiff olive gray (5Y, 4/2) SILTY CLAY with sand and gravel, moist, medium plasticity	CL	1.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
26.4 27 27.7	11-18-91 1020 33550	6 9 13	8	Medium stiff olive gray (5Y, 4/2) SILTY CLAY with sand and a little fine gravel, moist, medium plasticity	CL	.75	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
28.5 30	11-18-91 1030 33551	3 6 8	18	Stiff olive gray (5Y, 5/2) SILTY CLAY with a little sand and trace gravel, moist, medium plasticity	CL	1.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm

NOTES

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.311	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3421	COORDINATES:	DATE: 11-18-91
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91/1100	DATE STARTED: 11-14-91
ENGINEER/GEOLOGIST: Ken Marion	Depth: Date/Time:	DATE COMPLETED: 12-10-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF 13 15

K.M. 1-16-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	11-18-91 1045 33552	8 13 25	18	Stiff olive gray (5Y, 5/2) SILTY CLAY with a little sand and trace gravel, moist, medium plasticity	CL	1.0	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
31.5	11-18-91 1350 33553	12 19 21	10	Medium dense light brownish gray (2.5Y, 6/2) medium sand, dry	SM	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
32.3 33	11-18-91 1401 33554	11 20 21	17	Medium dense light brownish gray (2.5Y, 6/2) medium sand, dry	SM	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
34.4 34.5				No sample taken here split spoon samples will be taken at 5 ft. intervals			
37.5							

NOTES

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE 11-18-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF 15	

K.M. 1-16-92

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5							
40	33555 11-18-91 1554	5 17 23	10	Dense medium light brownish gray (2.5Y, 6/2) medium sand and trace gravel, dry	SW	N/A	Hnu = .2 ppm BT = 60 cpm α = 0 cpm
40.8 41.5							
45	11-18-91 1635 33556	10 57	12	Very Dense light brownish gray (2.5Y, 6/2) medium sand and trace gravel, dry	SW	N/A	Hnu = .2 ppm BT = 60 cpm α = 0 cpm
46 46.5							
50	11-18-91 1656 33557	6 13 21	12	Dense light gray (10YR, 7/2) medium sand with trace fine gravel, dry	SW	N/A	Hnu = .2 ppm BT = 60 cpm α = 0 cpm
51 51.5							
52.5							

NOTES

N/A

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RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3421	COORDINATES:	DATE 11-19-91
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 / 1100	DATE STARTED: 11-14-91
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 7 OF ~~13~~ 15

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55							
56.4 56.5	11-19-91 0930 33558	10 27 45	17	Very dense light gray (10YR, 7/2) pea size gravel with sand, dry	GW	N/A	Hnu = .2 ppm Br = 60 cpm α = 0 cpm
60							
61 61.5	11-19-91 1715 33559	16 50	12	Very dense Light gray (10YR/7/2) Coarse gravel with sand, dry	GW	N/A	Hnu = .2 ppm Br = 60 cpm α = 0 cpm
65							
66 66.5	11-20-91 ~~1035~~ 33560	35 60	12	Very dense light gray (10YR, 7/2) medium sand, dry	SP	N/A	Hnu = .2 ppm Br = 60 cpm α = 0 cpm
67.5							

NOTES

11/20/91

Hnu S/N: 1104 .2 ppm
Br S/N: 50746 60 cpm
α S/N: 50767 0 cpm
} Background Levels

11/19/91

Hnu S/N: A01345 .2 ppm
Br S/N: 50746 60 cpm
α S/N: 50767 0 cpm
} Background Levels

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.311	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE 11-20-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit.		PAGE 8	OF ~~13~~ 15

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67.5							
▽				Water level on 12-11-91 69.7 ▽ ft			
70	11-20-91 1048 33561	6 12 17	18	Medium dense light olive brown (2.5Y, 5/4) gravelly sand, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
71.5							
75	11-20-91 1358 33562	25 30 30	18	Very Dense light olive brown (2.5Y, 5/4) gravelly sand, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
76.5							
80	11-20-91 1430 33563	8 5 10	K.M. 12-20-91 14	Medium Dense light olive brown (2.5Y, 5/4) gravelly sand, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
81.2							
81.5							
82.5							

NOTES

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RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3421	COORDINATES:	DATE: 11-20-91
ELEVATION:	GWL: Depth 69.7 Date/Time 2-11-91 1100	DATE STARTED: 11-14-91
ENGINEER/GEOLOGIST: Ken Marion	Depth: Date/Time	DATE COMPLETED: 12-10-91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 9 OF ~~13~~ 15

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
~~82.5~~							
85	11-20-91 1540 33564	2 5 10	18	Medium dense Grayish brown (2.5Y, 5/2) gravelly SAND, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
86.5							
90	11-20-91 1612 33565	2 5 5	18	Loose grayish brown (2.5Y, 5/2) gravelly sand, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
91.5							
95	11-21-91 1455 33566	6 9 13	4	Medium dense grayish brown (2.5Y, 5/2) sand and gravel, wet	SW ~~GW~~ K.M. 11-21-91	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
95.3							
96.5							
~~97.5~~							

NOTES

402-11-66

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE: 11-21-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit.		PAGE 10 OF 13/15	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97.5							
100	11-21-91 1525 33567	5 8 11	18	Medium dense grayish brown (2.5Y, 5/2) gravelly SAND, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
100.5							
105	11-21-91 1645 33568	10 15 21	12	Dense grayish brown (2.5Y, 5/2) gravelly SAND, wet	SW	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
106							
106.5				Continued on next page			

NOTES

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602 3.4	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE 11-25-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91 1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable tool 10"		PAGE 11 OF 13/15	

K.M. 1-16-92

DEPTH ft 106.5	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				VERY LOOSE, Dark gray 10YR, 4/1 well graded sand, and gravelly sands with some fines, wet	SW	NA	
110	11/26/91 2			VERY LOOSE, Dark gray (10YR, 4/1) well graded sand and gravelly			HNU = 0 ppm
	33569 11:15	3 5	18	sands with some fines, wet.	SW	NA	Bγ = 0 cpm α = 0 cpm
111.5				MEDIUM to LOOSE Density, Dark gray (10YR 4/1) sand, gravelly sands with some fines, wet	SW	NA	
115	11/25/91 7 33570 1358	13 18	8	MEDIUM to LOOSE Density, Dark gray (10YR, 4/1) well graded sand with some fines. wet.	SW	NA	HNU = 0 ppm Bγ = 0 cpm α = 0 cpm
116.5				No RECOVERY			
				MEDIUM Density, Dark gray (10YR 4/1) sand, gravelly sands with some fines.	SW	NA	
120	11/25/91 5 33571 15:15	6 6	10	LOOSE Density, Dark gray (10YR 4/1) MEDIUM to fine sand, trace of gravel with fines. wet.	SW	NA	HNU = 0 ppm Bγ = 0 cpm α = 0 cpm.
121.5				No RECOVERY			
				LOOSE to MEDIUM Density, Dark gray (10YR, 4/1) MEDIUM to fine sand, with some gravelly sands. wet	SW	NA	
125							

NOTES: Drilling Company Penn Drilling
Driller Dave Newman
Helper Bob Johnson
Geo-Tech Joe Mediate.
Rig Cyclone 42

HNU = .2 Background
Bγ = 20 cpm
α = 0 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE: 11/25/91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91/1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: G. Marshall/T. Anderson	Depth Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable tool 10"		PAGE 12 OF 13/15	

K.M. 1-16-92

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
125	11/25/91 33572 17130	2 5 12	8	LOOSE to MEDIUM DENSITY, DARK GRAY (10 YR, 4/1) WELL graded SAND, MED to fine SAND, TRACE of GRAVEL, wet	SW	NA	HNU = 0ppm βγ = 0 cpm α = 0 cpm.
126.5				NO RECOVERY			
130	11-26-91 33573 1000	3 9 9	18	med. dense TA 11-26-91 ~~loose~~ dark gray (10YR, 4/1), poorly graded ~~sorted~~ fine to medium sand trace coarse sand and gravel, wet	SP	NA	Hnu = 0 ppm βγ = 0 cpm α = 0 cpm
131.5							
135	11-26-91 33574 1100	4 8 9	15	Medium dense, dark gray (10YR 4/1), poorly graded sand fine to medium, trace course sand, wet	SP	NA	Hnu = 0 ppm βγ = 0 cpm α = 0 cpm
136.5							
140	11-26-91 33575 1510	23 25 27	15	Dense, ~~dark~~ gray (5Y, 5/2), ~~poorly~~ well graded fine to medium sand with course gravel, wet TA 11-26-91	SW	NA	Hnu = 0 ppm α = 0 cpm βγ = 0 cpm
141.5							
145	11-26-91 33576 1700	7 50/6"	12	very dense, dark gray (10YR, 4/1) ~~poorly~~ well graded sand - fine to course trace gravel and broken cobbles TA 11-26-91	SP	NA	Hnu = 0ppm α = 0 cpm βγ = 0 cpm
146.5							

NOTES:

402-11-86

VISUAL CLASSIFICATION OF SOILS

5211

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3421	COORDINATES:	DATE: 11-27-91	
ELEVATION:	GWL: Depth 69.7 Date/Time 12-11-91/1100	DATE STARTED: 11-14-91	
ENGINEER/GEOLOGIST: Glen Marshall/T. Anderson	Depth: Date/Time	DATE COMPLETED: 12-10-91	
DRILLING METHODS: Cable Tool 10" drill bit.		PAGE 13 OF 13/15	

K.M. 1-16-92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150 151.5	K-27-9 33577 1015	29 45 50	18"	very dense, dark gray (10 YR 6/1) well graded sand and gravel some cobbles (sand = fine to coarse)	SW	NA	Hna = 0 ppm α = 0 cpm βγ = 0 cpm
				Bottom of Bore hole 150 FT Bottom of Sampling 151.5 FT			

NOTES

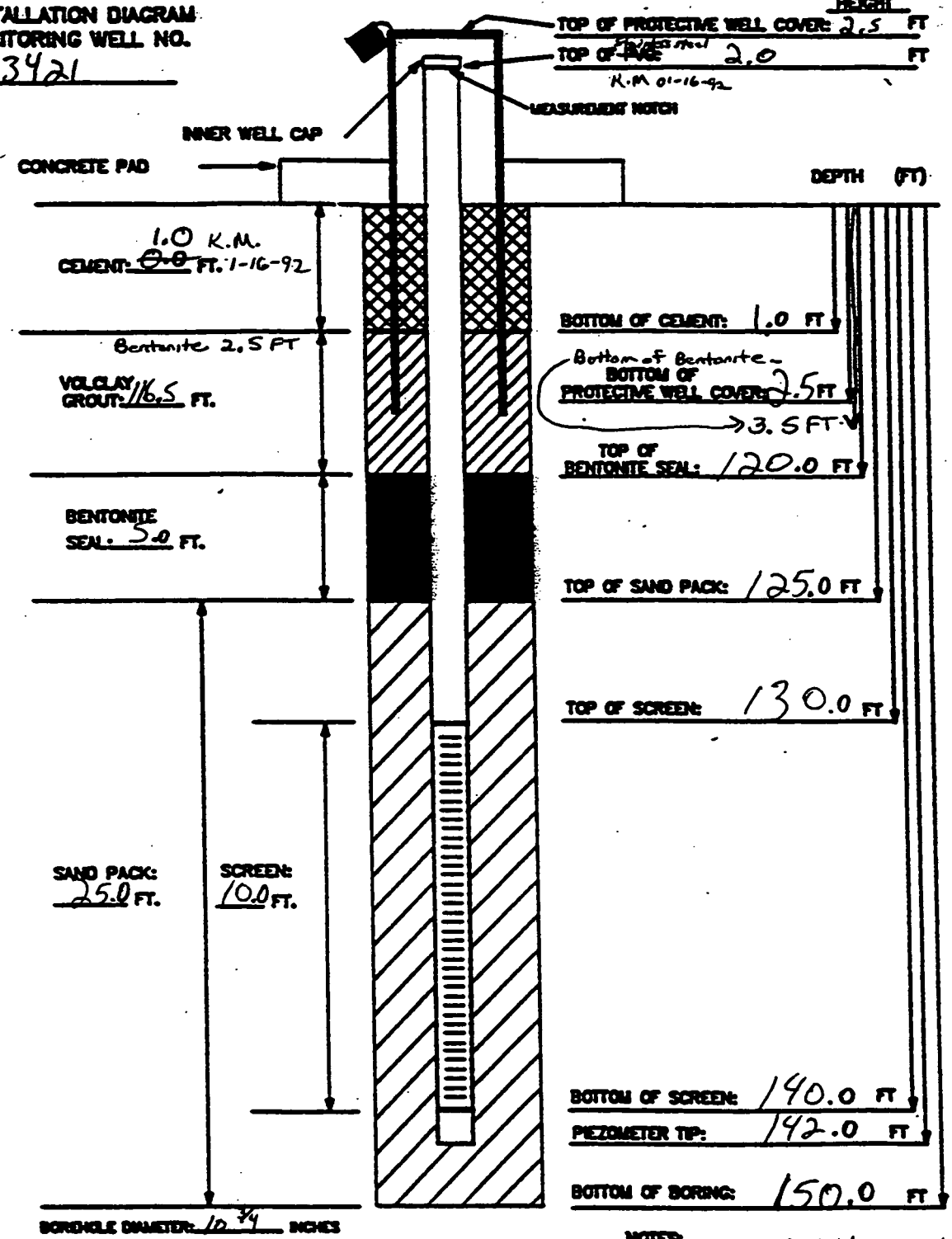
402-11-66

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
3421

Stickups

INSTALLATION DATE: 12-10-91



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 sand, 21 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 9
BAGS OF VOLCLAY GROUT: 27
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 1200 gallons
OTHER:

NOTES:
1) RISER PIPE IS 3-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS. 4" Stainless Steel
2) SCREEN IS 3-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. 4 inch I.D. .010 slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 69.70 / 12-11-91

TASK: 662.3.11

GEOLOGIST/ENGINEER: Ken Marion

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
FIELD ENG./GEO. Ken Marion DATE 12-11-91
PROJECT NO. 602.3.11
CHECKED BY C. Grube DATE 01-16-92
BORING NO. 3421 KM 12-11-91
PIEZOMETER NO. ~~N/A~~ 3421
DATE OF INSTALLATION 12-10-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO 150.0
FLUID NA FROM -- TO —

TYPE OF BIT 10" Churn bit
CASING SIZE (S) USED:
SIZE 10 3/4 in. FROM 0.0 TO 150.0
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Cable Tool - monitoring well
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 132 ft. (130 ft section, 2 ft section)
JOINING METHOD flush-Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Steel well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT/SLURRY	TOP KM 12-11-91 ~~0~~ 3.5	BOTTOM 120.0	TOP	BOTTOM
BENTONITE	TOP 1.0 120.0	BOTTOM 2.5 125.0	TOP	BOTTOM
SAND	TOP 125.0	BOTTOM 150.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 130.0	BOTTOM 140	TOP	BOTTOM
PIEZOMETER TIP	142.0			
BOTTOM OF BOREHOLE	150.0			
GWL AFTER INSTALLATION	69.7 ft. on 12-11-91			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS The temporary casing was removed during the installation of the well

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1423	COORDINATES:	DATE: 2/14/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/14/90	
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 2/18/90	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	2-14	NA	6	Cement	NA	NA	HNU = 0ppm, α = 40-60cpm, Bγ = 3800-4400cpm
	19589 1040 2-15	11/3	4	Dense (10YR 5/4) yellowish brown well graded gravelly sand, (Gravel fine to coarse) very moist	SW	NA	HNU = 0ppm, α = 0-20cpm, Bγ = 800-840cpm
1	2-16	NA	6	Cement	NA	NA	HNU = 0 ppm, α = 20-40cpm, Bγ = 2200 cpm
	19590 1450 2-16	7/2	3	Dense (10YR 5/4) yellowish brown well graded gravelly sand (gravel fine to coarse) very moist	SW	NA	HNU = 0 ppm, α = 40cpm, Bγ = 1000 cpm
2	19591 1000 2-17	NA	6	Dense (10YR 4/2) dark grayish brown silty sand, trace of fine gravel, slightly moist	SM	NA	HNU = 0ppm, α = 0 cpm, Bγ = 240-260 cpm
3	Grab Sample		6	SAA	SM	NA	HNU = 0 ppm, α = 0 cpm, Bγ = 160 cpm
	19592 1030 2-17	NA	6	SAA	SM	NA	HNU = 0 ppm, α = 0 cpm, Bγ = 160 cpm
4	Grab Sample		6	Dense (10YR 4/2) dark grayish brown silty sand, trace of fine gravel and clay, slightly moist	SM	NA	
	19593 1037 2-17	39	6	medium stiff (2.5Y 4/4) olive brown silty clay, some sand, trace fine to medium gravel, low plasticity, moist	CL	JS	HNU = 0 ppm, α = 0 cpm, Bγ = 160 cpm
5	19594 1037 2-17	59/2	4	Dense (2.5Y 4/4) olive brown silty sand, trace of fine gravel and gray slag like material, slightly moist	SM	NA	HNU = 0 ppm, α = 0 cpm, Bγ = 160-180 cpm
	19595 1053 2-17	15	6	SAA	SM	NA	
6	19596 1053 2-17	8	5	SAA	SM	NA	
	19597 1056 2-17	7	6	medium dense (10YR 5/4) yellowish brown clayey silt some sand and fine gravel, moist	ML	NA	HNU = 0ppm, α = 0cpm, Bγ = 160cpm
Top of water bearing zone at 6.5ft	19598 1056 2-17	6	6	SAA	ML	NA	
7	19599 1056 2-17	5	6	medium dense (2.5Y 5/4) light olive brown silt, very moist	ML	NA	
				medium dense (5YR 5/4) reddish brown well graded sand some silt, wet	SW	NA	
				SAA	SW	NA	

NOTES: CONTRACTOR: PENN DRILL
RIG: CME-45
DRILLER: Bob Yost
ASSISTANT: Brian Strouzeen
Geo Assistant and HSO Officer: Ben Brier

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TE
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0-20 CPM Bγ = 160-240cpm
Bγ = 1000-1100 CPM w/ cond
LEL: 0% 02/14/90
O_2: 20.8%

SAA = Same As Above
NR = No Recovery

LEL O_2:

HNU # 1234

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1423	COORDINATES:	DATE: 2/17/90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/14/90
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 2/18/90
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	19600 1103 2-17	11	6	Medium dense (10 YR 5/4) yellowish brown, well graded sand, some silt, trace of clay and fine gravel, wet	SW	NA	HNU = 0 ppm α = 0 cpm BG = 140-60 cpm
	19601 1103 2-17	11	6	Medium dense (2.5 Y 5/4) light olive brown, well graded sand, trace of fine to med. gravel, trace silt wet	SW	NA	
9	19602 1103 2-17	8	6	Medium dense (7.5 YR 2/0) black silty sand, some coal fines and (5 Y 4/2) olive gray silt, wet	SM to ML	NA	
10	19603 1108 2-17	5	6	Medium dense (2.5 Y 5/4) light olive brown well graded sand, trace of fine gravel with bottom 2 inches of (7.5 YR 2/0) black coal fines in sand, wet	SW	NA	HNU = 0 ppm α = 0 cpm BG = 180-200 cpm
	19604 1108 2-17	5	6	Medium dense (5 Y 4/1) dark gray silt, trace of sand and clay, wet	ML	NA	
	19605 1108 2-17	8	6	Medium dense (5 Y 4/1) dark gray sandy silt, wet	ML	NA	
11	19606 1423 2-17	2	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm BG = 160-180 cpm
	19607 1423 2-17	3	6	SAA	ML	NA	
12	19608 1423 2-17	7	5	Loose (2.5 Y 5/4) light olive brown poorly graded sand trace of silt, very moist Loose (2.5 Y 5/4) light olive brown silt, some clay, moist	SP ML	NA NA	
Bottom of water bearing zone at 12.5 FT	CY 2/17/90 54075 1424 2-17	17	6	Dense (2.5 Y 4/4) olive brown poorly graded sand trace of fine to coarse gravel, wet	SP	NA	HNU = 0 ppm α = 0 cpm BG = 240-260 cpm
13	54076 1434 2-17	50/1	3	very stiff (5 Y 4/1) dark gray silty clay, trace of sand and fine gravel, low plasticity, moist	CL	2.25	
			✱	Bottom of Boring and Sampling at 12.6 FT			
14							HNU = α = BG =

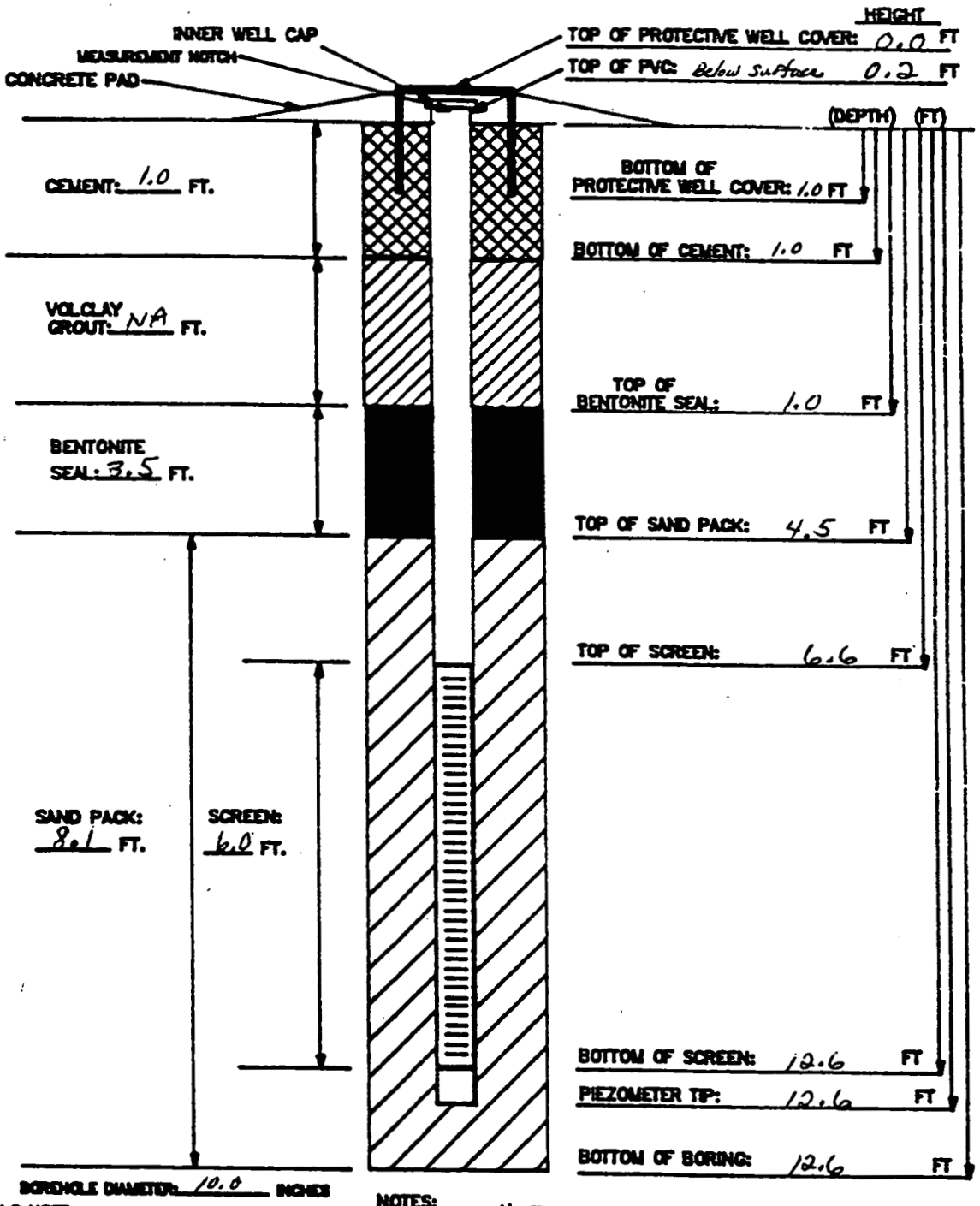
NOTES:

SAA = Same As Above
NR = No Recovery

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1423

INSTALLATION DATE: 2-18-90



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20 sand - 5 - 80# sks
BENTONITE PELLETS (5-GALLON BUCKETS): 2½
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ½ - 94# sk
AMOUNT OF WATER USED: 10 gal
OTHER: Protective flush mount cover

NOTES: 4 ct.
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6023.7 GEOLOGIST/ENGINEER: C. Grube

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. C. Grube DATE 2/18/90
PROJECT NO. 602 3.7 CHECKED BY S.T. DATE 2/22/90
BORING NO. 1423
PIEZOMETER NO. 1423 DATE OF INSTALLATION 2/18/90

BOREHOLE DRILLING

DRILLING METHOD Hollow Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring piezometer
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 6.0 FT

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 4½ in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 6.4 FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT
PROTECTIVE PIPE O.D. 8¼ in

OTHER PROTECTION Protective flush mount Cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	0.2 Below Surface			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.0			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/Cement	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.5	TOP	BOTTOM
SAND	TOP 4.5	BOTTOM 12.6	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 6.6	BOTTOM 12.6	TOP	BOTTOM
PIEZOMETER TIP	12.6			
BOTTOM OF BOREHOLE	12.6			
GWL AFTER INSTALLATION	To be taken at a later date			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Top of water bearing zone at 6.5 FT
Bottom of water bearing zone at 12.5 FT

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1602.3.23	PROJECT NAME. Fernald RI/FS Misc. Wells	
BORING NUMBER: 2423	COORDINATES:	DATE 2/24/92
ELEVATION:	GWL: Depth 76.3 Date/Time 3/2/92	DATE STARTED: 2/24/92
ENGINEER/GEOLOGIST. D. O'Brien / T. Anderson	Depth Date/Time	DATE COMPLETED: 3/2/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS 0930 3/2/92
0				For description of soils refer to boring log 3423			
94				* Bottom of Boring at 94.0 ft.			

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Craig Caulter
Gary Dyl

Bkgd - HNu = 0 ppm
BX = 40-60 cpm

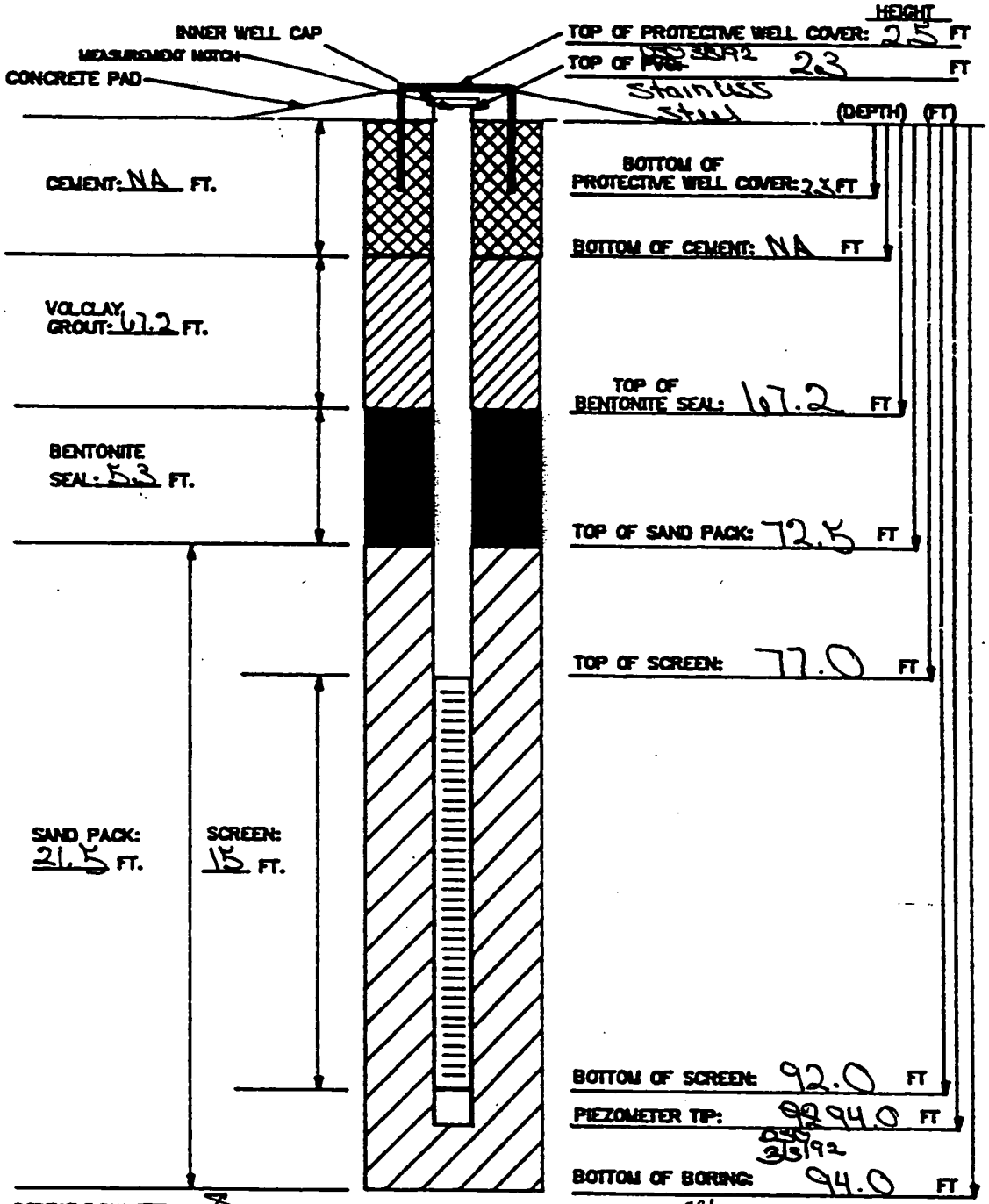
402-11-86

2423

FERNALD RI/FS

INSTALLATION DATE: 3/2/92

INSTALLATION DIAGRAM
MONITORING WELL NO.
2423



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 9 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6 buckets
BAGS OF VOLCLAY GROUT: 13 bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 400 gal.
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 76.54 (3/2/92)
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.23 GEOLOGIST/ENGINEER: Tom Anderson/D.O'Br

FERNALD RI/FS

3 of 3

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS Misc Well FIELD ENG./GEO. D. O'Brien DATE 3/2/92
PROJECT NO. 602.3.23 CHECKED BY _____ DATE _____
BORING NO. 2423
PIEZOMETER NO. 2423 DATE OF INSTALLATION ~~2/27/92~~ 3/2/92 (2) 3/31/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 94.0	SIZE 8" FROM 0 TO 94.0
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0".
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 15' screen 81' riser
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 15 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 in	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	(2) 3/31/92 ~~2.5~~ 2.3			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 67.2	TOP	BOTTOM
BENTONITE	TOP 67.2	BOTTOM 72.5	TOP	BOTTOM
SAND	TOP 72.5	BOTTOM 94.0	TOP	BOTTOM
GRAVEL	TOP — NA	BOTTOM — NA	TOP	BOTTOM
PERFORATED SECTION	TOP 77.0	BOTTOM 92.0	TOP	BOTTOM
PIEZOMETER TIP	94.0			
BOTTOM OF BOREHOLE	94.0			
GWL AFTER INSTALLATION	76.5			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

000171

409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.3.23	PROJECT NAME. Misc. Wells	FEMP RI/FS	
DRILLING NUMBER: 3423	COORDINATES:	DATE 2/7/92	
ELEVATION: 591 ft	GWL: Depth 80.5 Date/Time 2/19/92 1645	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST. J. Lear/D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0930 33415 2/7/92	2 3 5	12	Med. Stiff. 10YR(4/2) Dark grayish brown silty clay some organics 0.0-0.5, low plasticity, moist	Cl	.9	HNU = 0 ppm BX = 40cpm
2	0935 2/7/92	5 8 10	0	No Recovery	NA	NA	HNU = NA BX = NA
4	0940 33416 2/7/92	3 7 14	8	Stiff. 10YR(5/8) Yellowish brown silty clay, low to mod plasticity, moist.	Cl	1.5	HNU = 0ppm BX = 50cpm
5	0945 33417 2/7/92	15 14 25	12	Stiff. 10YR(5/6) Yellowish brown to brown, silty clay trace gravel, low to mod plasticity, moist	Cl	1.5/2.0	HNU = 0ppm BX = 50cpm
6 7	1000 33418 2/7/92	2 3 5	6	Stiff. 10YR(5/6) Yellowish brown to gray, silty clay trace gravel, low plasticity slightly moist.	Cl	1.5	HNU = 0ppm BX = 60cpm

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment Cyclone 43

Craig Coulter

Gary Dye

NA = Not Applicable

Background:
HNU = 0 ppm
BX = 40-60ppm

Samples collected per ASTM Standard Penetration Test
Colors Indentified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: Misc. Wells Femp RI/FS		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/7/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: J. Lear/D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	1005 35419 2/7/92	6 11 15	12	Yellowish brown Stiff. 10YR(5/6-5/4) silty clay, trace gravel, low plasticity, slightly moist.	cl	1.75	HNU= 0ppm BG= 60cpm
9 10	1030 35420 2/7/92	5 9 15	16	Very stiff. 10YR(5/4) to 7.5YR(5/4) yellowish brown to brown, silty clay trace gravel, slightly moist	cl	2.25	HNU= 0ppm BG= 50cpm
12	1035 35421 2/7/92	7 11 16	3	Very stiff. 10YR(5/4) yellowish brown silty clay large gravel interrupting recovery. Low plasticity, slightly moist.	cl	2.5	HNU= 0ppm BG= 40cpm
13	0845 35422 2/10/92	3 6 9	10	Stiff. 5Y(5/1) Gray gravelly silty clay, medium plasticity slightly moist.	cl	1.75	HNU= 0ppm BG= 60cpm
14	0900 35423 2/10/92	15 20 26	6	Very stiff. 5Y(5/1) Gray gravelly, sandy clay. Low plasticity, slightly moist.	cl	2.25	HNU= 0ppm BG= 50cpm

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Driller: Craig Courtin

Bacy Dye

see p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1102.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells 5711		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 ft.	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	0905	3		Medium stiff. 5Y(5/1) Gray gravelly clay. low plasticity slightly moist.	Cl	.75	HNU = 0 ppm
	33424	4	7				BX = 50 cpm
16		7		16.5 Ft			
	2/10/92						
	0915	3		Soft. 5Y(5/1) Gray, gravelly sandy clay. No plasticity moist.	Cl	.5	HNU = 0 ppm
17	33425	4	5				BX = 40 cpm
		7		18.0 Ft			
18	2/10/92						
		7		No Recovery.			
		14	0		NA	NA	
19		17		19.5 Ft			
	0930	3		Very stiff. 5Y(5/1) Gray sandy clay, low plasticity slightly moist.	Cl	2.0	HNU = 0 ppm
20	33426	8	12				BX = 40 cpm
21	2/10/92	10		21.0 Ft			

NA - not applicable

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Crew: Craig Coulter, Gary Dye

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1102.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells		
RING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 ft.	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 4 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22	6933 3342 2/10/92	5 7 17	4	Stiff. 5Y(5/1) Gray. Gravelly sandy clay, low plasticity moist 22.5 Ft	CL	1.25	HNU = 0 ppm BG = 40 cpm
23		10 14 9	0	No Recovery. 24.0 Ft	NA	NA	
24 25	1080 3342 2/10/92	3 4 6	5	Stiff. 5Y(5/1) Gray sandy gravelly clay no plasticity, moist. 25.5 Ft	CL	1.75	HNU = 0 ppm BG = 50 cpm
26 27		3 5 7	0	No Recovery 27.0 Ft	NA	NA	

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Driller: Craig Coulter, Gary Dye

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 102.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells		571 1
BORING NUMBER: 3423	COORDINATES:	DATE 2/10/92	
ELEVATION: 591 ft.	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 2/10/92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
28		3 5 10	0	No Recovery 28.5 Ft	NA	NA	
29	1080 35429	2 5 7	3	Stiff. 5Y (3/1) Gray gravelly clay, low plasticity, moist. 30.0 Ft	CL	1.0	HNU = 0 ppm BX = 40 cpm
30	2/10/92						
31		3 5 8	0	No Recovery. 31.5 Ft	NA	NA	
32		5 9 6	0	No Recovery. 33.0 Ft	NA	NA	

NOTES:
Drilling Contractor Penn Drill
Drilling Equipment Cyclone 43
Craig Coulter
Gary Dye

See p. 1

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1023.23	PROJECT NAME: Fernald RI/FS Misc. Wells		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 ft.	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 2/10/92	
DRILLING METHODS: Cable Tool		PAGE 4 OF 17	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
34		5 7 9	0	No Recovery. 34.5 Ft.	NA	NA	
35	1330 35430 2/10/92	7 9 15	4	Stiff. 5Y(5/1) Gray gravelly clay, high plasticity moist. 36.0 Ft.	cl	1.25	HNU = 0 ppm RS = 50 cpm
36 37	1350 35431 2/10/92	5 8 17	14	Very stiff. 5Y(5/1) Gray sandy gravelly clay, low plasticity, moist. 37.5 Ft.	cl	2.25	HNU = 0 ppm RS = 60 cpm
38	1415 35432 2/10/92	15 26 36	16	Hard. 5Y(5/1) Gray sandy gravelly clay, low plasticity, moist 39.0 Ft.	cl	14.0	HNU = 0 ppm RS = 60 cpm

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Driller: Craig Coulter, Gary Dye

See p. 1

402-11-86

FERNALD
R1/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 1102.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 Ft.	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 7 OF 17	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
40	1430 38433 9/25/92	9 9 12	15	Top 6" Very stiff. 5Y(5/1) Gray gravelly clay. Low Plasticity. Moist. 39.5 Ft. Last 12" Dense 5Y(5/1) Gray silt, very moist. 40.5 Ft	cl ml	3.75 NA	HNU=0ppm BX= 20 cpm
41	2/10/92 1445 38435	5 4 10	15	Medium Dense. 5Y(5/1) Gray silt, clayey silt at very bottom. Very moist 42.0 Ft	ml	NA	HNU=0ppm BX=50ppm
42 43	2/10/92 1500 38435 9/25/92	9 12 14	16	Dense. 5Y(5/1) Gray clayey silt. Moist. Dense 5Y(5/1) Gray silt moist. Dense 5Y(5/1) Gray poorly graded sand. Slightly moist 43.5 Ft	ml ml sp	NA NA NA	HNU=0ppm BX= 40cpm
44	2/10/92 1505 38436	13 15 20	11	Dense. 5Y(5/1) Gray. Silty sand with clay, slightly moist 45.0 Ft	sm	NA	HNU= 0 ppm BX= 40cpm

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Craig Coulter

Gary Dye

See p. 1

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1102.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 ft.	GWL: Depth / Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth / Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 8 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1610	13	12	Dense. 5Y (5/1) Gray Poorly graded sand, moist Bottom 3" Dense 5Y (5/1) Gray silt, moist	SP	NA	HNU = 0 ppm
	33437	17			ML	NA	BX = 40cpm
		30		46.5 Ft			
	2/10/92						
47	1620	15	14	Very Dense 2.5Y (6/2) Light brownish gray. Poorly graded sand, slightly moist 1" silt at bottom.	SP	NA	HNU = 0ppm
	33438	27					BX = 50 cpm
		50/5		48.0 Ft			
	2/10/92						
48	1625	12	13	Very Dense 2.5Y (6/2) Light brownish gray. ~~Poorly~~ 2/10/92 silt, moist	ML	NA	HNU = 0ppm
	33439	22		Very Dense 2.5Y (6/2) Light brownish gray, poorly graded sand, slightly moist	SP	NA	BX = 50 cpm
49		30		Very Dense 2.5Y (6/2) Light brownish gray silt, moist 49.5 Ft	ML	NA	
	2/10/92						
50	1640	13	10	Very Dense. 2.5Y (6/2) Light brownish gray silty sand slightly moist.	SM	NA	HNU = 0 ppm
	33440	24		Very Dense 2.5Y (6/2) Light brownish gray coarse poorly graded sand, dry.	SP	NA	BX = 40 cpm
		30		51.0 Ft			* Base of fill at approx. 50 ft
	2/10/92						

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Driller: Craig Coulter, Gary Dye

See p. 1

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 6012.3.2.3	PROJECT NAME: Misc. Wells Fernald RI/FS		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/10/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 9 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52, 53, 54				Split spoon samples will be taken at 5.0 ft intervals			
55, 56	1700 38441 2/10/92	14 25 50	15	Very Dense. 2.5Y (6/2) Light brownish gray. poorly graded sand, slightly moist	SP	NA	HNU = 0ppm BX = 50cpm
58, 59							
60, 61	1750 38442 2/10/92	25 50.3	8	Very Dense. 2.5Y (6/2) Light brownish gray, well graded, coarse sand with gravel. Moist.	SW	NA	HNU = 0ppm BX = 40cpm
62, 63, 64							
65, 66	0910 38443 2/11/92	18 50/2	7	Very dense. 2.5Y (6/2) Light brownish gray, coarse, well graded sand with gravel. Moist	SW	NA	HNU = 0ppm BX = 10 ppm

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

D: Craig Coulter, Gary Dye

see p. 1

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1402.3.23	PROJECT NAME: Misc. Wells Fernald RI/FS		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/11/92	
ELEVATION: 591 ft	GWL: Depth / Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE ~~10~~ 10 OF 17	

CH 3/25/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67							
68							
69							
70	0930 3344 2/11/92	50/4	4	Very dense. 2.5Y (6/2) Light brownish gray, coarse, well graded sand, dry.	SW	NA	HNu = 0 ppm BG = 40 ppm
71							
72							
73							
74							
75	1025 3344 2/11/92	50/2	3	Very dense. 2.5Y (6/2) Light brownish gray. Coarse well graded sand, moist	SW	NA	HNu = 0 ppm BG = 50 cpm
76							
77							
78							
79							
80	1105 3344 2/11/92	28 24 34	15	Very dense. 2.5Y (5/2) Grayish brown, coarse well graded sand, moist	SW	NA	HNu = 0 ppm BG = 40 ppm
81							

NOTES:

Drilling Contractor: Ann Drill

Drilling Equipment: Cyclone 43

Dri: Craig Coulter
Gary Dye

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: Fernald RI/FS Misc. Wells		521
BORING NUMBER: 3423	COORDINATES:	DATE 2/11/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 11 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82							
83							
84							
85	1330	28		Very dense. 2.5Y (5/2) Grayish brown. Coarse well graded sand with gravel. Wet.	SW	NA	Hit water table
86	38447 2/11/92	32 49	14				HNO = 0 ppm RX = 50 ppm
87							
88							
89							
90	1400	14		Dense. 2.5Y (5/2) Grayish brown coarse well graded sand, grading into a gravel wet.	SW/GW	NA	HNU = 0 ppm
91	38448 2/11/92	18 23	18				RX = 40 cpm
92							
93							
94							
95	1510 38449 2/11/92	50/2	8	Very dense. 2.5Y (5/2) Grayish brown fine, poorly graded sand grading to a well graded sand w gravel, wet.	SP/SW	NA	HNU = 0 ppm RX = 60 cpm

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone H3

D: Craig Coulter
Gary Dye

See p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 682.3.23	PROJECT NAME: Misc. Wells Fernald RI/FS		
BORING NUMBER: 3423	COORDINATES:	DATE: 2/11/92	
ELEVATION: 591 ft	GWL: Depth: Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth: Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 12 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97							
98							
99							
100	1600 SS4150 2/11/92	50/4	6	Very Dense. 2.5Y (5/2) Grayish brown, well graded coarse sand with gravel, wet.	SW	NA	HNu = 0 ppm RS = 50 cpm
101							
102							
103							
104							
105	1620 SS4151 2/11/92	21 32 43	18	Very Dense. 2.5Y (5/2) Grayish brown, well graded coarse sand with gravel, wet	SW	NA	HNu = 0 ppm RS = 60 cpm
106							
107							
108							
109							
110			0	No Recovery.			

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone 43

Driller: Craig Coulter, Gary Dye

See p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.23	PROJECT NAME: Misc Wells Fernald RI/FS		5711
BORING NUMBER: 3423	COORDINATES:	DATE: 2/12/92	
ELEVATION: 591 ft	GWL: Depth: Date/Time	DATE STARTED: 2/12/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth: Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 13 OF 17	

DEPTH 0.4'	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6"	RECOVERY 11"	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112							
113							
114							
115	0950	50/5	18	Very dense. 2.5Y(5/2) Grayish brown. Coarse with gravelly sand with gravel. Wet	SW	NA	HNU = 0ppm BG = 40cpm
116	2/12/92						
117							
118							
119							
120	1115	12 23 20	8	Dense. 2.5Y(5/2) Grayish brown coarse with gravelly sand with gravel admix.	SW	NA	HNU = 0ppm BG = 40cpm
121	2/12/92						
122							
123							
124							
125	1415	34 50/4	18	Very dense. 2.5Y(5/2) Grayish brown. Coarse sand with gravelly sand.	SW	NA	HNU = 0ppm BG = 40cpm
126	2/12/92						

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone H3, Craig Coulter, Gary Dye

See p. 1

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: Misc. Wells Fernald RI/FS		
BORING NUMBER: 3423	COORDINATES:	DATE 2/12/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 14 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6"/1")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
127							
128							
129							
130	1435 SS/GB 2/12/92	8 12 17	18	Dense. 2.5Y(5/2) Grayish brown coarse well graded sand with gravel, lime	SW	NA	HNU = 0 ppm BG = 80 cpm
131							
132							
133							
134							
135	1610 SS/GB 2/12/92	9 12 16	15	Dense. 2.5Y(5/2) Grayish brown medium well graded sand with 1% gravel, lime.	SW	NA	HNU = 0 ppm BG = 40 cpm
136							
137							
138							
139							
140	1635 SS/GB 2/12/92	25 50/4	18	Very dense. 2.5Y(5/2) Grayish brown coarse well graded sand, lime	SW	NA	HNU = 0 ppm BG = 60 ppm

NOTES:

Drilling Contractor: Ann Drill

Drilling Equipment: Cyclone 43

Dri: Craig Coulter, Gary Dye

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.23	PROJECT NAME: Misc. Wells Fernald RI/FS		
BORING NUMBER: 0884 ~~1393~~ 3/23	COORDINATES:	DATE: 2/12/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 2/7/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/19/92	
DRILLING METHODS: Cable Tool		PAGE 15 OF 17	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
142							
143							
144							
145							
146	1730 SS#159 2/12/92	50/4	12	Very dense. 2.5Y (5/2) Grayish brown medium fine well ~~[illegible]~~ sand, wet graded ~~[illegible]~~	SW	NA	HNU = 0 ppm BX = 40 cpm
148							
149							
150	0840 SS#159 2/14/92	15 19 22	18	Stiff. 5Y (4/2) Light olive gray. Silty clay. Medium plasticity, moist.	CI	1.75	HNU = 0 ppm BX = 60 cpm
151				Bottom of Borehole Drilled to 150.0 FT Sampled to 151.5 FT			

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Cyclone H3

Craig Coulter

Gary Dye

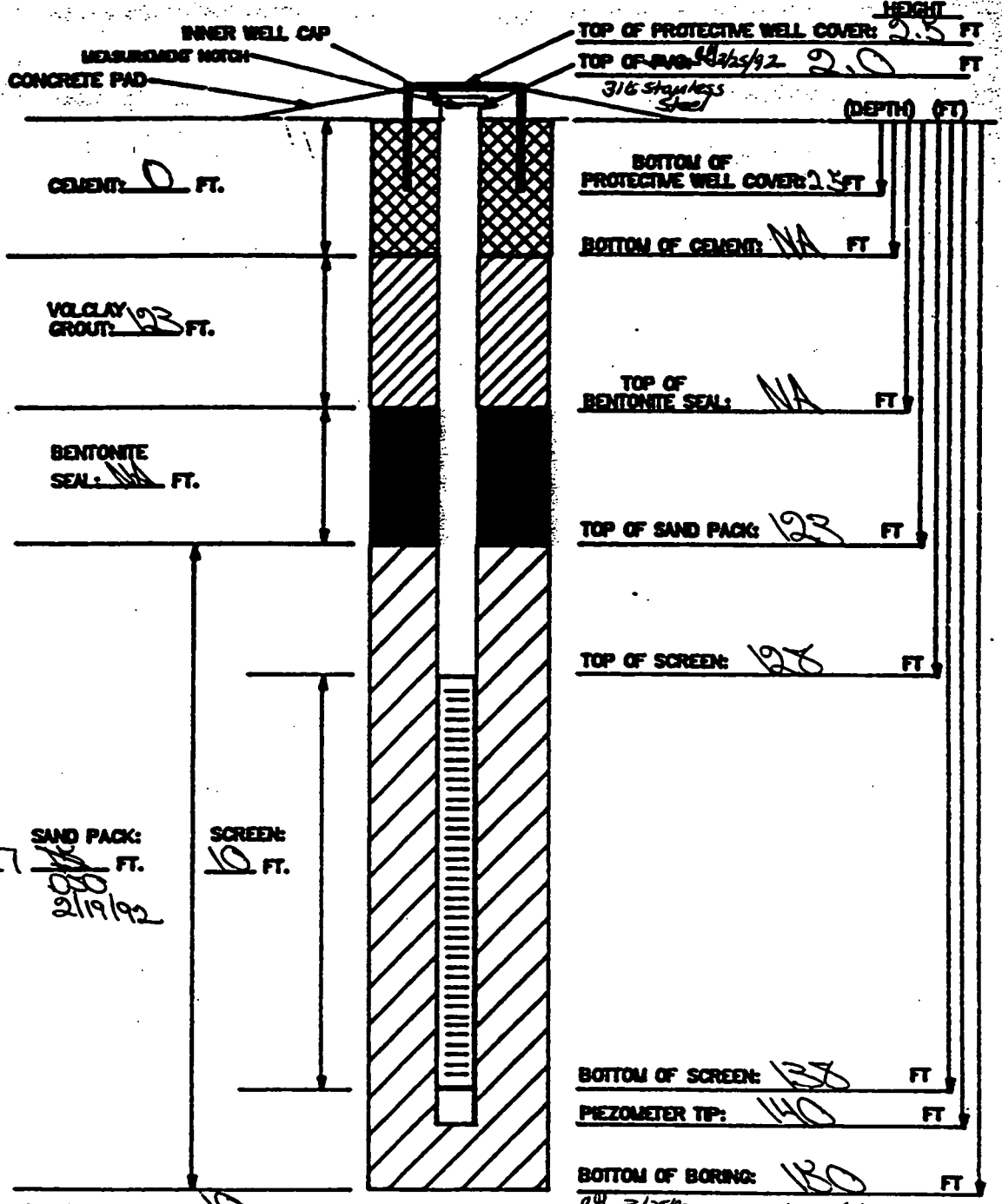
see p. 1

402-11-66

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 3423

INSTALLATION DATE: 2/19/92



MATERIALS USED:
SAND TYPE AND QUANTITY: 11 bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 30 bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 1000 gal
OTHER: NA

NOTES:
1) RISER PIPE IS 4 in 316 Stainless Steel SCHEDULE-40 PVC PIPE; FLUSH-THREADED JOINTS.
2) SCREEN IS 4 Stainless Steel 0.010-INCH-LO-SCHEDULE-40 PVC PIPE WITH 0.010-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP or welded sump
4) WATER DEPTH/DATE: 80.5 ft 2/18/92
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.23 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

1701417

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS Misc. Wells FIELD ENG./GEO. D. O'Brien DATE 2/19/92
PROJECT NO. 1032.3.23 CHECKED BY CGrule DATE 3/25/92
BORING NO. 3423
PIEZOMETER NO. 3423 DATE OF INSTALLATION 2/19/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 150 ft	SIZE 6 3/4 OD FROM 0 TO 150 ft
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 1 10ft screen 13-10ftr
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD Flush joint threaded
TOTAL PERFORATED AREA 10ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 in	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 123	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 123	BOTTOM 150	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 128	BOTTOM 138	TOP	BOTTOM
PIEZOMETER TIP	140			
BOTTOM OF BOREHOLE	150			
GWL AFTER INSTALLATION	80.5 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11-86

PLANNED
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER 2424	COORDINATES	DATE 1/27/93	
ELEVATION:	GWL: Depth 94.8 Ft Date/Time 1/25/93	DATE STARTED 1/6/93	
ENGINEER/GEOLOGIST B. Yeardley	Depth Date/Time	DATE COMPLETED 1/25/93	
DRILLING METHODS Cable Tool		PAGE	OF 6

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For Classification of soil see Footage logs for 4424 (VCOS)			
107.0				Bottom of hole at 107 Ft			

NOTES

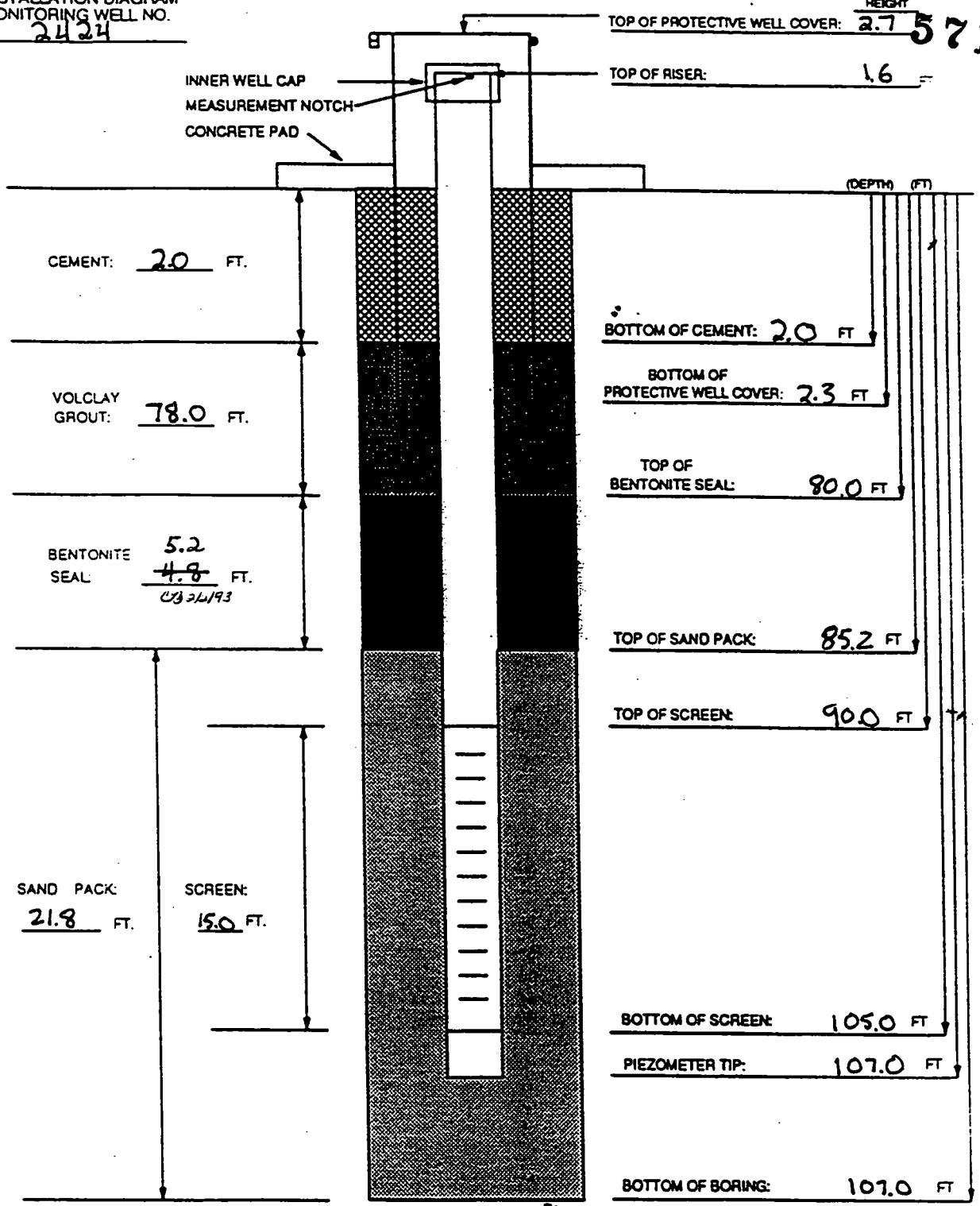
Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
* Sieve Analysis sample #104692 collected from 90.0 to 105.0
Samples collected per ASTM standard penet
Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2424

INSTALLATION DATE: 1/6/92 - 1/25/93

5711



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 25 bags coarse (4/20)
BENTONITE PELLETS (5-GALLON BUCKETS): 6 buckets
BAGS OF VOLCLAY GROUT: 16 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1000 gal.
OTHER: 17 drums soil
TASK: WEA-05 (04.27)

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.02 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 9.48 FT/1/
5) TOP OF CASING IS SECURED W/ STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH [illegible] GROUND LEVEL.
7) WELL CASING HAS A PROTECTIV[illegible] COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeardley

ASI FORM 0157 REV. (0)

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. WEA-05
BORING NO. 2424
PIEZOMETER NO. 2424

FIELD ENG./GEO. B. Yearsley DATE 1/2[illegible]
CHECKED BY C Brier DATE 2/2[illegible]
DATE OF INSTALLATION 1/6/93 - 1/25/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 TO 95.0
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 TO 110.0
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.02 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 9-10 ft 2-2 ft
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	1.6			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.3			
BOREHOLE FILL MATERIALS:	TOP 0.0	2.0		
Volclay CEMENT GROUT / ~~SLURRY~~ By 1/27/93	TOP 2.0	BOTTOM 80.0	TOP	BOTTOM
BENTONITE Pellets	TOP 80.0	BOTTOM 85.2	TOP	BOTTOM
SAND	TOP 85.2	BOTTOM 107.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 90.0	BOTTOM 105.0	TOP	BOTTOM
PIEZOMETER TIP	107.0			
BOTTOM OF BOREHOLE	107.0			
GWL AFTER INSTALLATION	94.8 (ground elev.)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS

Monitor Well 2424 Brian Yeardley

Sand Pack and Sieve Size Determination

I. Wemco values for grain size

40% value = 0.10
50% value = 0.10
90% value = 0.064

II. Uniformity Coefficient 40%/90% Ratio

0.100 in / .064 = 1.56 which is < 3
Use factor of 5

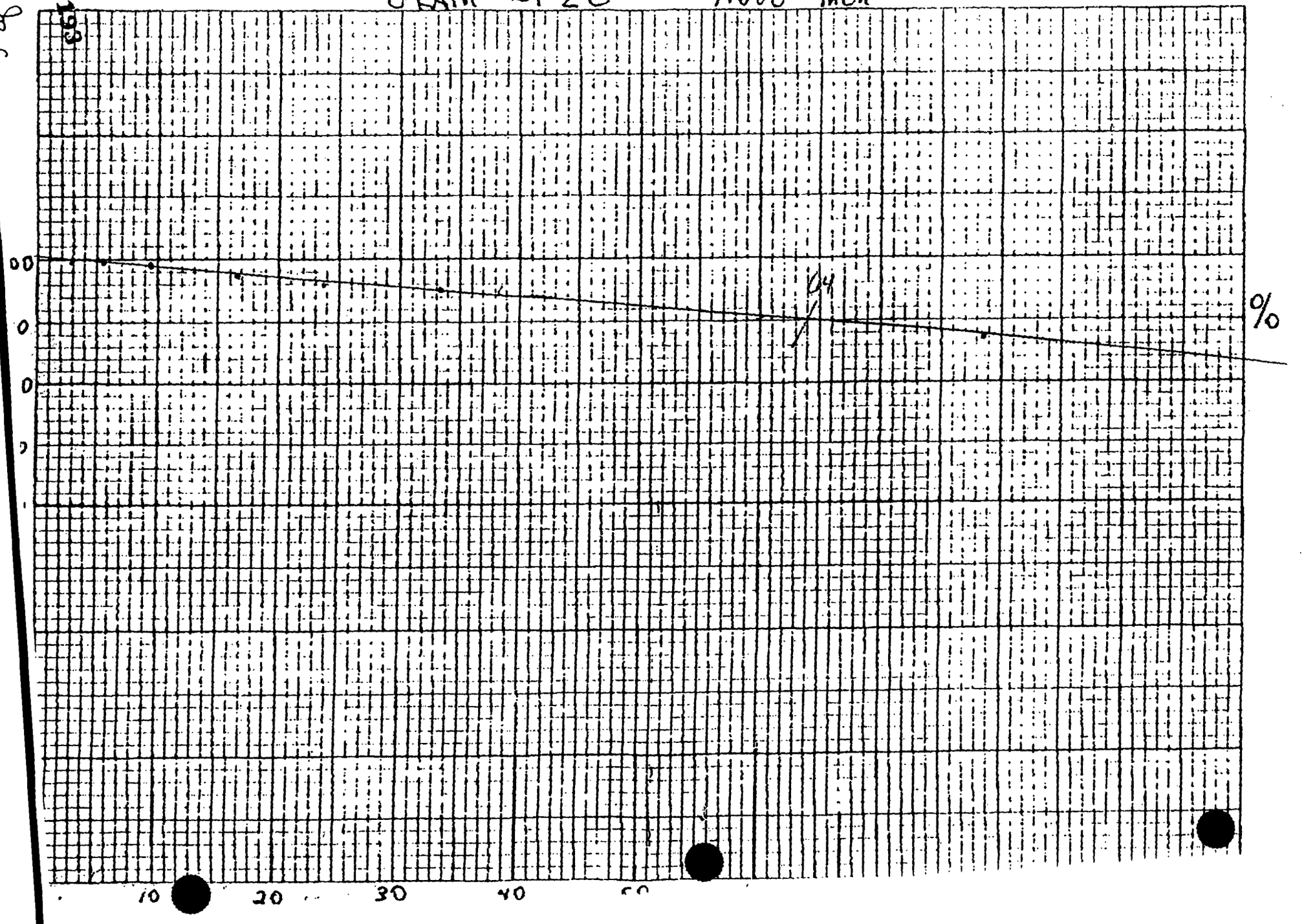
III. 50% value × 5

0.10 in × 5 = 0.5

IV. 0.50 falls to left of both medium and coarse grain size distribution curves. However, this value is closer to coarse grain curve and therefore the coarse grain sand with the 20 slot (0.02in) screen will be used. This allows for maximum flow of water into well and also retain formation.

mw-2424

GRAIN SIZE 1/1000 inch



MW-2424

5711

MATERIAL: Soil

Customer Number ~~930114~~ 1046

DETERMINATION: Particle Size

SAMPLE NUMBER: 930114-028

Sample weight: 179.8

METHOD: Sieve Analysis

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	155.27	86.4	86.4	78.7
20	15.63	8.7	95.1	33.5
40	4.45	2.5	97.6	16.7
60	1.43	0.8	98.4	9.8
100	0.61	0.3	98.7	5.9
200	0.80	0.4	99.1	3.0
Pan	0.80	0.4	99.5	

$\frac{W_2 \times 100\%}{W_1} = R$

$\frac{\text{Original} - \text{Duplicate}}{\text{Average}} \times 100\% = \text{RPD}$

Analyzed by: [signature]

Checked by: [signature]

Date analyzed:

Grain Size 40% Retained > 100 .001 inch

50% > 100

90% 64

2/9/93

Monitor Well 2424

Brian

Sand Pack and Sieve Size Determination

I. Wemco values for grain size

40% value = 0.1[illegible]

50% value = 0.10

90% value = 0.0[illegible]

II. Uniformity Coefficient 40%/90% Ratio

0.100 in/0.064 = 1.56 which is < 3

Use factor of 5

III. 50% value x 5

0.10 in x 5 = 0.5

IV. 0.50 falls to left of both medium and coarse grain size distribution curves. However this value is closer to coarse grain and therefore the coarse grain sand with the 20 slot (0.02in) screen will be used. This allows for maximum flow of water into well and also retain formation

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME. RCRA Phase I		
BORING NUMBER 3424	COORDINATES.	DATE 12/30/92	
ELEVATION:	GWL: Depth 95.0 Date/Time 12/30/92	DATE STARTED 11/18/92	
ENGINEER/GEOLOGIST B. Yeardley	Depth Date/Time	DATE COMPLETED: 12/30/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For soil classification logs see #4424			
172.0				Bottom of Boring at 172.0 ft			

NOTES

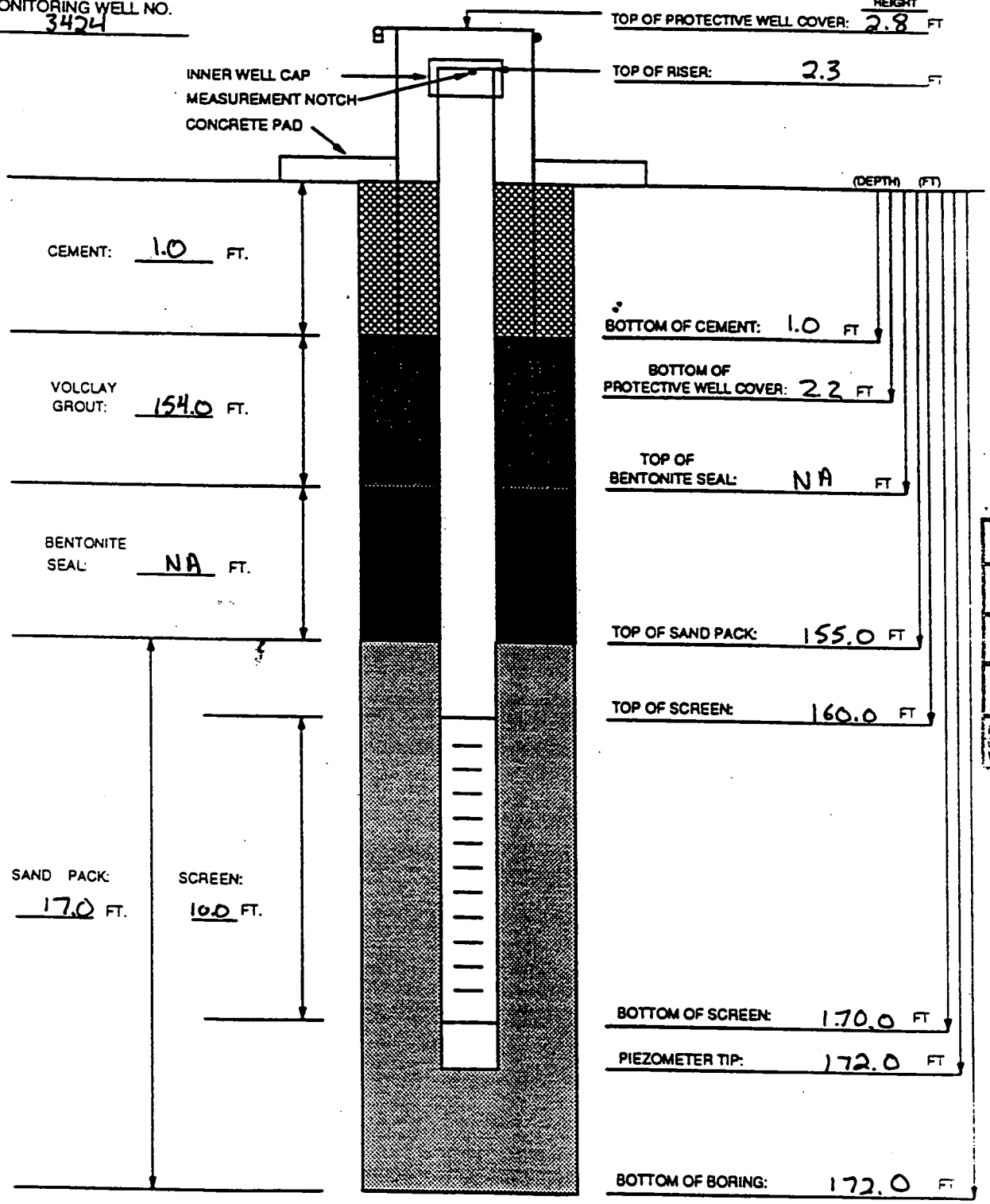
Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
*Sieve Analysis collected from 160.0 - 170.0 FT - Sample 104690
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3424

INSTALLATION DATE: 12/21/92 - 12/30/92



	Initial	Date
Field Check	CB	2/10/93
1st Check		
2nd Check		
Hard Copy Verification		

BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 17 bags of 4/30 coarse
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 52 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1750 gals.
OTHER: 31 soil drums, 0 water
TASK: 602 04.27

NOTES:

1) RISER PIPE IS 4 in IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 in IN. ID. 316 STAINLESS STEEL PIPE WITH 0.002 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 95.0 FT. 12/30/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH [illegible] GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeardley

000197

ASI FORM 0157 REV. (0)

PIEZOMETER INSTALLATION SHEET 5711

PROJECT NAME RCRA Phase I
PROJECT NO. 602 04.27
BORING NO. 3424
PIEZOMETER NO. 3424

FIELD ENG./GEO. B. Yeardley DATE 12/30
CHECKED BY C Bruer DATE 12/30/9
DATE OF INSTALLATION 12/21/92 – 12/30/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 TO 95.0
FLUID — FROM — TO —

TYPE OF BIT Hammer – Percussion
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 TO ~~172.0 ft~~ 175.0 B
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 16 – 10 ft, 2 – 2 ft
JOINING METHOD Flush Joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.3			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.2			
BOREHOLE FILL MATERIALS:	0.0	1.0		
VOLCLAY GROUT / ~~SLURRY~~ CEMENT By 12/30/92	TOP 1.0	BOTTOM 155.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 155.0	BOTTOM 172.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 160.0	BOTTOM 170.0	TOP	BOTTOM
PIEZOMETER TIP	172.0			
BOTTOM OF BOREHOLE	172.0			
GWL AFTER INSTALLATION	95.0			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS A variance was written on this well – a five (5) foot sandpack was installed above the top of the screen.

10 20 30 40 50 60 70 80 90 100
10 20 30 40 50 60 70 80 90
GRAIN SIZE
1/1000 inch
10 X 10 PER INCH
104690
000199

Customer Number 104690

MATERIAL: _____ SAMPLE NUMBER: 01217-053

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 124.7

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	54.14	43.4	43.4	78.7
20	24.18	19.4	62.8	33.5
40	18.83	15.1	77.9	16.7
60	8.88	7.1	85.0	9.8
100	5.27	4.2	89.2	5.9
200	6.14	4.9	94.1	3.0
Pan	7.14	5.7	99.8	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
J Roberts		

GRAIN SIZE 40% RETAINED >100 .001 inch

50% 54

90% 6

	Initial	Date
	CB	2/6/93

Customer Number 104690

MATERIAL: _____ SAMPLE NUMBER: 91217-053

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 124.7

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	54.14	43.4	43.4	78.7
20	24.18	19.4	62.8	33.5
40	18.83	15.1	77.9	16.7
60	8.88	7.1	85.0	9.8
100	5.27	4.2	89.2	5.9
200	6.14	4.9	94.1	3.0
Pan	7.14	5.7	99.8	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
J Roberts		

GRAIN SIZE 40% RETAINED >100 .001 inch

50% 54

90% 6

	Initial	Date
	CB	3/6/93

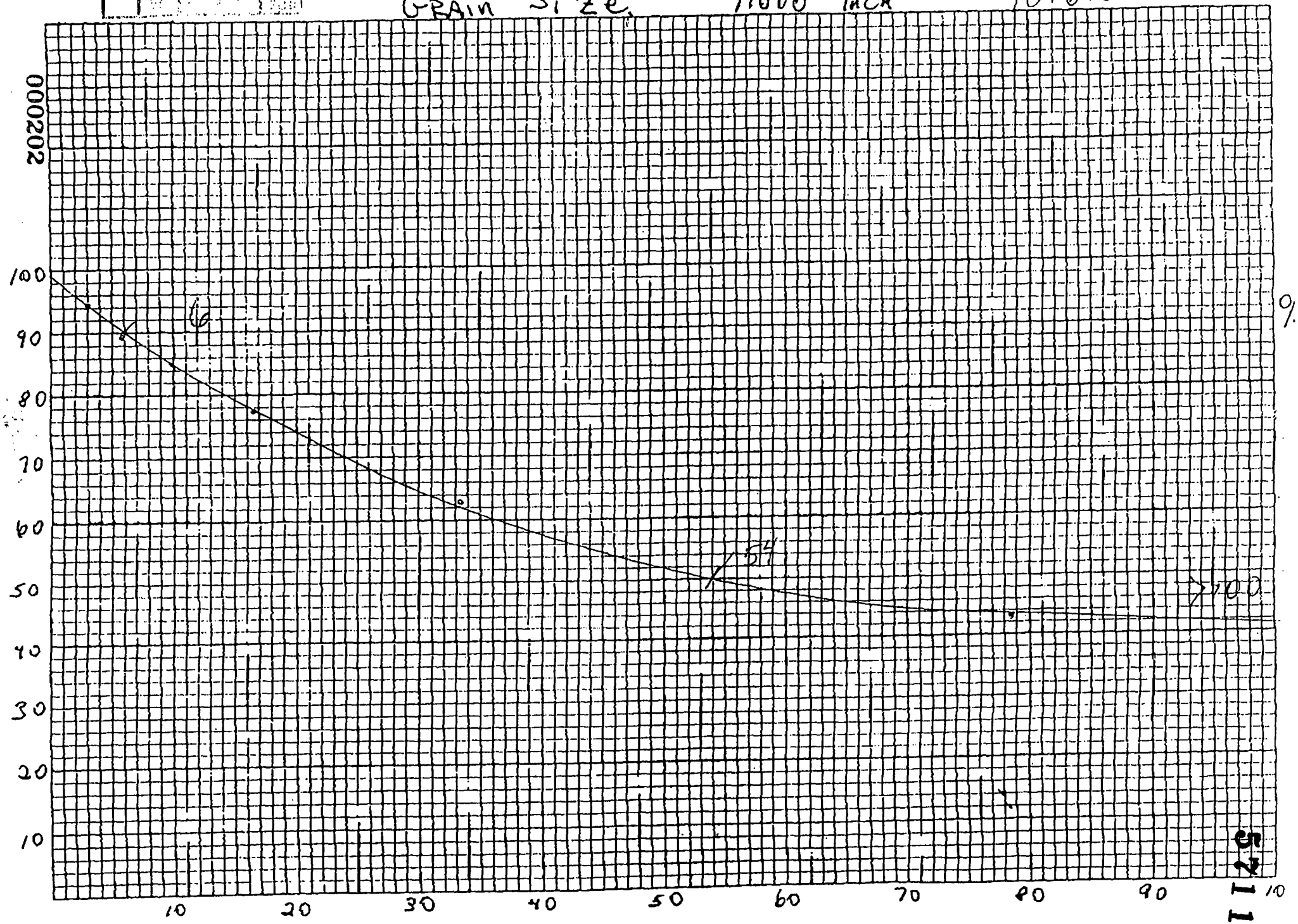
NO. 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

MW 3424

104690

Grain Size, 1/1000 inch



DEC-18-92 FRI 15:15 WHOO ANALYTICAL FAX NO. 513/300001 P.06

Monitor Well 3424 BRIAN YEARDLEY

Sand Pack and Sieve size determination

I. Wemco values for grain size
40% => 100 (.100)
50% = 54 (.054)
90% = 6 (.006)

II 40% ÷ 90% Ratio or Uniformity Coefficient
0.100 in / .006 = 16.7 which is > 3
∴ use factor of 4

CB 2/10/92

III 50% value x 4
.054 in x 4 = .216

IV 0.216 falls to left of both medium and coarse grain size distribution curves. Howevever, this value is closer to coarse grain curve and therefore the coarse grain sand (#30) with the 20 slot (0.02 in) screen will be used. This allows for maximum flow of water into well and also retain formation

Monitor Well 3424 BRIAN YEARDLEY

Sand Pack and Sieve size determination

I. Wemco values for grain size

40% = >100 (.100)

50% = 54 (.054)

90% = 6 (.006)

II 40% ÷ 90% Ratio or Uniformity Coefficient

0.100 in / .006 = 16.7 which is > 3

∴ use factor of 4

	Initial	Date
Field Check	CB	9/10/92
In Field		
2nd Review		
Hard Copy Verification		

III 50% value × 4

.054 in × 4 = .216

IV 0.216 falls to left of both medium and coarse grain size distribution curves. Howevere this value is closer to coarse grain curve and therefore the coarse grain sand (#30) with the 20 slot (0.02 in) screen will be used. This allows for maximum flow of water into well and also retain formation

VISUAL CLASSIFICATION OF SOILS

571

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/8/92	
ELEVATION:	GWL: Depth 96.7 ft Date/Time 10/7/92	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/15/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
1	10:25 10:27 9/9/92	1 1 1	3	V Stiff 2.5Y(6/3) Light yellowish brown Clayey silt, w/ organics no plasticity, dry	CL ML	3.25	HNU = 0 ppm BG = 20 cpm
2	10:27 10:29 9/9/92	16 14 14	11	Hard 2.5Y(6/6) Olive yellow silty clay, no plasticity dry	CL	4.5	HNU = 0 ppm BG = 60 cpm
3 4	10:30 10:32 9/9/92	8 23 48	14	Hard 2.5Y(6/6) Olive yellow, silty clay, no plasticity, dry	CL	4.5	HNU = 0 ppm BG = 60 cpm
5 6	1405 10:33 9/9/92	48 50	15	SAA	CL	4.0	HNU = 0 ppm BG = 60 cpm
7	1420 10:33 9/9/92	19 21 28	15	Hard 2.5Y(6/6) Olive yellow mottled w/ gray silty clay w/ gravel. No plasticity, dry	CL	4.5	HNU = 0 ppm BG = 60 cpm
8 9	1430 10:34 9/9/92	11 13 20	0	No Recovery	NA	NA	HNU = NA BG = NA
10	1445 10:34 9/9/92	11 17 21	11	Hard 10YR(5/8) Yellowish brown mottled w/ gray silty clay w/ some gravel, low plasticity, slightly moist	CL	4.0	HNU = 0 ppm BG = 60 cpm
11 12	1525 10:35 9/9/92	13 13 17	15	SAA	CL	4.5	HNU = 0 ppm BG = 60 cpm
13	1535 10:35 9/9/92	8 10 15	0	No Recovery	NA	NA	HNU = NA BG = NA
14	1545 10:35 9/9/92	8 13 15	16	V. Stiff 2.5Y(4/1) Gray gravelly clay, low plasticity, slightly moist	CL	2.25	HNU = 0 ppm BG = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background: HNU = 0 ppm BG: 40 cpm - 60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		DATE 9/9/92
BORING NUMBER: 4424	COORDINATES:		DATE STARTED: 9/9/92
ELEVATION:	GWL: Depth see p. 1	Date/Time	DATE COMPLETED: 10/14/92
ENGINEER/GEOLOGIST D. O'Brien	Depth	Date/Time	PAGE 2 OF 21
DRILLING METHODS: Cable Tool			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1610 10285 9/9/92	6 7 9	9	Stiff 2.5Y(N5/1) Gray gravelly silty clay, low plasticity slightly moist.	cl	1.8	HNU = 0ppm BZ = 40cpm
17	1620 10286 9/9/92	4 8 12	13	Stiff 2.5(N5/1) gray gravelly silty clay, low plasticity, slightly moist	cl	1.25	HNU = 0ppm BZ = 60cpm
18	1630 10287 9/9/92	4 5 11	10	SAA	cl	1.5	HNU = 0ppm BZ = 40cpm
19	0540 10288 9/10/92	5 7 8	9	SAA, medium stiff	cl	.75	HNU = 0ppm BZ = 60cpm
20	0550 10289 9/10/92	3 8 10	6	SAA, stiff	cl	1.5	HNU = 0ppm BZ = 40cpm
21	0400 10290 9/10/92	5 8 11	10	SAA, stiff	cl	1.0	HNU = 0ppm BZ = 60cpm
22	0915 10291 9/10/92	8 13 12	4	SAA, v. stiff	cl	2.0	HNU = 0ppm BZ =
23	1045 10292 9/10/92	7 8 11	5	SAA	cl	2.25	HNU = 0ppm BZ = 40cpm
24	1055 10293 9/10/92	5 8 11	7	SAA, stiff	cl	1.25	HNU = 0ppm BZ = 60cpm
25	1045 10294 9/10/92	8 6 21	5	SAA	cl	1.5	HNU = 0ppm BZ = 40cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/10/92	
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/15/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1315 102945 9/10/92	3 3 4	14	Stiff 2.5Y(N5/1) Gray, silty gravelly clay, low plasticity slight moist	CL	1.75	HNU = 0 ppm BZ = 60 ppm
32	1320 102946 9/10/92	3 8 13	15	SAA	CL	1.25	HNU = 0 ppm BZ = 40 ppm
33							
34	NA 9/10/92	4 3 15	0	NO RECOVERY	NA	NA	HNU = ~~0 ppm~~ BZ = NA NA 9/10/92
35	1335 102947 9/10/92	15 9 16	15	V Stiff 2.5Y(N5/1) Gray gravelly clay, low plasticity, moist	CL	2.25	HNU = 0 ppm BZ = 40 ppm
36	1240 102948 9/10/92	7 12 20	5	Stiff 2.5Y(N5/1) Gray gravelly clay, low plasticity, moist	CL	1.5	HNU = 0 ppm BZ = 40 ppm
37	1325 9/10/92						
38	1130 102949 9/14/92	4 10 20	12	SAA, V Stiff Bottom 2" sand mixed in	CL	2.25	HNU = 0 ppm BZ = 60 ppm
39	1320 102950 9/14/92	19 17 16	10	Dense 2.5Y(N5/1) Gray clayey sand, very fine, moist.	SC	NA	HNU = 0 ppm BZ = 40 ppm
40							
41	1345 102951 9/14/92	6 10 17	9	V Stiff 2.5Y(N5/1) Gray silty gravelly clay w/ fine sand. No plasticity moist.	CL	2.0	HNU = 0 ppm BZ = 40 ppm
42							
43	1400 102952 9/15/92	10 12 19	15	Hard 2.5Y(N5/1) Gray gravelly clay, no plasticity, moist	CL	4.0	HNU = 0 ppm BZ = 40 ppm
44	1410 102953 9/15/92	10 15 19	3	V. Stiff 2.5Y(N5/1) Gray gravelly silty clay, low plasticity moist	CL	2.5	HNU = 0 ppm BZ = 40 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/15/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/12/92	
DRILLING METHODS Cable Tool		PAGE 4 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1425 102954 9/15/92	8 17 22	17	V. Stiff 2.5Y(N5/1) Gray silty gravelly clay, low plasticity, moist	CL	2.5	HNU = 0 ppm BG = 60 cpm
47 48	1445 102955 9/15/92	20 30 32	14	SAA	CL	2.25	HNU = 0 ppm BG = 40 cpm
49	1505 102956 9/15/92	16 27 36	18	SAA	CL	2.5	HNU = 0 ppm BG = 60 cpm
50 51	1620 102957 9/15/92	16 20 20	8	V. Stiff 2.5Y(N5/1) Gray sandy gravelly clay, low plasticity, moist.	CL	2.5	HNU = 0 ppm BG = 60 cpm
52	1630 9/15/92 102958 9/15/92	7 13 21	0	No Recovery	NA	NA	HNU = NA BG = NA
53 54	1645 102959 9/15/92	11 17 30	12	V. Stiff 2.5Y(N5/1) gray silty gravelly clay, low plasticity moist	CL	2.25	HNU = 0 ppm BG = 60 cpm
55	1655 102959 9/15/92	7 12 22	16	SAA	CL	2.0	HNU = 0 ppm BG = 60 cpm
56 57	1700 102960 9/15/92	8 12 16	14	SAA	CL	2.0	HNU = 0 ppm BG = 60 cpm
58	1710 102961 9/15/92	4 8 13	18	Stiff 2.5Y(N5/1) gray clay med. plasticity, moist.	CL	1.5	HNU = 0 ppm BG = 60 cpm
59	1725 102962 9/15/92	20 50/2	9	Top 2" SAA V. Dense. 10YR(5/6) Yellowish brown, clayey silt, moist	ML	NA	HNU = 0 ppm BG = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/16/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIS D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/15/92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
U1	1025 1027163 9/16/92	20 28 30	8	V. Dark. 2.5Y (3/4), light olive brown, silty sand, poorly graded, dry	SP	NA	HNU = 0ppm BG = 40ppm
U2				Begin sampling every 5ft. See next page			HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/16/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/15/92	
DRILLING METHODS: Cable Tool		PAGE 16 OF 21	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
66.5	1115 102964 9/16/92	50/5	5	V. Dense. 2.5Y(5/4) Light olive brown, med. grained sand, poorly graded, dry	SP	NA	HNU = 0 ppm BZ = 100 ppm
70	1305 102965 9/16/92	15 20 25	7	SAA, dense	SP	NA	HNU = 0 ppm BZ = 100 ppm
75	1345 102966 9/16/92	7 50/3	5	SAA, v. dense.	SP	NA	HNU = 0 ppm BZ = 100 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS 5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/16/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/14/92	
DRILLING METHODS: Cable Tool		PAGE 7 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31.5	4415 102967 9/16/92	30 50/2	6	V. Dense. 2.5Y(5/4) Light olive brown sandy gravel with gravel, poorly graded, dry	SP	NA	HNu=0ppm BS=60cpm
36	4516 102968 9/16/92	25 50/2	5	V. Dense. 2.5Y(5/4) Light olive brown sandy gravel with gravel, moist	GW CB 11/4/92	NA	HNu=0ppm BS=40cpm
91.5	4617 102969 9/16/92	36 50/4	8	SAA, wet	GW CB 11/4/92	NA	HNu=0ppm BS=40cpm ~~Not listed/table~~ DSD 9/16/92

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/17/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/15/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 21	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9/17/92 96.5	~~0745~~ 0745 1027711 9/17/92	16 27 50	5	V. Dense. 2.5Y (5/4) Light olive brown, gravel w/ sand, wet well graded	GW ~~SW~~ GA 11/14/92	NA	HNU = 0 ppm BS = 40 cpm
100							
101.5	0780 1027712 9/17/92	20 32 40	5	V. Dense. 2.5Y (5/4) Light olive brown, med grain sand, w/ with gravel wet poorly graded	SP	NA	HNU = 0 ppm BS = 100 cpm
105							
105.5	0835 1027713 9/17/92	20 35 45	5	V. Dense. 2.5Y (5/4) Light olive brown, gravel w/ sand, wet poorly graded	GP ~~SP~~ DEO 11/14/92	NA	HNU = 0 ppm BS = 100 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter
Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:		DATE 9/17/92
ELEVATION:	GWL: Depth see p. 1	Date/Time	DATE STARTED: 9/9/92
ENGINEER/GEOLOGIST D. O'Brien	Depth	Date/Time	DATE COMPLETED: 9/17/92
DRILLING METHODS: Cable Tool			PAGE 9 OF 21

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
102717 111.5	23 20 5/11/92	23 20 16	10	Dense. 2.5Y(5/4) Light olive brown coarse sand w/ gravel, well graded, wet	SW	NA	HNU=0ppm BS=60cpm
118	0835 102916 9/18/92	10 9 11	18	M. Dense. 5Y(6/1) Gray med grain sand with gravel, ~~wet~~ poorly graded, wet	SP	NA	HNU=0ppm BS=40cpm
120	0925 102717 9/18/92	8 32 42	18	V. Dense. SAA	SP	NA	HNU=0ppm BS=40cpm
121.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/18/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9/18/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/1/92	
DRILLING METHODS: Cable Tool		PAGE 10 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1130 10297B 9/18/92	3 5 8	18	M. Dense. By (10YR 7/1) Gray mud grained sand w/gravel, fine to medium grained, wet	SP	NA	HNU = 0 ppm BZ = 40 cpm
DD 9/18/92 131.5							
DD 9/18/92 135	1135 10298B 9/18/92	10 15 25	18	SAA	SP	NA	HNU = 0 ppm BZ = 40 cpm
131.5							
135 136.5	1135 10299B 9/22/92	7 13 22	~~10~~ 18	SAA	SP	NA	HNU = 0 ppm BZ = 40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/22/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 9/15/92	
DRILLING METHODS Cable Tool		PAGE 11 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
141.5	1110 10:28:01 9/22/92	7 13 16	18	Mot. Dark BY (6/1) Gray, Med Fine Sand w/gravel, poorly graded, wet	SP	NA	HNU = 0 ppm BV = 0.0 ppm
146.5	1300 10:28:02 9/22/92	5 13 21	13	SAA Bottom 2" large gravel	SP	NA	HNU = 0 ppm BV = 0.0 ppm
151.5	1430 10:28:04 9/22/92	12 29 37	18	V Dark BY (6/1) Gray coarse sand w/some fines & gravel well graded, wet	SW	NA	HNU = 0 ppm BV = 0.0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/23/93	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 9/23/93	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 9/23/93	
DRILLING METHODS: Cable Tool		PAGE 12 OF 21	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
100.5	0900 D1886 9/23/93	10 20 22	10	Drill by (6/1) Gray, consolidated siltstone, well graded, wet	SW	NA	HNU = 0 ppm BG = 40 cpm
110 / 110.5	0935 D1886 9/23/93	11 13 22	10	SAA	SW	NA	HNU = 0 ppm BG = 40 cpm
115 / 115.5	1445 9/23/93	50/3	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		DATE 9/23/92
BORING NUMBER: 4424	COORDINATES:		DATE STARTED: 9/9/92
ELEVATION:	GWL: Depth see p.1	Date/Time	DATE COMPLETED: 10/14/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 13 OF 21
DRILLING METHODS: Cable Tool			

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	REC/VERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1128 10289 9/23/92	50 50/3	15	V. Dense. By (6/1) Gray coarse sand w/gravel, poorly graded, wet DSO 11/4/92	SP	NA	HNU = 0ppm RS = 60cpm
171.5							
172	1148 10289 9/23/92	20 30 50	13	V. Dense. By (6/1) Gray, med grained sand w/gravel, poorly graded, wet DSO 11/4/92 DSO 9/23/92	SP	NA	HNU = 0ppm RS = 60cpm
176.5							
180	0350 10290 9/24/92	22 24	17	Dense By (6/1) Gray med grain sand w/gravel, sand silty poorly graded, wet DSO 11/4/92			
181.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOI[redacted]

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/24/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 9/24/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 9/24/92	
DRILLING METHODS: Cable Tool		PAGE 14 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6.5	1330 102991 9/24/92	55/3	10	V. Dense. 5Y(6/1) Gray med grained sand, poorly graded wet	SP	NA	HNU = 0ppm BX = 60cpm
190	0930 102992 9/24/92	9 30 50	11	V. Dense 5Y(6/1) Gray coarse sand, well graded, wet Bottom 3" v. fine sand	SW	NA	HNU = 0ppm BX = 60cpm
195	1340 102994 9/25/92	15 30 85	18	V. Dense 5Y(6/1) Gray coarse sand w shell fragments, wet	SW	NA	HNU = 0ppm BX = 60cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/25/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/2/92	
DRILLING METHODS: Cable Tool		PAGE 15 OF 21	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1505 102995 9/25/92	75 75	16	V. Dense. 5Y (6/1) Gray med grain coarse & fine, well graded, wet	SW	NA	HNU = 0 ppm BG = 60 cpm
198 199	1625 102996 9/25/92	7 9 15	14	m. dense 5Y (6/1) Gray, med. grain to coarse gravelly sand, well graded, wet	SW	NA	HNU = 0 ppm BG = 60 cpm
199.5 200 201	1700 102997 9/25/92	8 12 15	18	m. dense 5Y (6/1) Gray, coarse to fine to medium sand w/ trace gravel, well graded, wet	SW	NA	HNU = 0 ppm BG = 60 cpm
201.5 202	0925 102998 9/25/92	20 43 50	15	V. Dense, SAA	SW	NA	HNU = 0 ppm BG = 60 cpm
202.5 203	0945 102999 9/25/92	23 24 50	12	V. Dense, 5Y (6/1) Gray medium sand w/ trace gravel, well graded, wet	SW	NA	HNU = 0 ppm BG = 60 cpm
204 205	1050 103000 9/25/92	25 32 49	15	SAA	SW	NA	HNU = 0 ppm BG = 60 cpm
				Resume 5ft. sampling see next page			HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA
							HNU = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/22/92	
ELEVATION:	GWL: Depth Sep. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIS D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/1/92	
DRILLING METHODS: Cable Tool		PAGE 11 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
211.5	1145 103001 9/22/92	7 14 21	18	M. Dense. 5Y(6/1) Gray med grained to fine sand and silt with some organic, wet Description on 1142	SW	NA	HNU = 0 ppm BK = 40 cpm
215							
216.5	1420 103002 9/22/92	5 16 46	18	SAA	SW	NA	HNU = 0 ppm BK = 40 cpm
220							
221.5	1550 9/23/92	23 24 40	0	No Recovery.	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/28/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/13/92	
DRILLING METHODS: Cable Tool		PAGE 17 OF 21	

DEPTH 000	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9/28/92	1645	13 16 27	0	No Recovery	NA	NA	
226.5	9/28/92						
230	1625	50 62	0	No Recovery	NA	NA	
231.5	9/30/92			Begin continuous sampling see next page.			
235							
236.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS 571

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4424	COORDINATES:	DATE 9/30/92	
ELEVATION:	GWL: Depth See A1 Date/Time	DATE STARTED: 9/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/5/92	
DRILLING METHODS: Cable Tool		PAGE 18 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
222	1405 103004 9/30/92	50/3	15	V. Dense 5Y(6/1) Gray Fine sand poorly graded, Wet 30 11/4/92	SP	NA	HNU = 0 ppm BG = 60 cpm
223	1430 103005 9/30/92	16 33 50	18	SAA	SP	NA	HNU = 0 ppm BG = 60 cpm
234	1445 103006 9/30/92	20 37 50	15	SAA	SP	NA	HNU = 0 ppm BG = 60 cpm
235	1430 103008 10/1/92	35 47 50	12	SAA	SP	NA	HNU = 0 ppm BG = 60 cpm
236	1445 103009 10/1/92	42 43 50	13	SAA	SP	NA	HNU = 0 ppm BG = 40 cpm
237	1015 103010 10/1/92	15 34 46	15	SAA	SP	NA	HNU = 0 ppm BG = 40 cpm
238	1330 103011	6 24 50	15	SAA [illegible]	SP	NA	HNU = NA BG = NA
239							HNU = NA BG = NA
240							HNU = NA BG = NA
							HNU = NA BG = NA

NOTES

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

[redacted]

PROJECT NUMBER: [redacted]	PROJECT NAME: [redacted]	[redacted]
BORING NUMBER: [redacted]	COORDINATES:	DATE: [redacted]
ELEVATION:	GWL: Depth See p. / Date/Time	DATE STARTED: [redacted]
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: [redacted]
DRILLING METHODS: Cable Tool		PAGE 19 OF 21

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
246.5	1540 03011 [illegible]	16 24 50	13	V. Dense 5Y(6/1) Gray fine to med coarse sand, poorly ~~graded~~ graded, wet	SP	NA	HNU=0 ppm, PID=[illegible] ppm
250	1510 [illegible] [illegible]	171/3	2	Weathered limestone	NA	NA	
251.5				Boring terminated at 250 ft.			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

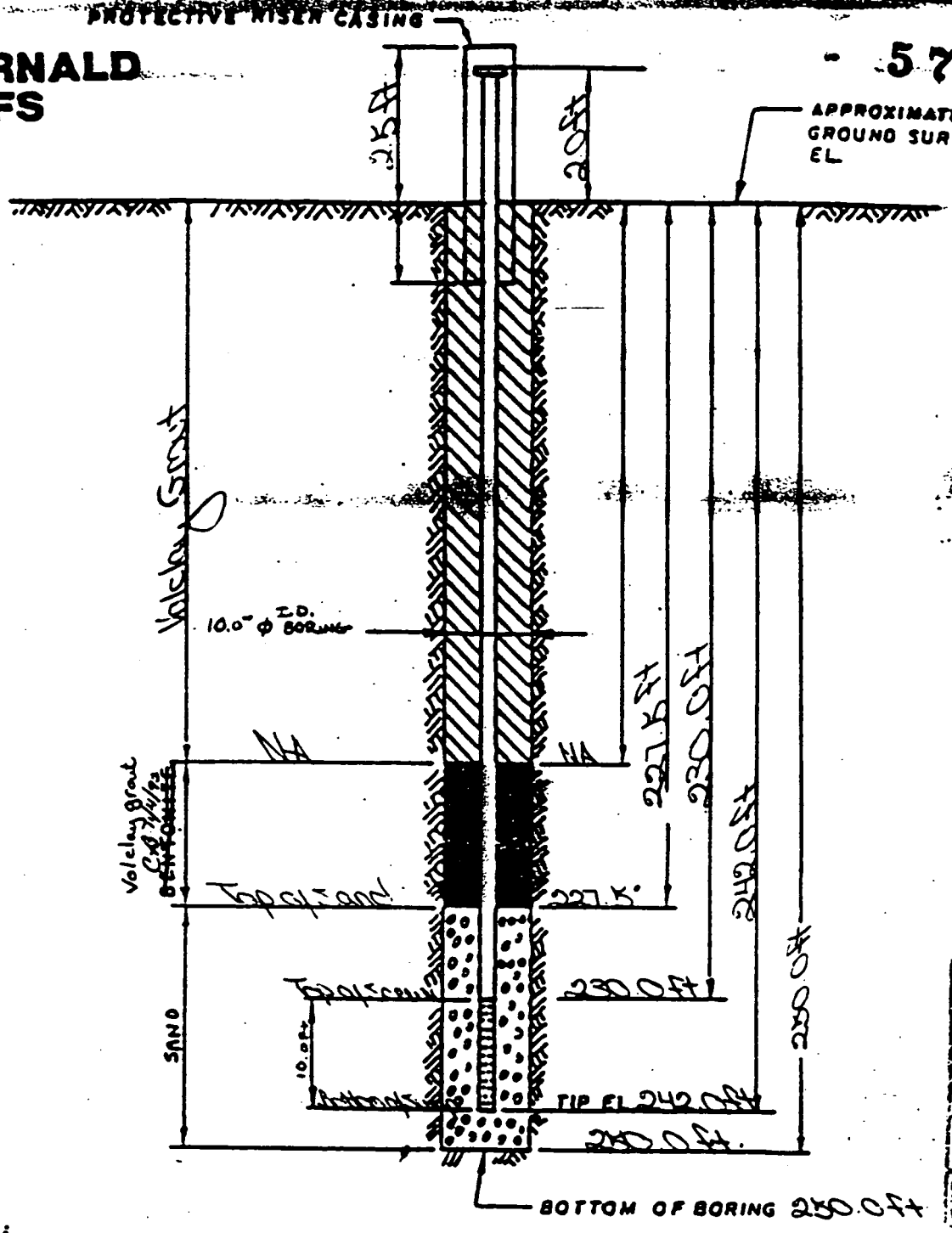
Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

[redacted]

FERNALD RI/FS

- 571-1



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS 4.0 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D. 316 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 96.7 ft
5. WATER LEVEL READING ON 10/11/92

[redacted]

22 bags of 10/20 sand

[redacted]

INSTALLATION DETAILS
MONITORING WELL # 4424

PREPARED FOR

FMPC RI/FS

PIEZOMETER INSTALLATION SHEET 3711

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. D.C. Brun DATE 10/12
PROJECT NO. 1029 04 27 CHECKED BY _____ DATE _____
BORING NO. 4424
PIEZOMETER NO. 4424 DATE OF INSTALLATION 10/12/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 ft TO 100 ft
FLUID ____ FROM ____ TO ____

TYPE OF BIT Chisel Bit
CASING SIZE (S) USED:
SIZE 20 in FROM 0.0 ft TO 200 ft
SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 10.0 ft²

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 23-10 ft 1-5 ft
JOINING METHOD Flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Lockable cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 227.5	TOP	BOTTOM
BENTONITE	TOP 0.0 NA	BOTTOM 227 NA	TOP	BOTTOM
SAND	TOP 227.5	BOTTOM 242.0	TOP	BOTTOM
GRAVEL	TOP 227.5	BOTTOM 242.0	TOP	BOTTOM
PERFORATED SECTION	TOP 230.0	BOTTOM 240.0	TOP	BOTTOM
PIEZOMETER TIP	242.0			
BOTTOM OF BOREHOLE	250.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

[redacted]

40% = 13 50% = 11

90% = 4

40%90% ratio = $\frac{13}{4}$ = 3.25

3.25 [redacted] factor of 4

[redacted]

USL Mud sand

[redacted]

B4424

5711

Customer Number L0301

MATERIAL: _____ SAMPLE NUMBER: 921002-001

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 171.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	4.59	2.7	2.7	78.7
20	5.13	3.0	5.7	33.5
40	37.21	21.7	27.4	16.7
60	72.35	42.3	69.7	9.8
100	26.22	15.3	85.0	5.9
200	14.03	8.2	93.2	3.0
Pan	10.72	6.3	99.5	

$\frac{W_2 \times 100\%}{W_1} = R$ | $\frac{\text{Original - Duplicate}}{\text{Average}} \times 100\% = RPD$

Analyzed by: John Robert | Checked by: [signature] | Date analyzed: 10-2-92

GRAIN SIZE 40% RETAINED ~~21~~ 13 .001 inch

50% , JLR ~~17~~ 11

90% 10-2-92 4

08/5/23

MADE IN U. S. A.

D-4424

Grain Size 1/1000 inch

000228

B4427

5711

Customer Number 103013

MATERIAL: _____ SAMPLE NUMBER: 921002-001

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 171.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	4.59	2.7	2.7	78.7
20	5.13	3.0	5.7	33.5
40	37.27	21.7	27.4	16.7
60	72.35	42.3	69.7	9.8
100	26.22	15.3	85.0	5.9
200	14.03	8.2	93.2	3.0
Pan	10.72	6.3	99.5	

$\frac{W_2 \times 100\%}{W_1} = R$

$\left| \frac{\text{Original - Duplicate}}{\text{Average}} \right| \times 100\% = RPD$

Analyzed by: John Robert

Checked by: [signature]

Date analyzed: 10-2-92

GRAIN SIZE 40% RETAINED ~~21~~ 13 .001 inch

50% ~~17~~ 11

90% 4

, JLR 10-2-92

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 1002 04.27	PROJECT NAME: RCRA phase II	
BORING NUMBER: 3428	COORDINATES:	DATE 12/3/92
ELEVATION:	GWL: Depth 20.74 ft Date/Time 12/14/92 1030	DATE STARTED: 11/27/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/14/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For descriptions of soils to 150.0 ft refer to boring log 4428			
75.0							
150.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cirbna

Driller: Craig Carlier, Kevin Myers

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 2	
BORING NUMBER: 3425	COORDINATES:	DATE 11/30/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/30/92
ENGINEER/GEOLOGIST: K. Gough	Depth Date/Time	DATE COMPLETED: 12/14/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150 151.5	0920 11/30/92	26 35 50/5	7	Very Dense Grayish Brown (10YR 5/2) Poorly Graded medium sand with some gravel, wet	SP	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
153.0	103086 1000 11/30/92	19 37 50/5	12	Very Dense Grayish Brown (10YR 5/2) Poorly Graded Gravelly Sand wet	SP	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
154.5	103086 1030 11/30/92	31 41 50/5	13	Very Dense Grayish Brown (10YR 5/2) well graded medium sand with some gravel wet	SW	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
156	103086 1110 11/30/92	27 34 50/5	14	Very Dense Grayish Brown (10YR 5/2) well graded medium sand with trace of gravel wet	SW	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
157.5	103086 1405 11/30/92	50/4	4	Very Dense Grayish Brown (10YR 5/2) well graded medium sand with some gravel wet	SW	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
159.0	103086 1440 11/30/92	36 41 50/5	16	Very Dense Grayish Brown (10YR 5/2) well graded medium sand with trace of gravel wet	SW	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
~~160.0~~ 160.5 162 163.5 165	103086 1530 11/30/92	37 45 50/5	12	Very Dense Grayish Brown (10YR 5/2) well graded medium sand with trace of gravel wet	SW	N/A	HNU = 1 ppm BS = 40 cpm α = 0 cpm
				For descriptions of soils refer to boring log 4425			
				Boring terminated at 165.0 ft			

NOTES:

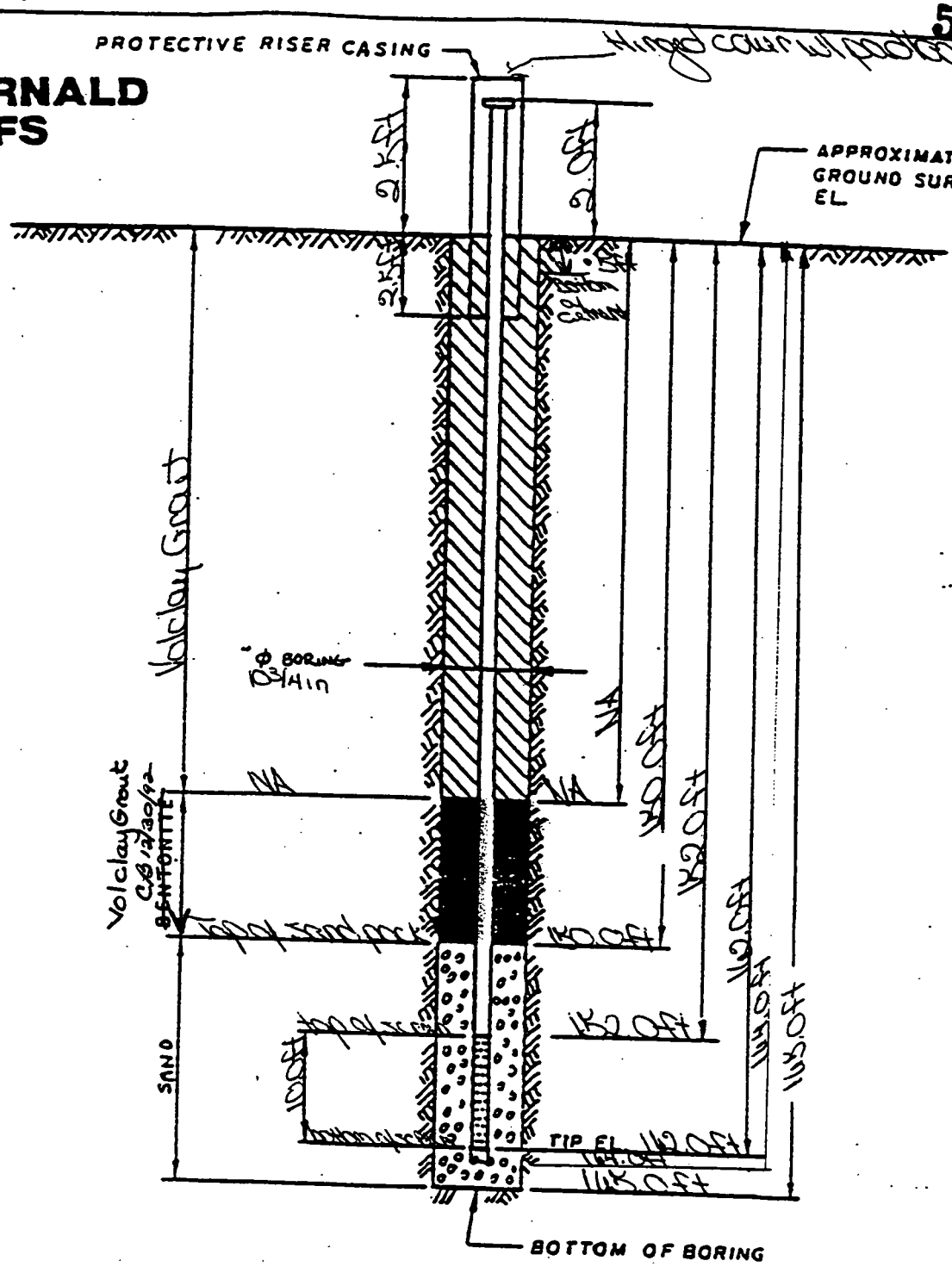
	Initial	Date
Field Check		

402-1-36

30/4

5711

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS 4.0 IN I.D. SCHEDULE 316SS PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D. 316SS PIPE CONTINUOUS SLOT SCREEN (0.020 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 30.74 ft
5. WATER LEVEL READING ON 12/14/92

Materials used during well installation:
15 bags of sand
50 bags of volclay grout
2500 gal. of water

INSTALLATION DETAILS
MONITORING WELL #3425

PREPARED FOR
FEMP RI/FS

316SS S. pipe: 1-10ft screen w/ 2-2ft sump, 15-10ft, 2-2ft 20-gal drums

FERNALD RI/FS

4 of 4

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase I
PROJECT NO. 162.04.27
BORING NO. 3428
PIEZOMETER NO. 3428

FIELD ENG./GEO. D. O'Brien DATE 12/[illegible]
CHECKED BY C. Brier DATE 12/30/9[illegible]
DATE OF INSTALLATION 12/14/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 90.0 ft
FLUID — FROM — TO —

TYPE OF BIT Chisel Bit
CASING SIZE (S) USED:
SIZE 10.0 in FROM 0.0 ft TO 10.0 ft
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 15-10 ft 2-2 ft
JOINING METHOD flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 2.5 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION large boring co[illegible] with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	CB 12/30/92 2.5 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Volclay GROUT/SLURRY (cement)	TOP 0.0	BOTTOM 0.5	TOP	BOTTOM
BENTONITE did not use	TOP 0.5	BOTTOM 150.0	TOP	BOTTOM
SAND 4/30	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL — none used	TOP 150.0	BOTTOM 164.0	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 152.0	BOTTOM 162.0	TOP	BOTTOM
BOTTOM OF BOREHOLE	164.0 ft			
GWL AFTER INSTALLATION	165.0 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

Sieve Analysis MW-3425

40% = 31 50% = 24 90% = 16

40%/90% = 31/16 = 5.16 > 3 so use coeff of

~~use slide~~

50% x 4 = ~~24~~ .024 x 4 = .096

use coarse sand & .020 screen

156

MW-3425

Customer Number 103086

MATERIAL: _____ SAMPLE NUMBER: 921201-015

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 160.1

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	22.17	13.8	13.8	78.7
20	35.11	21.9	35.7	33.5
40	44.92	28.1	63.8	16.7
60	32.79	20.5	84.3	9.8
100	12.10	7.6	91.9	5.9
200	5.72	3.6	95.5	3.0
Pan	6.42	4.0	99.5	

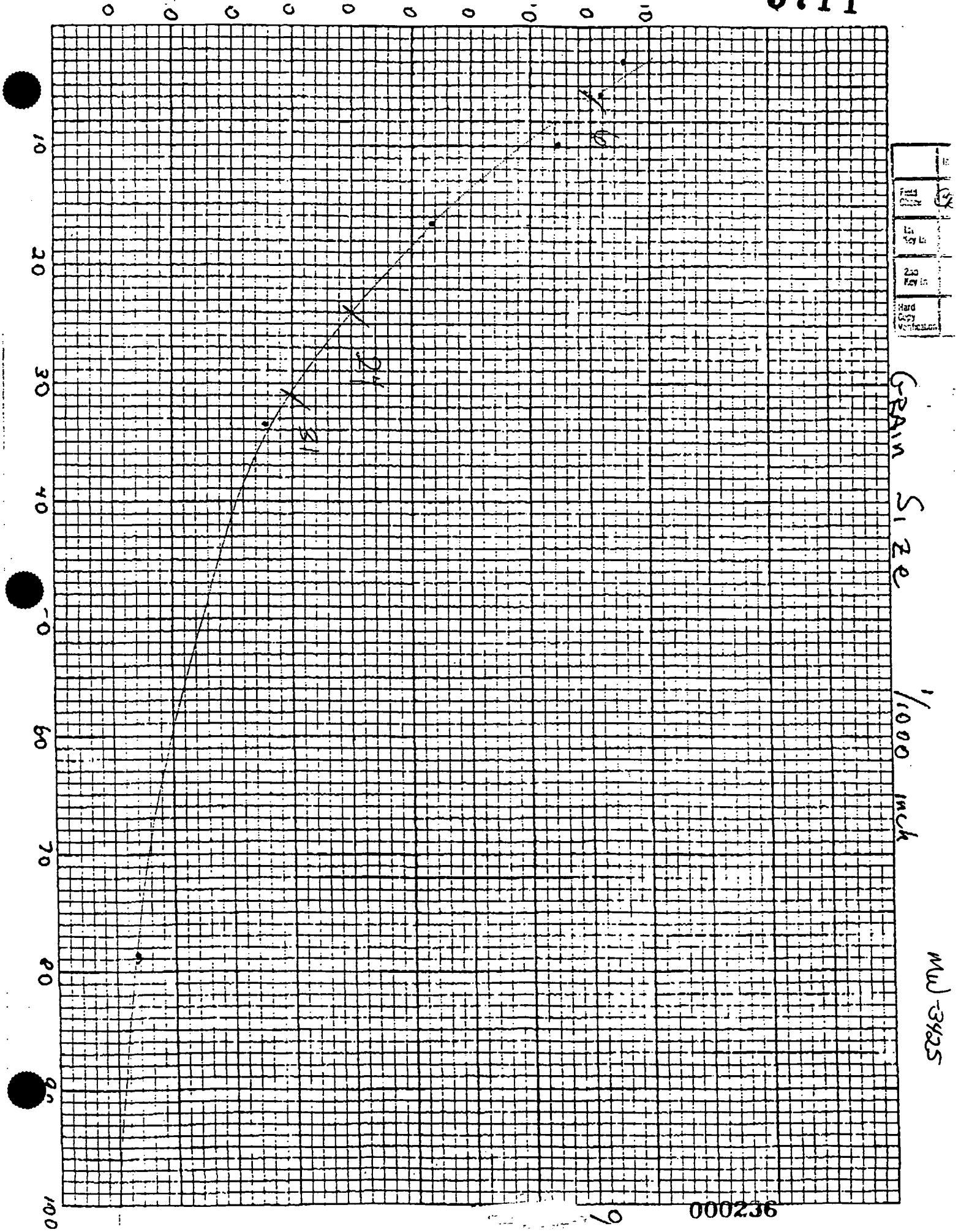
$\frac{W_2 \times 100\%}{W_1} = R$ $\left|\frac{\text{Original - Duplicate}}{\text{Average}}\right| \times 100\% = RPD$

Analyzed by: John Robert Checked by: Date analyzed: 12-1-92

Grain Size 40% Retained 31 .001 inch

50% 24

90% 6


GRAIN SIZE
1/1000 inch
MW-3435
Field Check
Key In
2nd Key In
Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/19/92	
ELEVATION:	GWL: Depth 20.65 Date/Time 11/18/92 1430	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/17/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
1	1420 103016 10/20/92	3 6 14	5	V. Stiff. 10YR (5/4) yellowish brown silty clay, no plasticity, dry	Cl	3.5	HNu = 0 ppm BG = 80 cpm
2 3	1425 10/20/92	17 21 17	0	No Recovery	NA	NA	HNu = NA BG = NA
4	1430 103017 10/20/92	6 15 29	10	V. Stiff. 10YR (5/4) yellowish brown silty clay, no plasticity, dry	Cl	3.5	HNu = 0 ppm BG = 80 cpm
5 6	1445 103018 10/20/92	10 14 27	12	Hard. 10YR (5/4) yellowish brown silty clay w/ limestone fragments, no plasticity, dry	Cl	4.5	HNu = 0 ppm BG = 60 cpm
7	1500 103019 10/20/92	10 13 19	10	SAA, V. Stiff	Cl	2.75	HNu = 0 ppm BG = 80 cpm
8 9	1510 10/20/92	15 25 30	0	No Recovery	~~Cl~~ NA	NA	HNu = NA BG = NA
10	1520 103020 10/20/92	10 18 22	4	Hard. 10YR (5/4) yellowish brown silty clay w/ limestone fragments no plasticity, dry	Cl	4.5	HNu = 0 ppm BG = 60 cpm
11 12	1535 10/20/92	12 16 20	0	No Recovery	NA	NA	HNu = NA BG = NA
13	1540 103021 10/20/92	6 14 20	10	V. Stiff. 10YR (5/4) yellowish brown, silty clay w/ gravel low plasticity, slightly moist Bottom 1" gray clay	Cl	3.5	HNu = 0 ppm BG = 80 cpm
14	1550 103022 10/20/92	2 7 11	2	Stiff. 2.5Y (5/1) C-ray gravelly clay, low plasticity slightly moist	Cl	1.5	HNu = 0 ppm BG = 80 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA Same As Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

~~BKG. HNu = 0 ppm BG = 60-70 cpm~~

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE: 10/22/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/1/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/16/92	
DRILLING METHODS: Cable Tool		PAGE 5/6 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
71.5	1448 103042 10/22/92	50/4	6	V. Dense. 2.5Y (5/4) Light olive brown, sand, poorly graded moist	SP	NA	HNU=0ppm PID=0ppm
75	1449 103043 10/22/92	9 13 17	8	SAA, dry	SP	NA	HNU=0ppm PID=0ppm
80	1450 103044 10/22/92	50/4	5	V. Dense 2.5Y (5/4) Light olive brown coarse sand, poorly graded, moist	SW	NA	HNU=0ppm PID=0ppm
81.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 442S	COORDINATES:	DATE 10/22/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 7 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
86.5	17HC 10/22/92	50/3	0	No Recovery.	NA	NA	
90	0830 1050-15 10/23/92	20 50/4	8	V. Dense. 2.5Y(5/4) Light olive brown, coarse sand, well graded, moist	SW	NA	HNU=0ppm BZ=60ppm
91.5							
95	0920 1050-16 10/23/92	50/4	4	SAA, wet	SW	NA	HNU=0ppm BZ=30ppm
96.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/20/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1555 10/20/92	7 12 15	0	No Recovery	NA	NA	HNU = NA BG = NA
17	1630 10/20/92	7 12 11	0	No Recovery	NA	NA	HNU = NA BG = NA
18	1710 10/20/92	3 9 12	0	No Recovery	NA	NA	HNU = NA BG = NA
19	1720 10/20/92	9 16 12	3	Hard. 2.5(5Y 1/1) Gray gravelly clay, no plasticity, slightly moist	CL	4.5	HNU = 0 ppm BG = 60 cpm
20	1730 10/20/92	6 9 11	9	SAA, stiff	CL	1.75	HNU = 0 ppm BG = 60 cpm
21	0845 10/21/92	5 10 15	9	SAA, stiff	CL	1.5	HNU = 0 ppm BG = 60 cpm
22	0855 10/21/92	15 16 17	4	SAA, v. stiff	CL	2.0	HNU = 0 ppm BG = 60 cpm
23	0900 10/21/92	6 10 17	3	SAA, stiff	CL	1.5	HNU = 0 ppm BG = 60 cpm
24	0910 10/21/92	50/4	0	No Recovery	NA	NA	HNU = NA BG = NA
25	1030 10/21/92	4 5 7	6	V. stiff. 2.5(5Y 1/1) Gray gravelly clay, no plasticity, slightly moist	CL	2.5	HNU = 0 ppm BG = 60 cpm
26							
27							
28							
29							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/21/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/15/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1035 10302 10/21/92	6 11 13	10	V. Stiff. 2.5Y(5/1) Gray gravelly clay. no plasticity slightly moist	Cl	3.25	HNu = 0 ppm BG = 50 cpm
32 33	1045 10/21/92	4 7 9	0	No Recovery	NA	NA	HNu = NA BG = NA
34	1120 10330 10/21/92	2 6 13	4	Stiff. 2.5Y(5/1) Gray gravelly clay. no plasticity slightly moist.	Cl	1.5	HNu = 0 ppm BG = 50 cpm
35 36	1430 10303 10/21/92	3 6 11	3	SAA	Cl	1.5	HNu = 0 ppm BG = 50 cpm
37	1445 10/21/92	3 6 11	0	No Recovery	NA	NA	HNu = NA BG = NA
38 39	1455 10302 10/21/92	9 11 11	5	V. Stiff 2.5Y(5/1) gray gravelly clay, no plasticity, slightly moist.	Cl	2.5	HNu = 0 ppm BG = 50 cpm
40	1505 10303 10/21/92	7 13 19	12	SAA, Stiff	Cl	1.5	HNu = 0 ppm BG = 50 cpm
41 42	1515 10/21/92	7 11 14	0	No Recovery	NA	NA	HNu = NA BG = NA
43	1525 10324 10/21/92	5 12	15	V. Stiff. 2.5Y(5/1) gray gravelly clay low plasticity slightly moist.	Cl	2.25	HNu = 0 ppm BG = 50 cpm
44	1545 10325 10/21/92	5 20 15	8	SAA	Cl	2.25	HNu = 0 ppm BG = 50 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE: 10/23/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 18 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
101.5	0950 10347 10/23/92	11 17 30	18	Dense. 2.5Y(5/4) Light olive brown coarse sand, poorly graded, wet (10/23/92)	SW	NA	HNU=0ppm BX=80cpm
105	1000 10349 10/23/92	23 38 40	18	SAA, V Dense	SW	NA	HNU=0ppm BX=60cpm
110	1450 10350 10/23/92	50/5	0	Dense. 2.5Y(5/4) light olive brown fine sand, poorly graded, wet	SP	NA	HNU=0ppm BX=80cpm
115							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/23/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/9/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 19 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
116.5	15B 103052 10/23/92	6 32 50	18	V. Dense 2.5Y(5/4) Light olive brown coarse sand, well graded, wet	SW	NA	HNU = 0 ppm BS = 600 cpm
120	15B 103053 10/23/92	3 7 11	18	SAA, M. Dense	SW	NA	HNU = 0 ppm BS = 600 cpm
125	15B 103054 10/23/92	15 50/4 → 12	18	SAA, V. Dense	SW	NA	HNU = 0 ppm BS = 600 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/21/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/13/92	
DRILLING METHODS: Cable Tool		PAGE 34 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1600 103030 10/21/92	8 11 14	16	V. Stiff. 2.5Y(5/1) Gray gravelly clay, low plasticity slightly moist.	CL	2.5	HNu = 0 ppm BG = 40 cpm
47	1635 103333 10/21/92	5 8 5	6	SAA, stiff	CL	1.25	HNu = 0 ppm BG = 60 cpm
48	1655 CB 10/21/92	8 15 27	0	No Recovery	NA	NA	HNu = NA BG = NA
49							
50	1710 103035 10/21/92	20 25 30	18	Stiff. 2.5Y(5/1) gray sandy clay, mod plastic, dry moist. Bottom 12" dense 10YR(5/6) yellowish brown fine sand, poorly graded, dry	CL SP	1.5	HNu = 0 ppm BG = 60 cpm
51				Begin sampling every 5 ft.			HNu = BG =

CB 12/21/92

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE: 10/21/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 10/21/92	
DRILLING METHODS: Cable Tool		PAGE 4 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
56.5	1125 103039 10/22/92	19 50/.2	4	V. Dark. 10YR (3/6) Yellowish brown sand poorly ~~sorted~~ graded dry	SP	NA	HNU = 0 ppm BZ = 40 cpm
60.0	1143 103040	50/.5	5	SAA	SP	NA	HNU = 0 ppm BZ = 60 cpm
61.5	10/22/92						
65	1150 103041	9 50	8	V. Dark. 2.5Y (5/4) Light olive brown coarse sand w/gravel, poorly graded dry.	SP	NA	HNU = 0 ppm BZ = 60 cpm
66.5	10/22/92	50/.1					

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 10/23/92	
ELEVATION:	GWL: Depth see p. / Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/17/92	
DRILLING METHODS: Cable Tool		PAGE 10 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135	1115 103086 10/26/92	15 23 50	10	Dense. 2.5Y(5/4) Light olive brown coarse sand, well graded, wet	SW	NA	HNU = 0 ppm BZ = 40 cpm
135							
135	0900 103087 10/27/92	50/2	1	v. Dense. 2.5Y(5/4) Light olive brown, fine sand w/some silt poorly graded, wet	SP	NA	HNU = 0 ppm BZ = 40 cpm
136.5							
140	0945 10/27/92	19 50/2	0	No Recovery	NA	NA	
141.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:		
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE 10/27/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE STARTED: 10/19/92	
DRILLING METHODS: Cable Tool		DATE COMPLETED: 11/17/92	
		PAGE 11 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
146.5	1405 103058 11/2/92	50/2	5	V. Dense 2.5Y(5/4) Light olive brown coarse sand w/ some clay & silt, well graded, wet	SW	NA	H.Nu = 0 ppm BZ = 60 cpm
150							
151.5	1440 11/2/92	50/4	0	No Recovery	NA	NA	
155							
156.5	0830 103060 11/4/92	22 50/3	18 12	V. Dense 2.5Y(5/4) Light olive brown coarse sand w/ gravel well graded, grading to a poorly graded sand, wet	SP SW	NA	H.Nu = 0 ppm BZ = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 11/4/92	
ELEVATION:	GWL: Depth See pg Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/17/92	
DRILLING METHODS: Cable Tool		PAGE 12 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
161.3	0900 10306 11/4/92	50/4	13	V. Dense 2.5Y (5/4) Light olive brown med to coarse sand. Chunks of the bottom, well graded, wet	SW	NA	HNU=0ppm BG=40cpm
165	1025 103062 11/4/92	21 27 32	15	V. Dense 2.5Y (5/4) Light olive brown med sand w/gravel. Well graded wet	SW	NA	HNU=0ppm BG=60cpm
170 171.5	1115 11/4/92	50/4	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Date 2/9/93

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 11/4/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/15/93	
DRILLING METHODS: Cable Tool		PAGE 13 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
176.5	1405 D5013 11/4/92	50/4	3	V. Dense. 2.5Y(5/4) Light olive brown, coarse sand(w) limestone chunks, poorly graded, wet.	SP	NA	HNU=0ppm BZ=100ppm
180	1445 D5014 11/4/92	17 50/3	7	SAA	SP	NA	HNU=0ppm BZ=40ppm
181.5							
183	1515 D5016 11/5/92	10 25 36	18	V. Dense. 2.5Y(5/4) Light olive brown, coarse to medium sand poorly graded, wet	SP	NA	HNU=0ppm BZ=40ppm
186.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE: 11/5/92	
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 14 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
190	1040 103067 11/5/92	25 50/5	12	V. Dense 2.5Y(5/4) lt. olive brown, medium sand w/ minor gravel, poorly graded, wet	SP	NA	HNU = 0ppm αβ = 60cpm
191.5							
195	1440 103068 11/5/92	50/3	~~14~~ 3	SAA	SP	NA	HNU = 0ppm αβ = 60cpm
196.5							
200	1525 103069 11/5/92	7 7 5	18	SAA	SP	NA	HNU = 0ppm αβ = 60cpm
201.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

4/9/93

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER 4425	COORDINATES:		DATE 11/6/92
ELEVATION:	GWL: Depth See p. 1	Date/Time	DATE STARTED: 10/19/92
ENGINEER/GEOLOGIST D. O'Brien	Depth	Date/Time	DATE COMPLETED: 11/18/92
DRILLING METHODS: Cable Tool			PAGE 15 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
205' 206.5'	1040 11/6/92	50/3"	0	No recovery	n/a	n/a	n/a
210'							
211.5'	1105 11/6/92	40-50/3"	0	No recovery	n/a	n/a	n/a
215'							
216.5'	1500 11/9/92 11/6/92	32-50/2"	12 in	very dense dark gray (10YR 4/1) medium sand, trace gravel, some silt, poorly graded, wet	SP	n/a	Hnu = 0 ppm BG = 80 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 11/9/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 18 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
235	1613 D3078 11/9/92	4B 3B/3	7	V. Dense. 2.5Y(5/4) Light olive brown medium to coarse sand, some gravel, poorly graded, wet.	SP	NA	HNU=0ppm BX=60cpm
236.5							
240	1615 D3079 11/9/92	17B/.1	1	Weathered shale & limestone chunks. (Bedrock)	NA	NA	HNU=0ppm BX=60cpm
241.5				Boring terminated at 240 ft. Bottom of sampling 240 ft			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - Same as Above

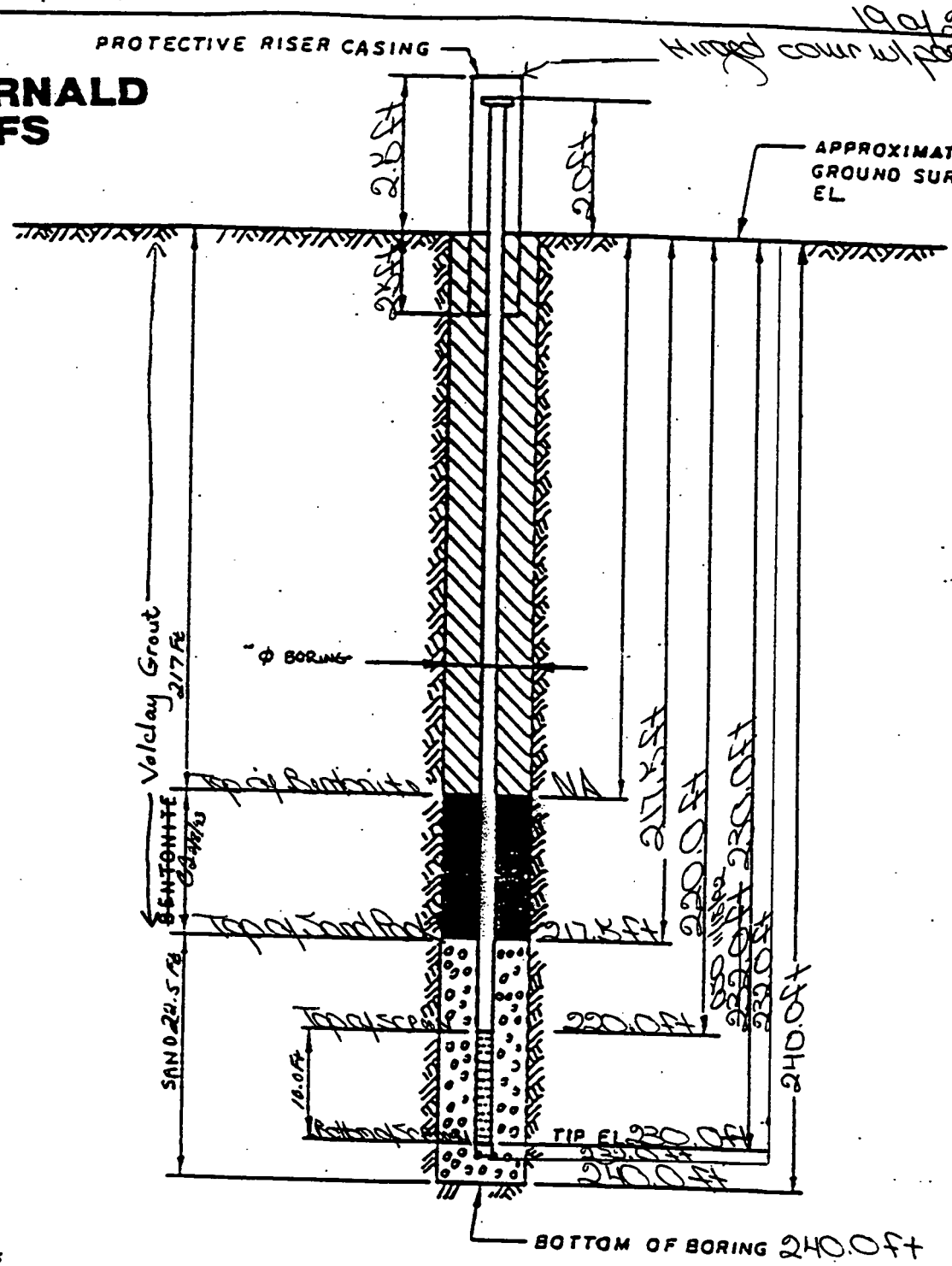
NA - Not Applicable

* Sieve Analysis sample at 103080 from 220.0 ft to 230.0 ft

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.020 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED (with welded silt trap)
4. ELEVATION OF WATER LEVEL 70.65 ft
5. WATER LEVEL READING ON 11/18/92

INSTALLATION DETAILS
MONITORING WELL # 4425

PREPARED FOR
TEMP RI/FS

Materials used during well installation:
23 bags of 4130 sand
63 bags of volclay grout
3000 gallons of water used during grouting & drilling
3/4 stainless steel pipe sections: 22-10ft; 1-2ft, 1-10ft screen w/2ft silt trap
20 soil drums; 2 water drums

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE: 11/6/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/16/92	
DRILLING METHODS: Cable Tool		PAGE 16 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 INCH	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
220	1600	72-50/3"	9 in	very dense, dark gray (10YR 4/1) medium to coarse sand, trace gravel some silt, poorly graded, wet	SP	n/a	Hnu = 0 ppm Bk = 80 cpm
221.5	11/6/92						
225	1355	50/3	8 in	V. Dense 2.5Y(5/4) Light olive brown fine sand, trace gravel some silt, poorly graded, wet	SP	NA	HNU = 0 ppm Bk = 160 cpm
226.5	11/9/92		4				
				DOO 11/6/92 Begin continuous sampling			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter

Kevin Myers

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

RMFS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4425	COORDINATES:	DATE 11/9/92	
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/19/92	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/18/92	
DRILLING METHODS: Cable Tool		PAGE 17 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 UNIT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
226.5	1423 / 0307 / 11/9/92	50/3	2	V. Dense 2.5Y (5/4) Light olive brown, coarse sand with gravel & silt, well graded, wet	SW/GW	NA	HNU = 0 ppm BG = 10 cpm
228	1425 / 0307 / 11/9/92	50/3	4	SAA	SW/GW	NA	HNU = 0 ppm BG = 10 cpm
229.5	1500 / 0307 / 11/9/92	50/3	4	SAA	SW/GW	NA	HNU = 0 ppm BG = 10 cpm
231				Resume SPT sampling			HNU = BG =
							HNU = BG =
							HNU = BG =
							HNU = BG =
							HNU = BG =
							HNU = BG =

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Craig Coulter, Kevin Myers

SAA Same as Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

DATE 2/9/93

FERNALD
RI/FS

20 of 20

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase 1 FIELD ENG./GEO. D. O'Brien DATE 11/18/92
PROJECT NO. 1122 04.27 CHECKED BY C. Brier DATE 2/8/93
BORING NO. 4428
PIEZOMETER NO. 4428 DATE OF INSTALLATION 11/18/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Chisel Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID water FROM 0.0 ft TO 95.0 ft	SIZE 10.0 in FROM 0.0 ft TO 240.0 ft
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 22-10 ft, 1-2 ft
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD Flush joint threaded
TOTAL PERFORATED AREA 10.0 ft	

PROTECTION SYSTEM

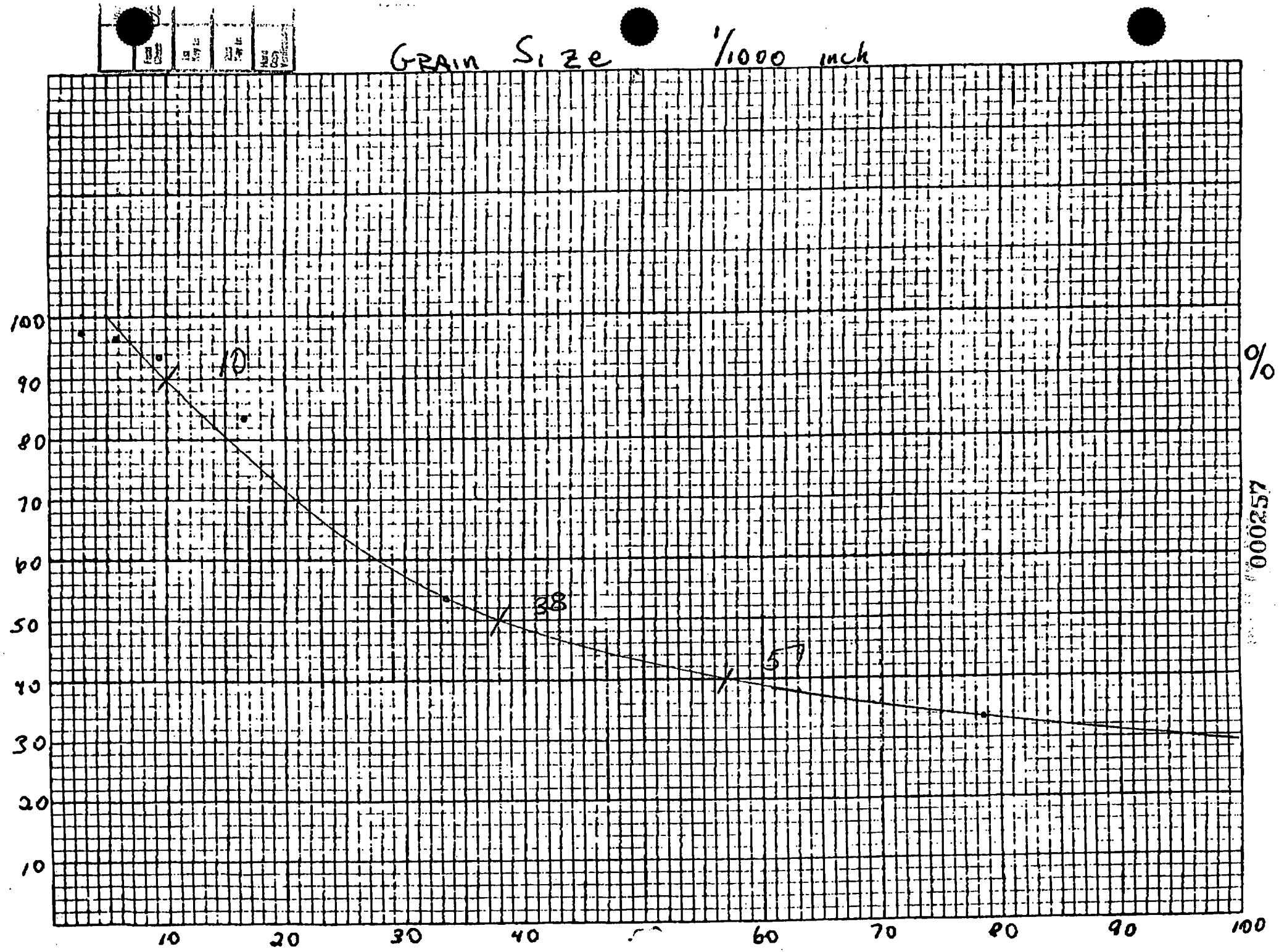
RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION buried boring
PROTECTIVE PIPE O.D. 10 3/4 in	cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.5~~ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 217.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 217.5	BOTTOM 230.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 220.0	BOTTOM 230.0	TOP	BOTTOM
PIEZOMETER TIP	232.0 ft			
BOTTOM OF BOREHOLE	240.0 ft			
GWL AFTER INSTALLATION	70.15 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11


Grain Size 1/1000 inch
%
100
90
80
70
60
50
40
30
20
10
10
38
59
10
20
30
40
60
70
80
90
100

000257

mw-4425

Customer Number 103080

MATERIAL: _____ SAMPLE NUMBER: 921110-065

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 101.49

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	34.37	33.9	33.9	78.7
20	20.21	19.9	53.8	33.5
40	30.40	30.0	83.8	16.7
60	10.15	10.0	93.8	9.8
100	2.69	2.6	96.4	5.9
200	1.50	1.5	97.9	3.0
Pan	1.64	1.6	99.5	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by: John Roberts

Checked by:

Date analyzed: 11-10-92

GRAIN SIZE 40% RETAINED 57 .001 inch

50% 32

90% 10

	Initial	Date
Field Check	CB	2/9/93
1st Sieve		
2nd Sieve		
Hand Check Verification		

MW - 4425

Sieve Analysis Calculations

40% = 57 50% = 38 90% = 10

$$\frac{40\%}{90\%} = \frac{57}{10} = 5.7$$

5.7 > 3 use factor of 4

.038 X 4 = 0.152

use 4/30 (coarse) sand 0.020 SCREEN

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27 wbaes	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2426	COORDINATES:	DATE 1/27/93	
ELEVATION:	GWL: Depth 78.8 Date/Time 2/4/93 1330	DATE STARTED: 1/27/93	
ENGINEER/GEOLOGIST: D. O'Brien	Depth 78.3 Date/Time 2/6/93 0900	DATE COMPLETED: 2/4/93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 4	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				For descriptions of soils from 0.0-74.0 Ft., refer to boring 4426, VC of Soils			
74.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Jim Saccani

Dan Jameson

SAA - Same as Above

NA - Not Applicable

Bkgd: HNU=0ppm BZ=40-10ppm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27		PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2426		COORDINATES:	DATE 1/29/93
ELEVATION:		GWL: Depth See p. 1 Date/Time	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: D. O'Brien		Depth See p. 1 Date/Time	DATE COMPLETED: 2/4/93
DRILLING METHODS: T. Atkinson	Cable Tool		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
74	1/29/93 103377 0845	30 47 49	18	V. Dense. 10YR(6/2) Light brownish gray, fine to coarse sand, trace gravel (fine to coarse), poorly graded well graded	SW	NA	HNu = 0 ppm BG = 60 cpm
75.5	1/29/93 103377 UK	27 37 40	18	SAA	SW	NA	HNu = 0 ppm BG = 40 cpm
77.0	1/29/93 103377 UK	47 60/3 10	9	V. Dense. 10YR(6/2) Light brownish gray, fine to coarse sand w/ coarse gravel, poorly graded, wet. Well graded on 2/1/93	SW	NA	HNu = 0 ppm BG = 40 cpm
78.5	1/29/93 NA	31 48 15	0	No Recovery	NA	NA	HNu = NA BG = NA Tried to sample twice
80.0	1/29/93 103377 UK	19 27 35	16	V. Dense 10YR(5/1) gray, fine to coarse sand, trace gravel, poorly graded, wet.	SP	NA	HNu = 0 ppm BG = 40 cpm
81.5	1/29/93 103377 1715	47 48 47	18	SAA	SP	NA	HNu = 0 ppm BG = 40 cpm
83.0	2/1/93 103377 0900	8 12 21	15	Dense. 10YR(5/1) Gray, fine to coarse sand w/ gravel, well graded, wet.	SW	NA	HNu = 0 ppm BG = 40 cpm
84.5	2/1/93 103377 0935	9 16 22	17	Dense. 10YR(5/1) Gray, fine to coarse sand, w/ gravel, well graded, wet.	SW	NA	HNu = 0 ppm BG = 40 cpm
86.0	2/1/93 103377 0950	11 10 14	18	M. Dense. 10YR(5/1) Gray, coarse sand, w/ gravel, well graded wet	SW	NA	HNu = 0 ppm BG = 60 cpm
87.5	2/1/93 103377 1010	5 6 10	18	SAA Boring terminated at 91.0 ft	SW	NA	HNu = 0 ppm BG = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 42 Cyclone

Driller: Jim Saccani

Dan Jameson

* Bottom of Sampling 89.5 ft

SAA - Same as Above

NA - Not Applicable

Note: Soils collected from 74.0-89.0 ft - used for sieve analysis

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

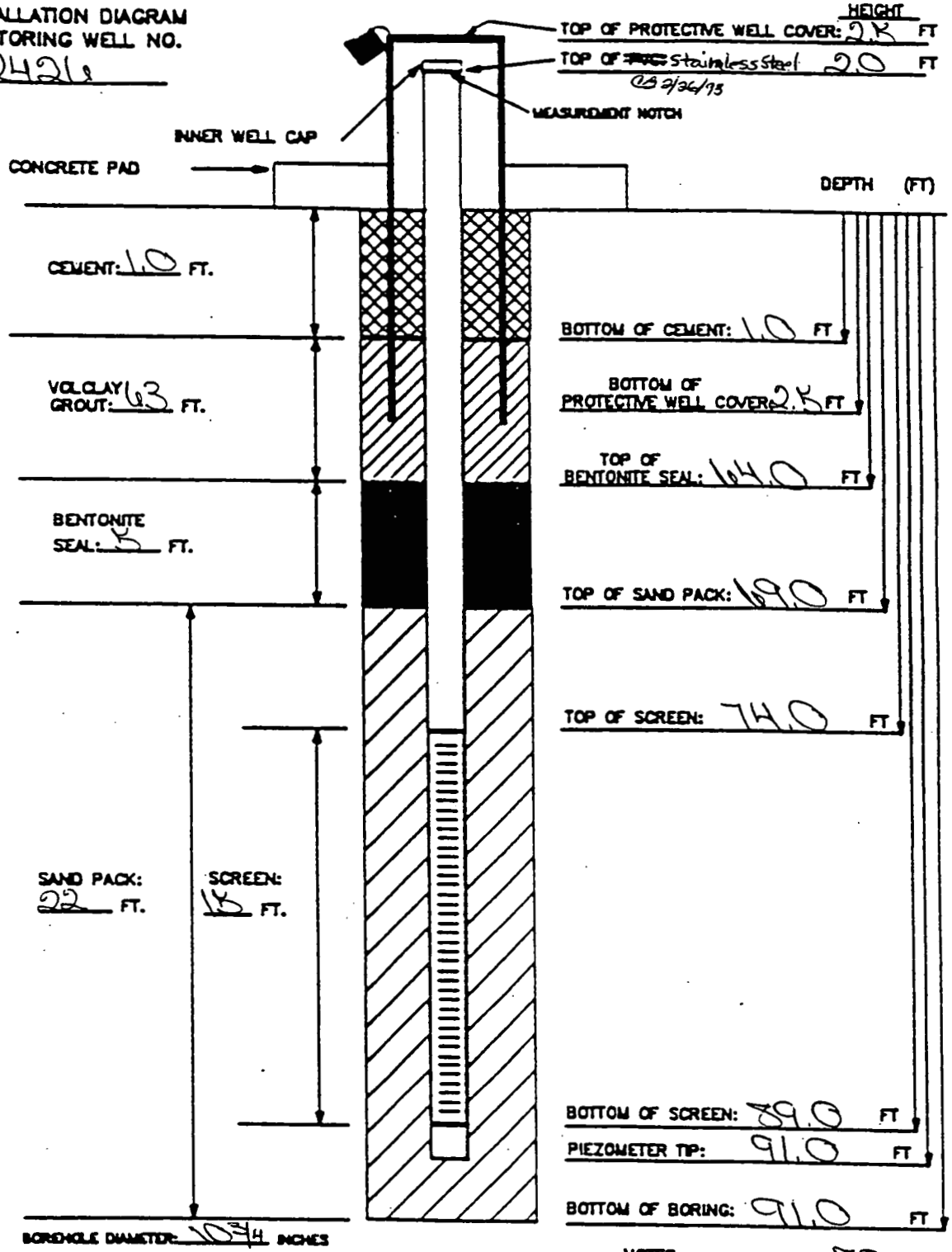
CB 2/26/93

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 2421

INSTALLATION DATE: 2/4/93



	Initial
Field Check	CB
1st Key In	
2nd Key In	
Hard Copy Verification	

MATERIALS USED:
SAND TYPE AND QUANTITY: 4/30 25 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 14 buckets
BAGS OF VOLCLAY GROUT: 17 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 100 gal
OTHER: 14 30 11 drums

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 316 S.S. PVC PIPE, FLUSH-THREADED JOINTS. DSO 2/4/93
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 316 S.S. PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 78.84 2/4/93

TASK: WA2 OU 27 (WBA 05)

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

H 044

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase 1 FIELD ENG./GEO. D. O'Brien DATE 2/[illegible]
PROJECT NO. 100 OH 127 (WBA 05) CHECKED BY C Brien DATE 02/26/
BORING NO. 2426
PIEZOMETER NO. 2426 DATE OF INSTALLATION 2/4/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT chisel bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 ft TO 91.0 ft	SIZE 10 3/4 in FROM 0.0 TO 91.0 ft
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in.
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 1-10 ft, 1-8 ft, 1-2
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD flush joint threads
TOTAL PERFORATED AREA 13 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft	OTHER PROTECTION hinged locking cover
PROTECTIVE PIPE O.D. 10 3/4 in	with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 64.0	TOP	BOTTOM
BENTONITE	TOP 64.0	BOTTOM 69.0	TOP	BOTTOM
SAND	TOP 69.0	BOTTOM 91.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 74.0	BOTTOM 89.0	TOP	BOTTOM
PIEZOMETER TIP	91.0			
BOTTOM OF BOREHOLE	91.0			
GWL AFTER INSTALLATION	78.8			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

MW-2426

Customer Number: 103377

MATERIAL: _____ SAMPLE NUMBER: 930201-092

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 133.9

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	31.87	23.8	23.8	78.7
20	28.66	21.4	45.2	33.5
40	29.21	21.8	67.0	16.7
60	22.14	16.5	83.5	9.8
100	11.07	8.3	91.8	5.9
200	4.54	3.4	95.2	3.0
Pan	5.44	4.1	99.3	

$\frac{W_2 \times 100\%}{W_1} = R$

$\left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$

Analyzed by: John Roberts

Checked by: [signature]

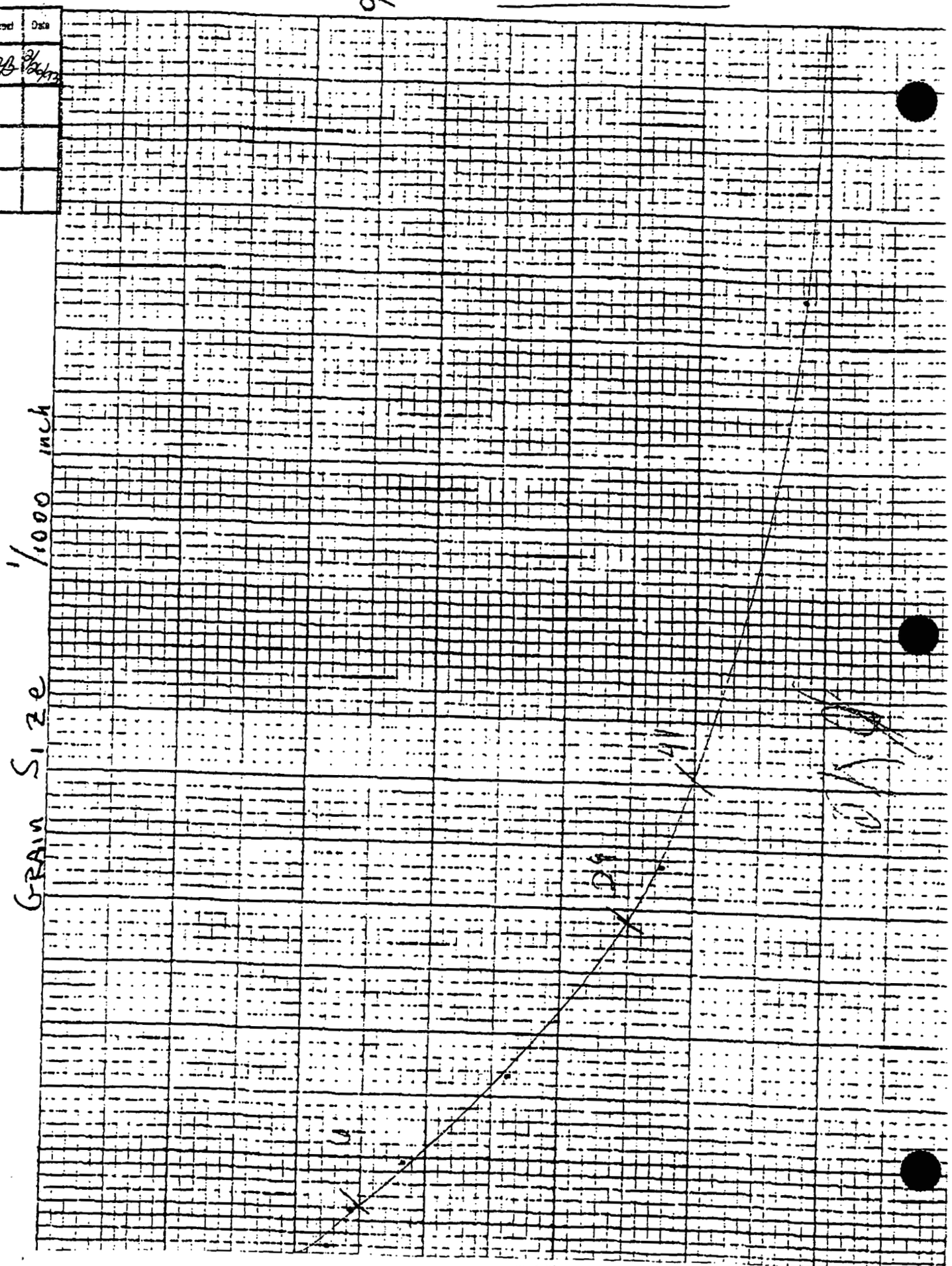
Date analyzed: 2-2-93

Grain Size Retained

40 %	41
50 %	29
90 %	6

MW — 2426

	Initial	Date
Field Check	CB	2/26/13
Well Log in		
Hard Copy Verification		



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NO. 340F AD DIETZGEN GRAPH PAPER
10 X 10 PER INCH

Sieve Analysis - WW 2426

5711

40% = 41 50% = 29 90% = 6

$\frac{40\%}{90\%} = \frac{41}{6} = \frac{6.83}{\cancel{6.83}}$ > 3 use factor of 4

CB 8/26/93

50% x 4 = .029 x 4 = 0.116

Use coarse sand & .020 slot screen

	initial	date
Field Check	CB	8/26/93
1st Rev to		
2nd Rev to		
Hard Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6020427	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3426	COORDINATES:	DATE: 12-21-92
ELEVATION:	GWL: Depth ~~13.55~~ Date/Time 1/28/93	DATE STARTED: 12-14-92
ENGINEER/GEOLOGIST: Kevin Seelk / D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/20/93
DRILLING METHODS: Cable Tool		PAGE 1 OF 84

DEPTH 0 ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1/4	RECOVERY 1/4	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				* For Soil Characterization of CO to 145.0 ft See boring Log for well 4426			
95							
145				* Continuous sampling will begin at 145.0 ft through 155.0 ft for Sieve screen Analysis			

NOTES:

Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller Jim Saccani
Kevin Cavanough

Samples collected per ASTM standard penetration test
All colors identified by the Munsell Color Chart.
Background { HNU 0 ppm
BG = 30 cpm
BG = 0 cpm

000267

402-11

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5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3426	COORDINATES	DATE 12/2/92	
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED 12/14/92	
ENGINEER/GEOLOGIST Kevin Sellak/D. O'Brien	Depth Date/Time	DATE COMPLETED 1/20/93	
DRILLING METHODS Cable Tool		PAGE 2 OF 4	

DEPTH (FT) 145.6	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (/)	RECOVERY (/)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
146.5	14:20 103376 11/6/93 12-2-92	24 37 53	18	Very Dense (5Y 4/2) Olive gray well graded gravelly sand wet	SW	NA	HNU = 0 PPM BS = 50 CPM
148.0	15:46 103376 12-2-92	21 19 14	18	Dense (5Y 4/2) Olive gray well graded gravelly sand wet	SW	NA	HNU = 0 PPM BS = 50 CPM
149.5	16:17 103376 12-2-92	33 37 34	16	Very Dense (5Y 4/2) Olive gray well graded sandy gravel wet	SW	NA	HNU = 0 PPM BS = 50 CPM
151.0	0910 103376 11/6/93	31 36 32	15	V. Dense (5Y (4/2) Olive gray med. to coarse sand, well graded, wet	SP	NA	HNU = 0 PPM BS = 40 CPM
152.5	1020 103376 11/6/93	42 43 49	13	V. Dense 5Y (4/2) Olive gray coarse sand, gravel, well graded, wet	SW	NA	HNU = 0 PPM BS = 40 CPM
154	1030 103376 11/6/93	33 42 37	17	V. Dense 5Y (4/2) Olive gray coarse sand w/ gravel, poorly graded, wet	SP	NA	HNU = 0 PPM BS = 50 CPM
155.5	1045 103376 11/6/93	30 43 43	15	SAA	SP	NA	HNU = 0 PPM BS = 40 CPM
157				Boring terminated at 157 CFT			

NOTES:

Drilling Company: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Sorcanti
Kevin Cavanaugh

* Samples collected for ASTM Standard Penetration Test
* Allocations identified by the Munsell Color Chart
Background { HNU = 0 PPM
BS = 50 CPM
* = 0 CPM
* Sample # 103376 - Sieve Analysis
SAA Same as above
NA Not Applicable

DSO 1/25/93

402-1

INSTALLATION DATE: 11/20/93

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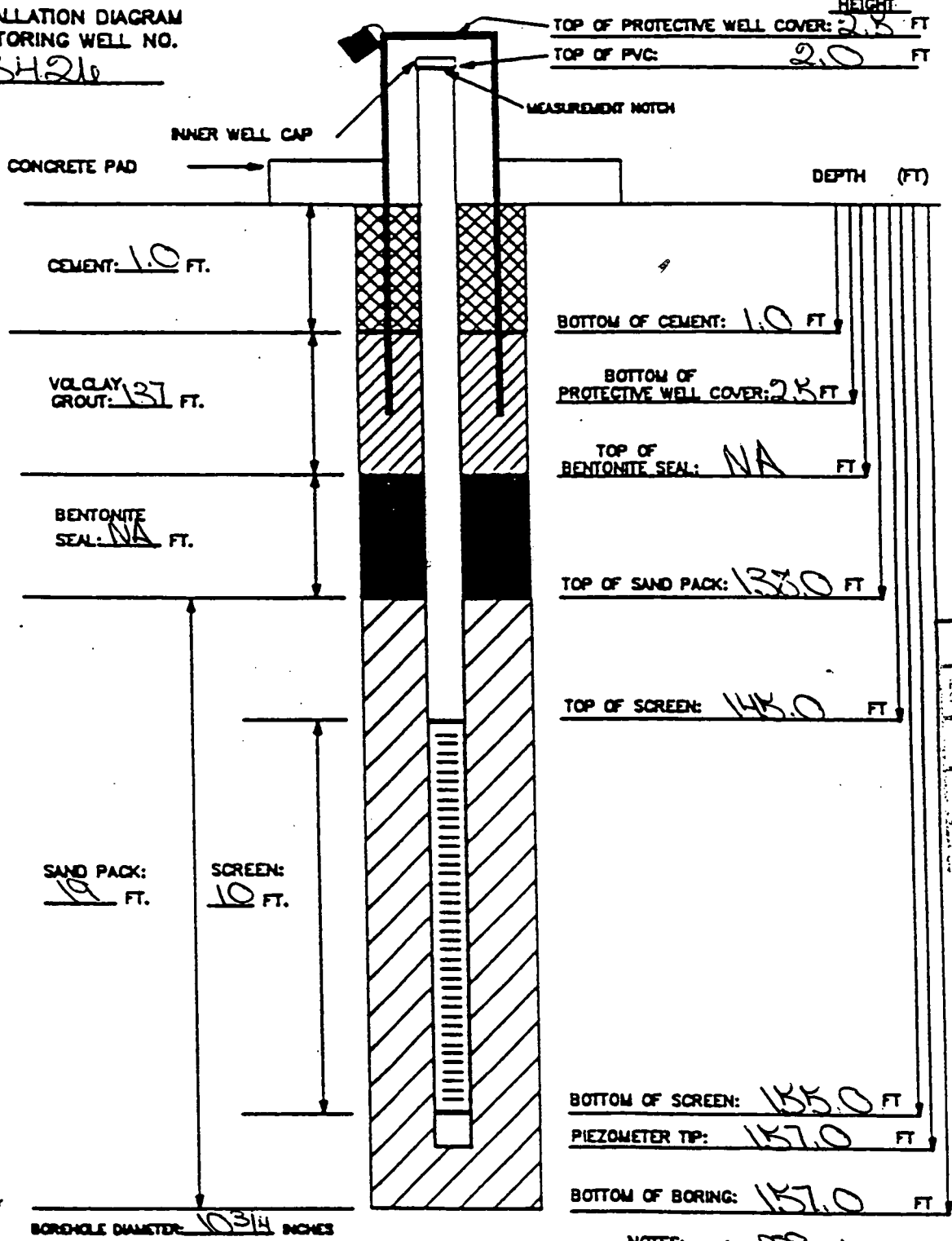
INSTALLATION DIAGRAM
MONITORING WELL NO.
3H216



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 3 bg 4/30, 6 bg 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~~1 bag~~ 0.005 DSO: 1/28/93
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 250 gal
OTHER: 27 50:1 drums
1 water drum

NOTES:
1) RISER PIPE IS ~~6-INCH SCHEDULE 40~~ 4 in. DSO 1/28/93 stainless steel ~~PVC PIPE, FLUSH-THREADED JOINTS.~~
2) SCREEN IS ~~6-INCH I.D. SCHEDULE 40~~ 4 inch stainless steel ~~PVC PIPE WITH 0.020-INCH SLOTS.~~
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 73.34 1/28/93

TASK: 04.27

GEOLOGIST/ENGINEER: D. O'Brien

		Date
	CB	2/10/93

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA phase 1 FIELD ENG./GEO. D. O'Brien DATE 1/20/93
PROJECT NO. 1002.04.27 CHECKED BY C Brill DATE 2/2/93
BORING NO. 3H21
PIEZOMETER NO. 3H21 DATE OF INSTALLATION 1/20/93

BOREHOLE DRILLING

DRILLING METHOD cable tool	TYPE OF BIT churn bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 Ft TO 80 Ft	SIZE 10 3/4 in FROM 0.0 Ft TO 157.0 Ft
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 14-10ft, 1-5ft, 1-2ft
AVERAGE SIZE OF PERFORATIONS 0.020 in	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 10.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cover
PROTECTIVE PIPE O.D. 10 3/4 in	w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 138.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP 138.0	BOTTOM 157.0	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 143.0	BOTTOM 157.0	TOP	BOTTOM
BOTTOM OF BOREHOLE	157.0			
GWL AFTER INSTALLATION	157.0 ft			
	78.8 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 4/30 sand installed from 157.0 Ft to 143.0 Ft, then 10/20 sand installed from 143.0 Ft to 138.0 Ft.

409-11-86

MW-3426

Customer Number: 103576

MATERIAL:

SAMPLE NUMBER: 930106-087

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 1716.7

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	678.5	39.5	39.5	78.7
20	35.05	20.4	59.9	33.5
40	25.76	15.0	74.9	16.7
60	24.42	14.2	89.1	9.8
100	10.86	6.3	95.4	5.9
200	4.22	2.5	97.9	3.0
Pan	2.47	1.4	99.3	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by: John Roberts

Checked by: [signature]

Date analyzed: 1-7-93

40 % 77

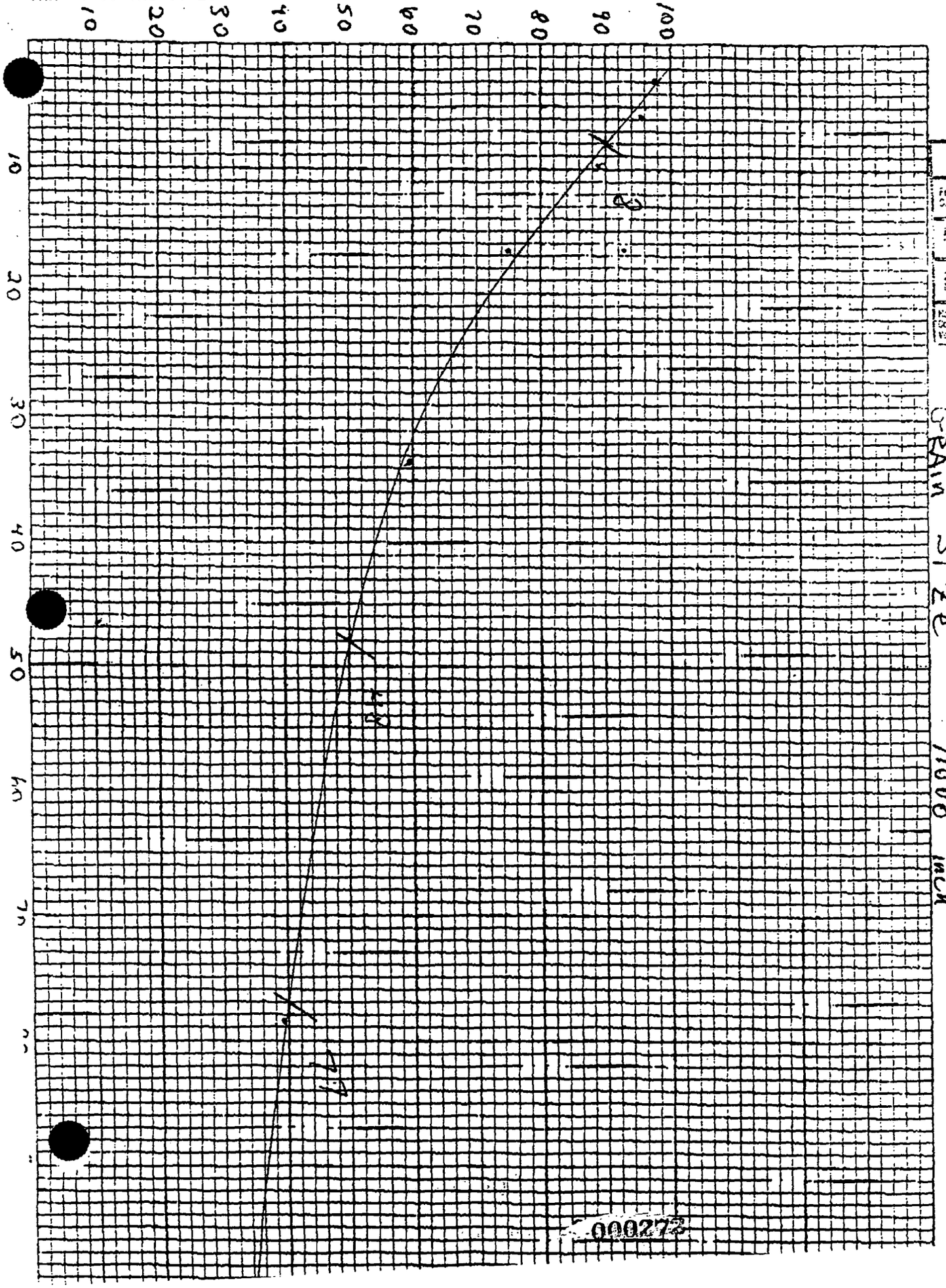
50 % 48

90 % 8

	Initial	Date
	CB	3/10/93

000271

JAN- 7-93 THU 10:25 WMCO ANALYTICAL FAX NO. 5137386667



Sieve Analysis - 3426

40% = 77 50% = 48 90% = 8

$\frac{40\%}{90\%} = \frac{77}{8} = 9.625$ use factor of 4

50% x 4 = .048 x 4 = 0.192

Note: 0.192 falls to the left of both the medium and coarse grain s. distribution curves. However, this value most closely fits the coarse sand profile. Therefore the sand pack for this well will consist of 4/30 coarse grained sand along with a 0.020 inch well screen.

	Initial	Date
Field Check	(illegible)	7/21/93
1st Key Entry		
2nd Key Entry		
Hard Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE: 10-29-92
ELEVATION:	GWL: Depth 78.95 Date/Time 12-9-92/1722	DATE STARTED: 10-29-9
ENGINEER/GEOLOGIST: K. Morgan, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	103375						
CB 2/1/93	~~103300~~ 10-29-92 0830	3 5 5	4	Loose light olive brown (2.5Y, 5/4) silt, some organic matter (grass), slightly moist	ML	N/A	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
1.5	103301 10-29-92 0835	2 5 8	8	Medium stiff light olive brown (2.5Y, 5/4) silty clay with sand and trace very fine gravel, trace root fragments, medium plasticity, moist	CL	.75	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
3.0	10-29-92 0848	8 9 14	0	No Recovery	N/A	N/A	Hnu = N/A Bf = N/A α = N/A
4.5	103302 10-29-92 0850	10 12 15	6	Stiff light olive brown (2.5Y, 5/4) silty clay with sand and trace gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
6.0	103303 10-29-92 0900	19 18 27	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, medium plasticity, moist	CL	3.0	Hnu = 0 ppm Bf = 20 cpm α = 0 cpm
7.5							

NOTES:
Drilling Company: Pennsylvania Drilling
Driller: Jim Succani

Colors Identified using Munsell color chart
Samples collected per ASTM standard Penetration Test

Background Levels
Hnu = 0 ppm
Bf = 20 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 10-29-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 10-9-92
DRILLING METHODS: Cable Tool		PAGE 2 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	103304 10-29-92 0905	20 25 31	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, high plasticity, moist	CL	2.5	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
9.0	103305 10-29-92 0915	20 22 32	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, low plasticity, slightly moist	CL	3.75	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
10.5	103306 10-29-92 1010	6 10 15	12	Hard yellowish brown (10YR, 5/6) silty clay with sand and gravel, low plasticity, slightly moist	CL	4.0	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
12.0	10-29-92 1017	9 11 14	0	NO Recovery	NA ~~CL~~ 10-29-92	NA	Hnu = NA ppm Bq = NA cpm α = NA cpm
13.5	10-29-92 1327	7 16 23	0	NO Recovery	NA	NA	Hnu NA ppm Bq NA cpm α NA cpm
15.0							

NOTES

See Page 1

CB 2/11/93

402-11-86

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1		
BORING NUMBER 4426	COORDINATES	DATE 10-29-92	
ELEVATION:	GWL: Depth 78.95 ft Date/Time 10-9-92 / 1022	DATE STARTED 10-29-92	
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 10-9-92	
DRILLING METHODS Cable Tool		PAGE 3 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	10-29-92 1340	6 12 17	0	No Recovery	N/A	N/A	Hnu = N/A Bq = N/A α = N/A
16.5	103307 10-29-92 1405	7 13 18	2	Medium Stiff gray (5Y, 5/1) gravelly sandy clay, medium plasticity, wet	CL	.75	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
18.0	103308 10-29-92 1530	6 8 9	6	Stiff gray (5Y, 5/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.75	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
19.5	103309 10-29-92 1550	3 7 9	4	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
21.0	103310 10-29-92 1603	5 11 11	10	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	1.75	Hnu = ppm Bq = cpm α = cpm
22.5							

NOTES

See Page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE: 10-29-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 12-9-9
DRILLING METHODS: Cable Tool		PAGE 4 OF 2

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	10-29-92 1611	6 10 11	0	No Recovery	N/A	N/A	Hnu = N/A Br = N/A α = N/A
24.0	103311 10-29-92 1634	9 10 11	12	Stiff dark gray (5Y, 4/1) silty clay with sand and very fine gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
25.5	103312 10-29-92 1642	5 7 8	6	Same As Above	CL	2.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
27.0	103313 10-30-92 0800	6 8 10	10	Stiff gray (5Y, 5/1) silty clay with sand and fine gravel, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
28.5	103315 10-30-92 0825	8 9 10	9	Same As Above	CL	2.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
30.0							

NOTES:

See Page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 607.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 442 G	COORDINATES:	DATE 10-30-92
ELEVATION:	GWL: Depth 78.95 Ft. Date/Time 10-9-92 / 1722	DATE STARTED 10-29-9
ENGINEER/GEOLOGIST K. Mario, K. Sellak	Depth Date/Time	DATE COMPLETED 10-9-92
DRILLING METHODS Cable Tool		PAGE 5 OF 21

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	103316 10-30-92 0840	5 8 10	11	Stiff gray (5Y, 5/1) silty clay with sand and fine gravel, medium plasticity, moist	CL	2.0	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
31.5	103317 10-30-92 LM 10-30-92 0855	3 11 10	2	Same As Above	CL	1.5	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
33.0	103318 10-30-92 0910	11 10 11	14	Same As Above	CL	1.5	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
34.5	103319 10-30-92 0926	12 9 13	18	Stiff gray (5Y, 5/1) silty clay, medium plasticity, moist	CL	1.5	Hnu = N/A * Br = 20 cpm α = 0 cpm
36.0	103320 10-30-92 0945	10 11 22	18	Dense gray (5Y, 5/1) silt, moist	ML	N/A	Hnu = N/A * Br = 20 cpm α = 0 cpm
37.5							

NOTES:

See Page 1

*Note: due to the high humidity the Hnu wasn't reliable today

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES	DATE 10-30-92
ELEVATION	GWL: Depth 78.95 ft Date/Time 12-9-92/1732	DATE STARTED 10-29-9
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 12-9-9
DRILLING METHODS Cable Tool		PAGE 6 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	103321 10-30-92 1000	9 9 14	14 (38.5 ft)	Medium dense strong brown (7.5YR, 5/8) banded silt, moist	ML	N/A	Hnu = N/A * BT = 20 cpm α = 0 cpm
				Medium dense yellowish brown (10YR, 5/8) poorly graded medium sand, wet	SP	N/A	Top of sand and gra aquifer material
39.0				Beginning with the 45 ft. split spoon sample, samples will be collected at 5 ft. intervals			
45.0							

NOTES

See Page 1

* Note: due to the high humidity the Hnu wasn't reliable today

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES	DATE 10-30-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 10-29-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 12-9-92
DRILLING METHODS Cable Tool		PAGE 7 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0							
46.5	103322 1415 10-30-92	56 50/2	8	Very Dense Yellowish brown (10YR, 5/6) well graded Sand with trace gravel, moist	SW	N/A	Hnu = N/A ppm * BT: 20 cpm α: 0 cpm
50.0							
51.5	103323 1430 10-30-92	25 18 50	14	Very dense light brownish gray (10YR, 6/2) well graded gravelly Sand, dry	SW	N/A	Hnu = N/A ppm * BT: 20 cpm α: 0 cpm
55.0							
56.5	103325 1125 11-3-92	25 41 57	18	Very Dense Very Pale brown (10YR, 7/4) poorly graded Medium Sand with gravel, dry	KM 11-3-92 ~~SW~~ SP	N/A	Hnu: 0 ppm BT: 20 cpm α: 0 cpm
60.0							

NOTES:

* Note: Due to the high humidity the Hnu wasn't reliable on 10-30-92

OB 2/11/93

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED: 10-9-92
DRILLING METHODS: Cable Tool		PAGE 8 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0							
61.5	103326 1345 11-3-92	12 21 43	18	Very Dense yellowish brown (10YR, 5/6) poorly graded medium Sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
65.0							
66.5	103327 1442 11-3-92	50/.4	5	Very dense yellowish brown (10YR, 5/6) poorly graded medium Sand, trace gravel, dry	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
70.0							
71.5	103328 1515 11-3-92	18 31 49	8	Very dense pale yellow (2.5Y, 7/3) well graded Sand with gravel, dry	SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
75.0							

NOTES:

See Page 1

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER 4426	COORDINATES	DATE 11-4-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 11-9-92
DRILLING METHODS Cable Tool		PAGE 9 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75.0	103329 1130 11-4-92	109/.5	6	Very dense yellowish brown (10YR, 5/6) poorly graded sandy gravel, dry	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
76.5							
▼78.95 ft							
80.0	103330 1455 11-4-92	8 11 10	12	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded gravelly coarse sand, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
81.5							Water Level = 78.95 ft below ground surface
85.0	103331 1520 11-4-92	6 6 7	9	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded coarse sand with a little fine gravel, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
86.5							
90.0							

NOTES:

See Page 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME KCRA Phase 1	
BORING NUMBER 4426	COORDINATES:	DATE 11-5-92
ELEVATION:	GWL: Depth 78.95 Date/Time 12-9-92/1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 11-9-92
DRILLING METHODS Cable Tool		PAGE 10 OF 2

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90.0	103333 0950 11-5-92	7 7 11	18	Medium dense dark grayish brown (2.5Y, 4/2) poorly graded Medium sand with trace gravel, wet	SP ~~SW~~ K.M. 11-5-92	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
91.5							
95.0							
	103334 1115 11-5-92	11 11 14	18	Medium dense dark grayish brown (2.5Y, 4/2) well graded sandy gravel, wet	GW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
96.5							
100.0							
	103335 1315 11-5-92	9 13 25	18	Dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = ppm Bq = cpm α = cpm
101.5							
105.0							

NOTES

See Page 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-5-92
ELEVATION:	GWL: Depth 78.95 Date/Time 10-5-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 11-9-92
DRILLING METHODS Cable Tool		PAGE 11 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105.0	103336 1710 11-5-92	10 17 30	18	Dense dark grayish brown (2.5Y 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
106.5							
110.0	103337 1006 11-6-92	5 8 9	18	Medium dense dark grayish brown (2.5Y 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
111.5							
115.0	N/A	N/A	N/A	N/A	N/A	N/A	Hnu = N/A Br = N/A α = N/A This sample interval was accidenta drilled past
116.5							
120							

NOTES:

See Page 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1		
BORING NUMBER 4426	COORDINATES	DATE 11-6-92	
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 11-9-92 / 1722	DATE STARTED 10-29-92	
ENGINEER/GEOLOGIST K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED 11-9-92	
DRILLING METHODS Cable Tool		PAGE 12 OF 21	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120.0							
121.5	103339 1450 11-6-92	3 9 12	18	Medium dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
125.0							
126.5	~~103342~~ ~~Rm. 11-6-92~~ 103340 1720S 11-6-92	6 50/2	8	Very dense dark grayish brown (2.5Y, 4/2) well graded sand with gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
130.0							
131.5	103341 1010 11-9-92	25 28 31	18	Very dense dark grayish brown (2.5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
135.0							

NOTES

See Page 1

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-9-92
ELEVATION:	GWL: Depth 18.95 ft. Date/Time 11-9-92/1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Selbik	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 13 OF 21

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135.0				very dense,			
136.5	103342 1355 11-9-92	18 29 31	18	Very dark grayish brown (2.5Y, 3/2) poorly graded fine sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
140.0	K.M. 11-10-92 ~~103343~~ 103344 1600 11-9-92	19 23 29	18	Very dense dark grayish brown (2.5Y, 4/2) poorly graded coarse sand, wet	SP	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
145.0	K.M. 11-10-92 ~~103345~~ 103345 1700 11-9-92	47 19 32	18	Very dense very dark grayish brown (2.5Y, 3/2) well graded sand and gravel, wet	GW & SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
150.0							

NOTES

See Page 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER 4426	COORDINATES.	DATE 11-9-92
ELEVATION:	GWL: Depth 78.85 ft Date/Time 12-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion, K Sellek	Depth Date/Time	DATE COMPLETED 12-9-92
DRILLING METHODS Cable Tool		PAGE 14 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150.0	103346 1745 11-9-92	12 21 42	16	Very dense dark grayish brown (2.5Y, ~~3/2~~ K.M. 4/2) Coarse sand with trace fine gravel, wet	SP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
155							
				Light olive brown K.M. 11-13-92			
155.0	K.M. 11-16-92 ~~103346~~ 103347 1100 11-13-92	50/5	4	Very dense ~~gray~~ (2.5Y, 5/4) Gravel (poorly graded), wet	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
156.5							
160.0	103348 1400 11-13-92	18 11 8	2	Medium dense Light olive brown (2.5Y, 5/4) Poorly graded gravel with a little sand, wet	GP	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
161.5							
165.0							

NOTES:

See Page 1

CB 2/11/9

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-13-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Schlak	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 15 OF 21

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
165.0							
166.5	103350 1715 11-13-92	11 50/5	6	Very dense very dark gray (5Y, 3/1) well graded gravel with some sand and trace clay, wet	GW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
170.0	103351 1000 11-16-92	3 9 11	12	Medium dense dark gray (5Y, 4/1) well graded gravelly sand, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
175.0	103352 1455 11-16-92	27 38 45	18	Very dense gray (5Y, 5/1) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Br = 20 cpm α = 0 cpm
180.0							

NOTES:

See Page 1

	Initial	Date
	CB	8/11/9

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-16-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sedlak	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 16 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
180.0	103353 1530 11-16-92	36 22 17	18	Dense dark gray (5Y, 4/1) well graded sand with a little gravel, wet	SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
181.5							
185.0	103354 1000 11-17-92	8 11 47	18	Very dense olive gray (5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
186.5							
190.0	103356 1145 11-17-92	27 33 41	18	same as above	SW	N/A	Hnu = 0 ppm Bg = 20 cpm α = 0 cpm
191.5							
195.0							

NOTES:

See Page 1

Initial	Date
CB	

FERNALD
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4426	COORDINATES:	DATE 11-17-92
ELEVATION:	GWL: Depth 78.95 ft Date/Time 12-9-92 1722	DATE STARTED: 10-29-92
ENGINEER/GEOLOGIST: K. Marion, K. Sellek	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 17 OF 21

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
195.0	103357 1450 11-17-92	50/4	4	Very dense olive gray (5Y, 4/2) well graded sand with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
196.5							
200.0	103358 1510 11-17-92	29 50/3	8	Very dense light olive brown (2.5Y, 5/3) coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
201.5							
205.0	103368 ~~103359~~ (sb gulks) 1620 11-17-92	18 31 39	12	Very dense olive (5Y, 4/3) coarse sand with trace gravel, wet	SP K.M. 11-17-92	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm used for sieve analysis
206.5							
210.0							

NOTES:

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602-04-27	PROJECT NAME RCRA Phase I	
BORING NUMBER 4426	COORDINATES:	DATE 11-17-92
ELEVATION:	GWL: Depth 78.95 ft. Date/Time 12-9-92 / 1322	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST K. Marion	Depth Date/Time	DATE COMPLETED 12-9-92
DRILLING METHODS Cable Tool		PAGE 18 OF 21

DEPTH ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
210.0	103368						
211.5	~~103360~~ cooling 1700 11-17-92	5 5 17	18	Medium dense olive gray (5Y, 4/2) very coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm used for sieve analysis
215.0							
215.0	103368 ~~103362~~ cooling 1020 11-18-92	18 47 32	18	Very dense light olive brown (2.5Y, 5/3) coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm used for sieve analysis
216.5							
220.0	103363 1130 11-18-92	8 11 32	18	Dense grayish brown (2.5Y, 5/2) coarse sand with a little gravel, wet	SP	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
221.5	103364 1440 11-18-92	27 18 34	18	Very dense grayish brown (2.5Y 5/2) well graded sand with a little gravel, wet	SW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
223.0	103365 1505 11-18-92	47 43 50/5	16	Very dense grayish brown (2.5Y, 5/2) well graded gravel including coal, granite, and limestone with a little sand, wet	GW	N/A	Hnu = 0 ppm Bq = 20 cpm α = 0 cpm
224.5				Continued on next page			

NOTES

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4426	COORDINATES:	DATE 11-18-92
ELEVATION:	GWL: Depth 78.95ft Date/Time 12-9-92 / 1722	DATE STARTED 10-29-92
ENGINEER/GEOLOGIST: K. Marion	Depth Date/Time	DATE COMPLETED: 12-9-92
DRILLING METHODS: Cable Tool		PAGE 19 OF 21

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
224.5	103366 1600 11-18-92	31 91/5	11	Very dense grayish brown (2.5Y, 5/2) well graded coarse limestone gravel with a little sand, wet	GW	N/A	Hnu = 0 ppm BΓ = 20 cpm α = 0 cpm
226.0	103367 1630 11-19-92	150/2	2	Gray (5Y, 6/1) weathered limey shale	(SH) N/A	N/A	Hnu = 0 ppm BΓ = 20 cpm α = 0 cpm
227.0	103369 1655 11-19-92	150/3	2	Same As Above	N/A	N/A	Hnu = 0 ppm BΓ = 20 cpm α = 0 cpm
227.3				Bottom of Bore Hole			

NOTES:

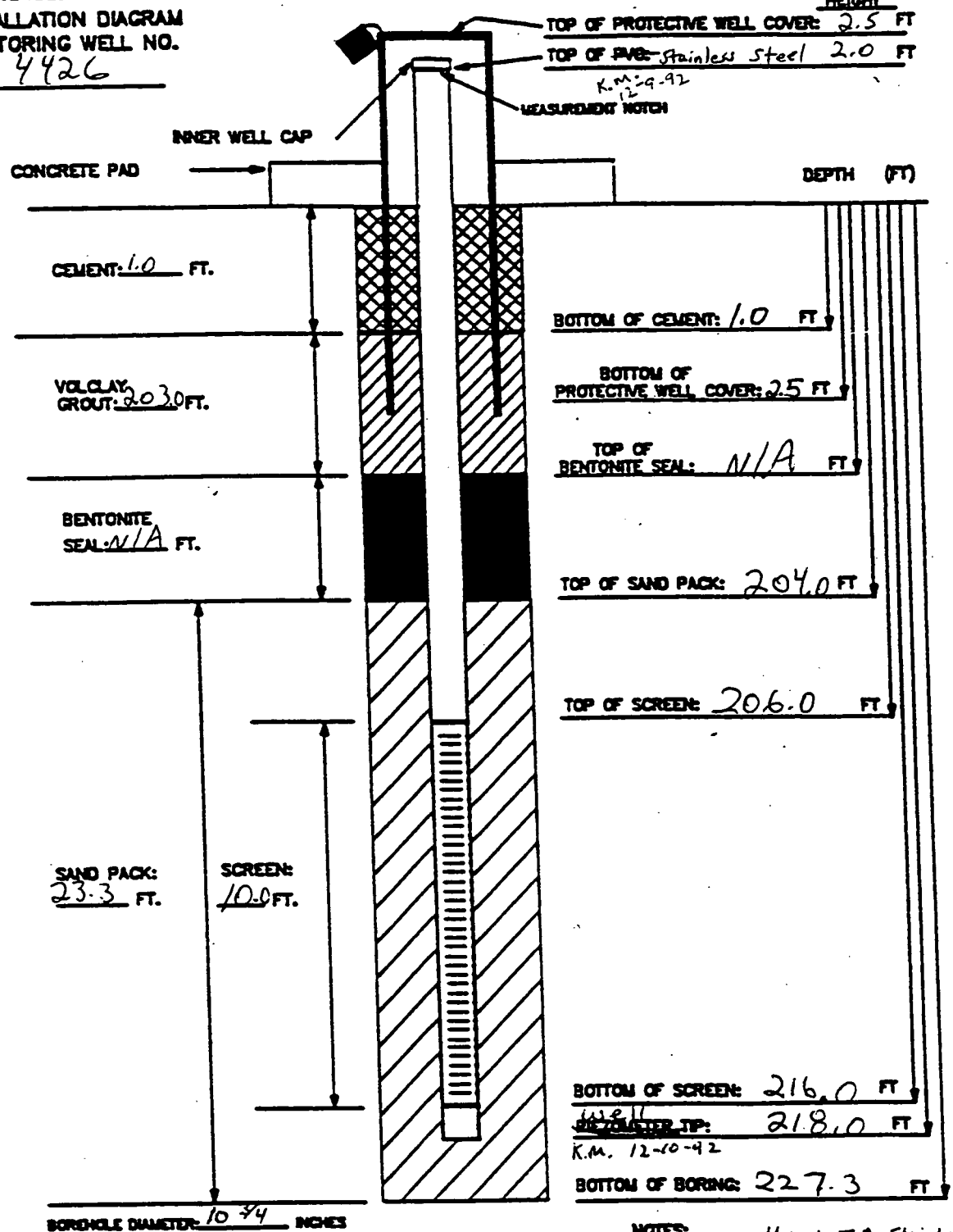
See Page 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 4426

Stickups

INSTALLATION DATE: 12-9-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 20-50 lb. bags of 430 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 79-50 lb bags
AMOUNT OF CEMENT: 1-50 lb. bag
AMOUNT OF WATER USED: 1630 gallons
OTHER: 2 ft. Sump; 10 ft. Screen, 20-10 ft. Sections, 1-8 ft. Section
42 soil drums
2 decon water drums

12-9-92 K.M.

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS. 4 inch I.D. Stainless Steel
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. 4 inch I.D. Stainle
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 78.95 ft. /12-9-92

TASK: 602.04.27 GEOLOGIST/ENGINEER: Ken Marion

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Marion DATE 12-9-92
PROJECT NO. 602.04.27 CHECKED BY C. Brien DATE 12/31/92
BORING NO. 4426
CB 12/31/92 ~~PIEZOMETER~~ Monitoring Well NO. ~~N/A~~ 4426 DATE OF INSTALLATION 12-9-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT 10" Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0 TO 80.0 ft.	SIZE 10 in FROM 0.0 TO 227.3 ft.
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Stainless Steel (Monitoring Well)	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 1-10 ft. Screen, 1-8 ft. riser, 1-2 ft. Sump, 20-10 ft. risers
AVERAGE SIZE OF PERFORATIONS ~~.020 in.~~ .020 in.	JOINING METHOD Threaded Flush Jointed
TOTAL PERFORATED AREA 10 ft. KM. 12-10-92	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.	OTHER PROTECTION Steel Well Cover with lock
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 204.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
SAND	TOP 204.0	BOTTOM 227.3	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 206.0	BOTTOM 216.0	TOP	BOTTOM
PIEZOMETER TIP	218.0			
BOTTOM OF BOREHOLE	227.3			
GWL AFTER INSTALLATION	78.95			

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑ CB
REMARKS The temporary steel casing was removed upon the installation of the well

Well # 4426

11-20-92

90% = .006 in.
50% = .024 in.
40% = .034 in.

$\frac{.034}{.006} = 5.67$ 5.67 > 3, so use a factor of 4

4 X .024 = .096

.096 most closely fits the coarse grai Sand and 20 Slot Screen Size.

KM.
11-20-92

mw-4426

Customer Number _____

MATERIAL: Sieve from C-29 SAMPLE NUMBER: 103368

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 200.3g

Sieve Number	Weight Retained, g	% Retained		Cumulative % Retained		Grain Size, 1/1000 inch
10	49.0	24.62	24.5	24.62	24.5	78.7
20	27.4	13.77	13.7	38.39	38.2	33.5
40	52.8	26.53	26.4	64.92	64.6	16.7
60	35.0	17.59	17.5	82.51	82.1	9.8
100	14.9	7.49	7.4	90.00	89.5	5.9
200	11.2	5.63	5.6	95.63	95.1	3.0
Pan	8.7	4.37	4.3	100.00	99.4	
	199.0					

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

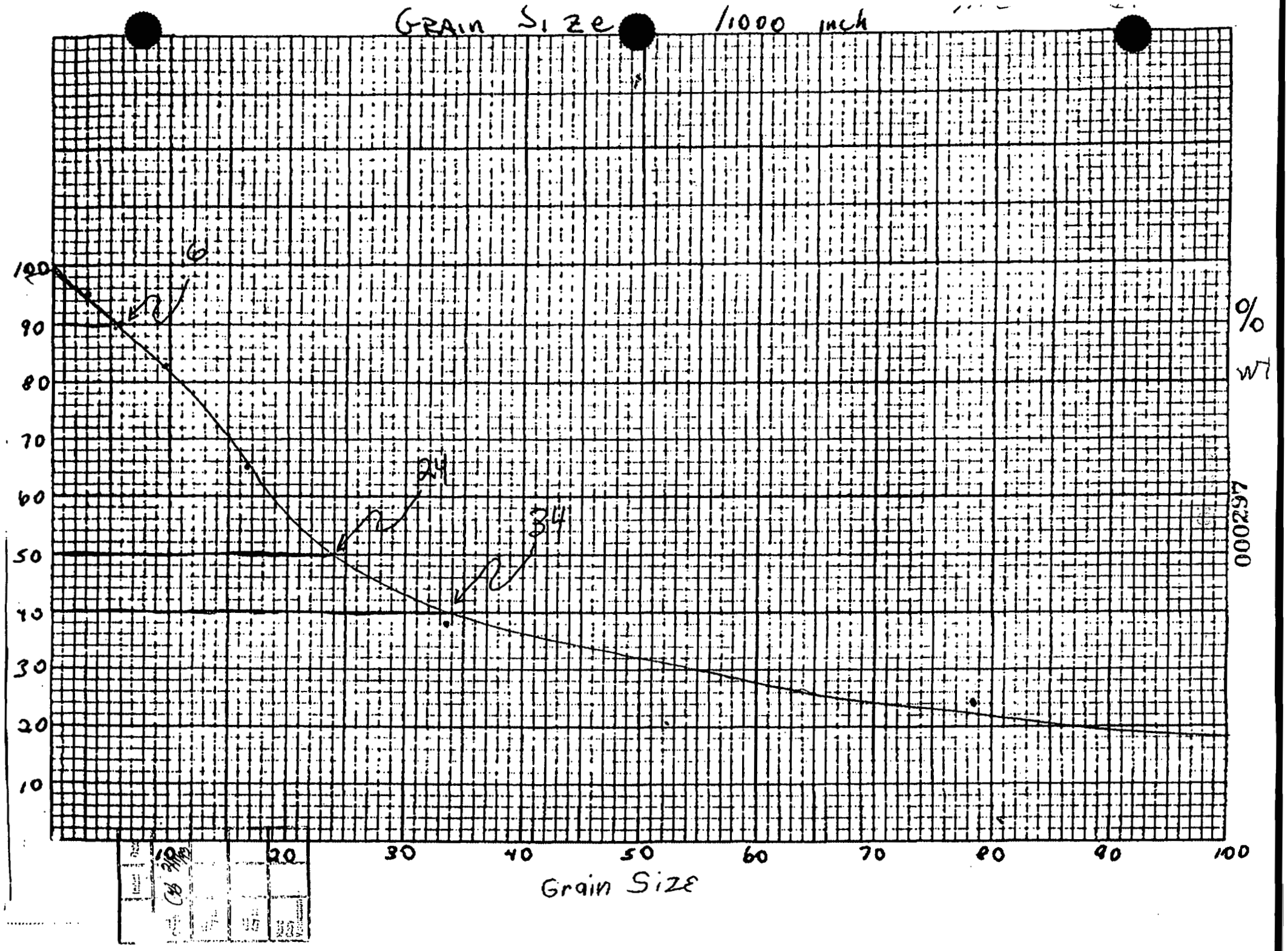
Analyzed by: Thomas McCullough | Checked by: J Steckel | Date analyzed: 11-20-92

GRAIN SIZE 40% RETAINED 34 .001 inch

50% 24

90% 6

CB 2/11/93


GRAIN SIZE 1/1000 inch
100
90
80
70
60
50
40
30
20
10
%
wt
6
24
34
10
20
30
40
50
60
70
80
90
100
Grain Size

0002297

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 2429	COORDINATES:	DATE: 7-28-93	
ELEVATION:	GWL: Depth 79.2 Date/Time 7-28-93	DATE STARTED: 7-30-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.6 Date/Time 8-7-93	DATE COMPLETED: 8-6-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 6-21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				See MW 3429 for description			
74.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sysson
Helper : Mark Riebodt

SAA = Same As Above
N/A = Not Applicable
Background = NA

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I 23 Well		
BORING NUMBER: MW2429	COORDINATES:	DATE: 7-27-93 7-28-93	
ELEVATION:	GWL: Depth 79.2 Date/Time 7-28-93	DATE STARTED: 7-24-93	
ENGINEER/GEOLOGIST: B. Yearsley	Depth 79.6 Date/Time 8-7-93	DATE COMPLETED: 8-6-93	
DRILLING METHODS: Cable Tool		PAGE 2 OF 4	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	1535 105310 7-27-93	88 139	11	Vy Dense, 10YR(6/6) Brownish yellow, fine to crse sand w/ gravel, some coarse (2"), well graded, dry	SW	NA	βγ: 40-60 cpm MTip: 0 ppm
76 77	1545 105311 7-27-93	81 46	9	SAA	SW		βγ: 40-60 cpm MTip: 0 ppm
78	1610 105312 7-27-93	12 84 110	11	SAA, moist to wet	SW		βγ: 40-60 cpm MTip: 0 ppm
H_2O Table 79 80	0840 105320 ~~105323~~ ~~105324~~ 7-28-93	6 10 24	3 All to sieve	Dense, 2.5Y(5/4) lt. olive brown, fine to crse sand w/ gravel, some coarse, well graded WET	SW		βγ: 40-60 cpm MTip: 0 ppm
81	0850 105314 7-28-93	9 24 26	5	Vy Dense, 2.5Y(5/4) lt. olive brown, fine to crse gravel w/ sand, well graded, wet	GW		βγ: 40-60 cpm MTip: 0 ppm
82 83	0935 105315 7-28-93	24 33 37	14	Vy Dense, 2.5Y(5/4) lt. olive br., med sand w/ gravel, some coarse, well graded wet (some clay)	SW		βγ: 40-60 cpm MTip: 0 ppm
84	1000 105316 7-28-93	5 7 14	15	M. Dense, 2.5Y(5/4) lt ol. brown, med. to crse grain sand w/ gravel, some crse well graded wet	SW		βγ: 40-60 cpm MTip: 0 ppm
85 86	1010 105320 ~~105321~~ 7-28-93	4 7 8	5 All to sieve	SAA	SW		βγ: 40-60 cpm MTip: 0 ppm
87	1020 105318 7-28-93	5 9 7	10	SAA	SW		βγ: 40-60 cpm MTip: 0 ppm
88 89	1030 105319 7-28-93	14 12 15	11	SAA	SW	NA	βγ: 40-60 cpm MTip: 0 ppm

NOTES: Sieve Sample # 105320
Bottom of Boring 92.0' Sampled To 89.0'

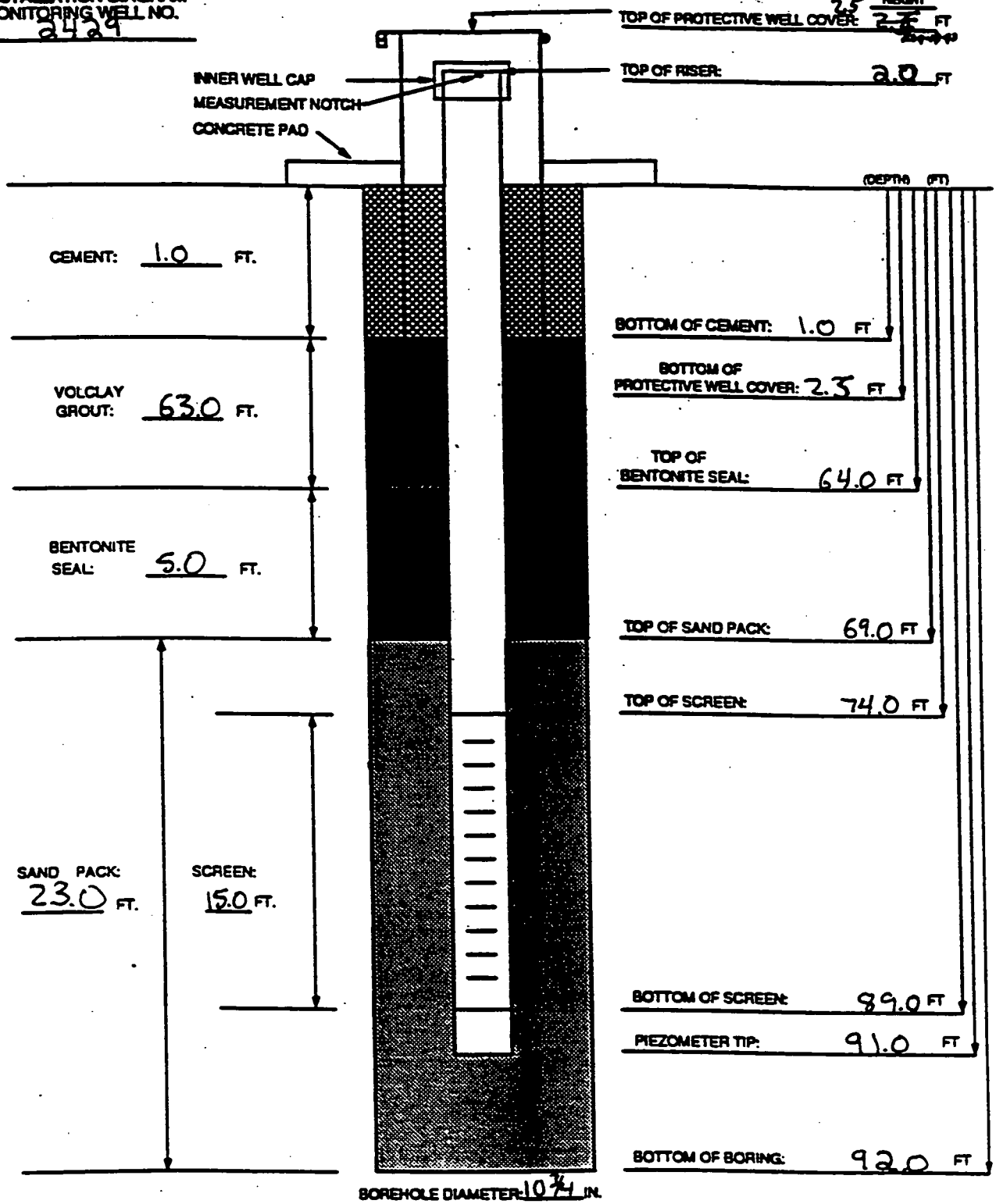
Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim [illegible]
Helper: Marli [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

- Samples collected per ASTM Standard Penetration Test.
- All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2429

INSTALLATION DATE: 7-29-93 to 8-6-93



MATERIALS USED

SAND TYPE AND QUANTITY: 27 bags coarse
BENTONITE PELLETS (5-GALLON BUCKETS): 8
BAGS OF VOLCLAY GROUT: 15 bags (50lb)
AMOUNT OF CEMENT: 7 bags
NT OF WATER USED: 900 gal
ER: 12 Drums Soil, 1 Drum H_2O
TASK: 04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 7.96 FT/ 8-6-
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: B. Yeardley

ASI FORM 0157 REV. (0)

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I, 23 Well FIELD ENG./GEO. B. Yeardley DATE 8-[illegible]
PROJECT NO. 04.27 CHECKED BY Keith Payne DATE 10-19-
BORING NO. 2429
~~PIEZOMETER~~ MW NO. 2429 DATE OF INSTALLATION 7-24-93 to 8-6-9

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 ft TO 79.0 ft
FLUID — NA FROM — NA TO — NA

TYPE OF BIT Percussion Hammer Bit
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0.0 TO 95.0 ft
SIZE — NA FROM — NA TO — NA

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 7-10 ft, 14 ft, 1-2 ft (1-15' Screen w/ 2' Sump)
JOINING METHOD ~~Hinged locking cover~~ By 8-6-93
Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged lockable cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	~~SLURRY~~ ~~2.2~~ 2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.3 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM 1.0 FT		
CEMENT GROUT / ~~SLURRY~~ By 8-6-93	TOP 1.0 FT	BOTTOM 64.0 FT	TOP	BOTTOM
BENTONITE	TOP 64.0 FT	BOTTOM 69.0 FT	TOP	BOTTOM
SAND	TOP 69.0 FT	BOTTOM 92.0 FT	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 74.0 FT	BOTTOM 89.0 FT	TOP	BOTTOM
PIEZOMETER TIP	92.0 ft			
BOTTOM OF BOREHOLE	92.0 ft			
GWL AFTER INSTALLATION	79.6 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS None

MW2429

Methodology for sand pack and sieve determinat
(from R. Scheper paper)

① WEMCO grain size
40% = .060 in
50% = .041 in
90% = .006 in

② 40% 90% Ratio (uniformity coefficient)
= 10 > 3 ∴ use 4 factor

③ 50% value × 4
.041 × 4 = 0.164

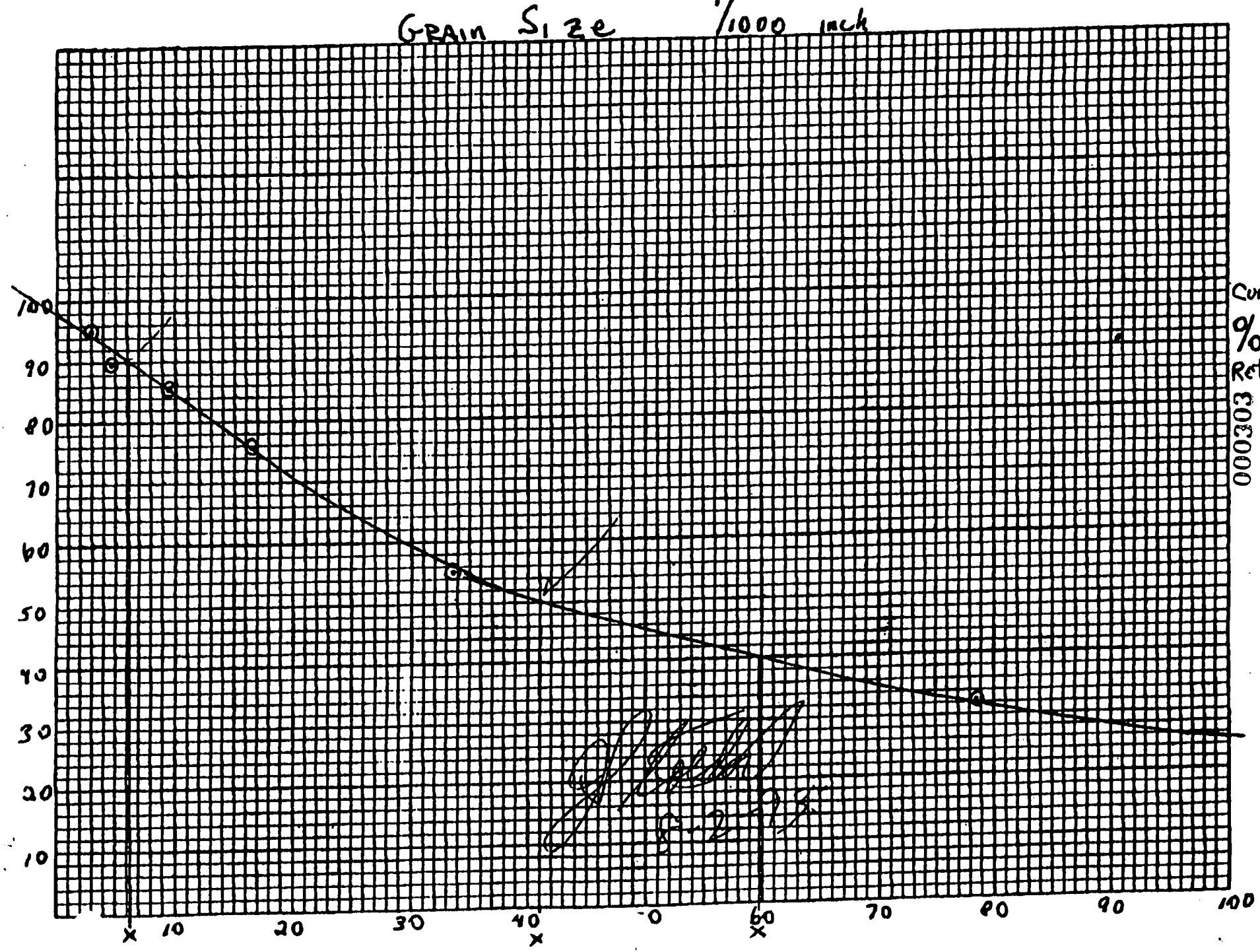
④ Look at distribution curves 0.164 falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in) screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

NO. 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

MW 2429



5711

DATE 28-JUL-93
TIME 15:53:06

WORK CARD REPORT
INORGANICS-EPM

PAGE 1

PRIORITY

SAMPLE ID: 200008622 P/A

USER SAMPLE ID: 105320
SAMPLE FAMILY NO: 9307281540

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: RCRA PHASE I 0427
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 1000002777
RELEASE NUMBER: 1000000441
CHARGE NUMBER: RCG01
DATE SAMPLED: 28-JUL-93
SPL RECEIVED: 28-JUL-93
LOGGED SINCE:

COMMENT: SEND RESULTS TO MIKE FRANK FAX 738-3207
48 HOUR TAT

****

TASK ID: 300011486

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	6	080293-002	T.O.M.	

TASK ID: 300011487

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	41	080293-002	T.O.M.	

TASK ID: 300011488

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

PRIORITY

DATE 28-JUL-93
TIME 15:53:06

WORK CARD REPORT
INORGANICS-EPM

SAMPLE ID: 200008622

USER SAMPLE ID: 105320
SAMPLE FAMILY NO: 9307281540

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	60	080293-009	T.O.M.	

3 TASKS PRINTED

*** END OF REPORT ***

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 6-10-93, 6-11-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 14/14	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.0	1600 105351 6-10-93	3 3 5	5	St:ff, 10YR(3/3) Dk. brown, organic silty clay, low plasticity, dry v. st:ff, 10YR(5/6) yellowish brown, silty clay med. plasticity, moist	OL CL	1.0 2.5	βγ: 80-100 cpm Micro = 0 ppm #105366 #105367
2.0 3.0	1603 105352 6-10-93	3 5 10	14	v. st:ff, 10YR(3/2) Vy. Dk. grayish brown, organic w/wood chips, silty clay, low plasticity, dry	OL	2.5	βγ: 80-100 cpm MTip = 0 ppm
4.0	1605 105353 6-10-93	7 7 8	8	Vy st:ff, 10YR(5/6) yellowish brown, silty clay, med. plasticity, moist	CL	2.5	βγ: 80-100 cpm MTip: 0 ppm
5.0	1607 105354 6-10-93	7 9 9	8	SAA	CL	2.5	βγ: 80-100 cpm MTip: 0 ppm
7.0	1610 105355 6-10-93	6 8 11	8	SAA w/ minor gravel	CL	2.0	βγ: 50-70 cpm MTip: 0 ppm
8.0 9.0	0925 105356 6-10-93	6 7 12	6	St:ff, mottled 2.5YR(5/6) & 10YR(5/6) lt. olive brown and yellowish brown, silty clay w/ minor gravel, med. plast., moist	CL	1.7	βγ: 50-70 cpm MTip = 0 ppm
10.0	0930 105357 6-10-93	7 11 13	17	v. st:ff, 10YR(5/6) yellowish brown, silty clay, w/ some gravel, med. plasticity, moist	CL	3.5 ↓ 2.0	βγ: 50-70 cpm MTip = 0 ppm
11.0 12.0	0945 105358 6-10-93	6 15 19	5	Hard, mottled 7.5YR(5/6) and 10YR(5/6) strong brown and yellowish brown silty clay w/ gravel, med. plast., moist	CL	>4.0	βγ: 50-70 cpm MTip: 0 ppm
13.0	0950 105359 6-10-93	17 17 23	12	v. st:ff, 10YR(5/6), yellowish brown silty clay w/ gravel (med. to crse) med. plasticity, moist	CL	3.5	βγ: 50-70 cpm MTip = 0 ppm
14.0 15.0	1045 105360 6-10-93	14 14 15	13	v. st:ff, mottled browns, silty clay, moist v. st:ff, 5Y(4/1) Dk Gray w/ 7.5YR(5/3) olive fxs., silty clay w/ gravel moist	CL CL	3.5 3.5	βγ: 50-70 cpm MTip: 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Craig Coulter
Helper: Jeff Check, Bill Siebert

SAA = Same As Above
N/A = Not Applicable

Background = 60-80 cpm
50-70 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 04.27	PROJECT NAME: RCRA Phase I 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 6-11-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7.27-93	
DRILLING METHODS: Cable Tool	Pat Riley By 6-23-93	PAGE 2 OF 14	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1050 105362 6-11-93	12 13 16	17	Vy St.ff, 2.5Y(4/1) Dk Gray w/ 7.5(5/8) strong brown fracture coatings, silty clay, moist Vy St.ff. 2.5Y 4/1 Dk Gray silty clay w/ gravel, med. plasticity, moist	CL CL	3.5 3.5	βγ: 50-70cpm HNU: 0ppm
17 18	1410 105363 6-11-93	3 6 6	2	St.ff, 2.5Y(4/1) Dk Gray, gravelly clay, med plast, moist	CL	2.0	βγ: 50-70cpm HNU: 0ppm
19	1415 105364 6-11-93	3 11 16	14	Very St.ff, 5Y(4/1) Dk. Gray, silty clay w/ gravel, moist, med. plasticity	CL	3.0	βγ: 50-70cpm HNU: 0ppm
20	1430 105365 6-11-93	4 7 11	8	Vy. Stiff, 5Y(4/1) Dk Gray, gravelly clay, medium plasticity, moist	CL	2.25	βγ: 50-70cpm HNU: 0ppm
21 22	1440 ~~105366~~ NA	4 7 13	0	No Sample	NA	NA	βγ: - NA HNU: - NA
23 24	1010 105368 6-15-93	4 6 7	18	Stiff, 5Y(4/1) Dk. gray, silty clay w/ gravel, moist, medium plasticity By 6-15-93	CL	1.75	βγ: 60-80cpm HNU: 0ppm
25	1620 105371 6-15-93	3 7 10	10	SAA	CL	1.5	βγ: 60-80cpm HNU: 0ppm
26 27	105369 1125 6-16-93	4 4 5	8	Stiff, 5Y(4/1) Dk Gray, silty clay w/ some gravel, medium plasticity, moist	CL	1.0	βγ: 40-60cpm HNU: 0ppm
28	105370 1350 6-16-93	4 6 8	3	Vy. soft, 5Y(4/1) Dk Gray, silty clay w/ some gravel, medium plasticity, wet	CL	0.5	βγ: 40-60cpm HNU: 0ppm
29 30	105371 1405 6-16-93	15 48 60	8.5	Vy. St.ff, 5Y(4/1) Dk Gray, silty clay w/ some gravel and rock fragments, medium plast, moist	CL	3.0	βγ: 40-60cpm HNU: 0ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Saccani
Helper: Jeff Checkan

SAA = Same As Above
N/A = Not Applicable

Background = 50-70 cpm 6-15
40-60 cpm 6-16

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 09.27	PROJECT NAME: RCRA PHASE I, 23	
BORING NUMBER: MW # 3429	COORDINATES:	DATE: 6-16-93, ~~6-17~~
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: RILEY, Yearsley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: ~~7-26-93~~ 7-27-93
DRILLING METHODS: CABLE TOOL		PAGE 3 OF ~~19~~ 14

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	105372 1419 6-16-93	4 5 9	12	VERY STIFF, GRAY (10YR 5/1) SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, MOIST	CL	2.5	BY = 40-60 cpm MicroTIP = 0 ppm
31.5	0930 105373 6-17-93	12 14 19	16	Vy Stiff, 5Y(4/1) Dk Gray, silty clay w/ gravel, med plasticity, moist	CL	2.0 ↓ 3.5	BY = 40-60 cpm MicroT = 0 ppm
33.0	0955 105374 6-17-93	8 9 10	17	Vy. Stiff, 5Y(4/1) Dk Gray, silty clay w/ gravel, med plasticity, moist	CL	2.25	BY = 40-60 cpm M.Tip = 0 ppm
34.5	1015 NA 6-17-93	8 8 10	0	No Recovery	NA	NA	BY = NA M.Tip = NA
36.0	0920 105375 6-18-93	3 4 3	8	Stiff, 5Y(4/1) Dk Gray, silty clay w/some gravel, high plasticity, moist	CL	1.5	BY = 40-60 cpm M.Tip = 0 ppm
37.5	0945 105376 6-18-93	5 18 31	17	soft, 5Y(4/1) Dk Gray, silty clay, high plasticity, moist Dense, 10YR (5/8) yellowish brown, silty clay, low plast, dry Dense 10YR (5/8) yellowish brown, fgr sand, poorly sorted, dry, well sorted, dry	CL ML SP	0.5 NA	BY = 40-60 cpm MTip = 0 ppm
39.0				Begin 5 ft sampling			BY = MTip =
40.5							BY = M.Tip =
42.0							BY = MTip =
43.5							BY = MTip =
45.0							

top of aquifer

NOTES

DRILLING CONTRACTOR: PENNSYLVANIA DRILLING
EQUIPMENT: CABLE TOOL
DRILLER: JIM SACCANI
HELPER: ALEX BAKER

See pg. 1

BACKGROUND LEVELS
6-16-93
BY = 40 cpm (6-16-93
MT = 0 ppm
BY = 40-60 cpm (6-17-9
BY = 40-60 cpm (6-18-93

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-18-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 4 OF ~~14~~ 14	

Rev 11-93

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
450	1015 105378 6-18-93	27 32 39	11	Vy. Dense, 2.5Y(6/4) lt. yel. brown, med. to crse sand w/gravel, well graded, dry	SW	NA	Bγ = 40-60 cpm MT.p = 0 ppm
500	1420 105379 6-18-93	63 56 56	16	Vy Dense, 2.5Y(6/4) lt. yellow brown, fine sand w/ gravel, poorly graded, dry minor clay	SP	NA	Bγ = 40-60 cpm MT.p = 0 ppm
550	1545 105380 6-18-93	40 32 45	12	Vy Dense, 10YR, yellowish brown, fine to medium sand w/ gravel, well graded, dry	SW	NA	Bγ = 40-60 cpm MT.p = 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Scisconi
Helper : Alex Dahen

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-21-93, 6-22-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: ~~7-26-93~~ 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 5 OF ~~19~~ 14	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	0940 105381 6-21-93	32 24 34	14	V. Dense, 10YR (5/4) yellowish brown, fine sand, poorly graded, dry	SP	NA	Bg = 50-70 cpm MT.p = 0 ppm
61.5							
65.0	1410 105382 6-22-93	48 96	13.	V. Dense, 10YR (5/4) yellowish brown, fine to ~~medium sand, well gr, dry~~ V. Dense, 10YR (5/4) yellowish brown, fine sand w/ minor gravel, poorly, dry	SW SP	NA	Bg = 50-70 cpm MT.p = 0 ppm
66.5							
70.0	1440 105383 6-22-93	40 45 37	16	V. Dense, 10YR (5/4) yellowish brown, fine to coarse sand w/ gravel some large limestone gravel, well graded, dry	SW	NA	Bg = 50-70 cpm MT.p 0 ppm
71.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Scarcini
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable
Background = 50-70cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-23-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 6 OF ~~19~~/14	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75.0	0850 105384 6-23-93	32 119	13	v. Dense 10YR(5/4) yellowish brown, fine to coarse sand w/ gravel, well graded, dry	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm
WT 78.4 ft							
80.0	0915 105385 6-23-93	15 13 11	17	Med Dense 2.5Y(5/4) lt. olive brown medium to crse sand and gravel, well graded, wet	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm
85.0	1440 105387 6-23-93	7 15 19	18	Dense, 2.5Y(5/4) lt. Olive Brown med. to crse sand w/ gravel, well graded, wet	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm
							Hydropunch sample # 105386
90.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Scagnoni
Helper: Alex Baker

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-23-93 6-24-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 7 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (RG 8-17-93)
900	1510 105388 6-23-93	10 12 18	14	Medium Dense 2.5Y(5/4) lt olive brown, fine gravel to a coarse sand then gravel, well graded to a poorly graded gravel, wet	SW ↓ GP	NA	Bg = 50-70 cpm MT.p = 0 ppm
950	0855 105389 6-24-93	27 35 32	18.	V. Dense, 2.5Y(5/4) lt. olive brown, med. to coarse sand w/ fine to medium gravel, well graded, wet	SW	NA	Bg = 60-80 cpm MT.p = 0 ppm
1000	0935 105390 6-24-93	7 7 6	9	M. Dense, 2.5Y(5/4) lt. olive brown, fine to medium sand w/ gravel, well graded, wet	SW	NA	Bg = 60-80 cpm MT.p = 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Scarcini
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable

Background (6-23-93) 50-70 cpm
(6-24-93) 60-80 cpm

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-24-93, 6-25-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-28-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 8 OF 14/14	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1050	1535 105391 6-24-93	H 19 35	13	very Dense, 2.5Y(5/4) lt. olive gray, fine to coarse sand w/ some gravel, well graded, wet	SW	NA	Bγ = 60-80 cpm MT.p = 0 ppm
				hydropunch @ 1110 ft 0910 #105392			
1100	0945 105393 6-25-93	11 13 10	12	M. Dense, 2.5Y(5/4) lt. olive brown, fine to coarse sand w/ some gravel, well graded, wet	SW	NA	Bγ = 40-60 cpm MT.p: 0 ppm
1150	1400 105394 6-25-93	45 35 30	10	v. Dense, 2.5Y(5/4) lt. olive brown, fine to coarse sand w/ fine to medium gravel, well sorted, wet	SW	NA	Bγ = 40-60 cpm MT.p: 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Saccomi
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable

Background = 60-80 cpm
40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-25-93, 6-28-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 9 OF ~~19~~ 14	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120.0	1439	10		Medium Dense, 2.5Y(5/4) lt. olive brown, fine to medium sand, well graded, wet to a fine to crse gravel, well, wet	SW	NA	Bg = 40-60 cpm
	105395	9	18				MT.p = 0 ppm
121.5	6-26-93	10			GW		
125.0	1015	28		Vy Dense, 2.5Y(5/4) lt. olive brown, fine to med. grain sand w gravel, well graded, wet	SW	NA	Bg = 40-60 cpm
	105396	60	16				MT.p = 0 ppm
126.5	6-28-93	59					
130.0	1055	7		M Dense, 2.5Y(5/4) lt. olive brown, fine to med. gr. sand w/ gravel well graded, wet	SW	NA	Bg = 60 cpm
	105397	11	15				MT.p = 0 ppm
131.5	6-28-93	14					

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sacconi
Helper : Alex Baken

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-30-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 10 OF ~~19~~ 14	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135.0	1420	33		V. Dense, 2.5Y(5/4) lt. olive brown			βγ = 70 cpm
	105399	51	14	fine - crse sand and gravel,	SW	NA	MT.p = 0 ppm
136.5	6-30-93	59		well graded, wet			
				Hydropunch #105398			
140.0				Continuous sampling begins			
	~~105400~~ BY 7-1-93						βγ = cpm MT.p = ppm
141.5							
145							
	~~105301~~ BY 7-1-93						βγ = cpm MT.p ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sessoni
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable
Background = 40-60cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 7-1-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-16-93	
ENGINEER/GEOLOGIST: B. Yearsley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 11 OF 14	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS (RG 7-17-93)
140.0	0720	13		Ar. Dense, 2.5Y(5/4) lt. olive brown, (Munsell) fine to coarse sand w/ minor gravel,			βγ: 40-60 cpm
141	105400 7-1-93	14 17	16	well graded, wet	SW	NA	MT.p: 0.7 ppm (background) = fog
142	0750 105301 7-1-93	6 8 12	3	M. dense, 2.5Y(5/4) H. olive brown; fine to coarse sand w/ minor gravel, well graded, wet	SW	NA	βγ: 40-60 cpm MT.p: 0.3 ppm (background)
143	1035 105302 7-1-93	20 40 52	16	V. Dense, 2.5Y(5/4) lt. olive brown, fine to coarse sand w/ gravel.. well graded, wet	SW	NA	βγ: 40-60 cpm MT.p: 0.0 ppm
144	1100 105303 7-1-93	15 27 82	14	SAA	SW	NA	βγ: 40-60 cpm MT.p: 0.0 ppm
145	1415 105304 7-1-93	13 18 28	10	SAA Dense	SW	NA	βγ: 40-60 cpm MT.p: 0.4 ppm Background: 0.4
146	1445 105305 7-1-93	43 63 40	11	SAA Very Dense	SW	NA	βγ: 40-60 cpm MT.p: 0.0 ppm
147	1510 105306 7-1-93	20 22 26	10	SAA Dense	SW	NA	βγ: 40-60 cpm MT.p: 0.0 ppm
148							
149				Go back to 50 ft Sampling			βγ: MT.p:
150							βγ: MT.p:
							βγ: MT.p:

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Saccani
Helper: Alex Rahen

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

422-11-66

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 7-8-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 12 OF 19/4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
155.0	1010 105308 7-8-93	56 71 50/0	14	Vy. Dense, 2.5Y(5/4) lt olive brown, fine to coarse gravel w/ sand, well graded, wet	GW	NA	Bg = 60-80 cpm MT.p = 0.0 ppm
156.5							
160							
	1210 105309 7-8-93	30 61 65	8	Hard, 5G(4/1), DK greenish gray, Silty clay, high plasticity, moist w/ some gravel by 7-8-93	CL	4.0	Bg = 60-80 cpm MT.p = 0.0 ppm
161.5				-Shelby Tube taken @ 161.5. No Sample -Hole drilled to 164.0 ft.			
							Bg = — cpm MT.p — ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Scaccini
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable
Background = 60-80 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

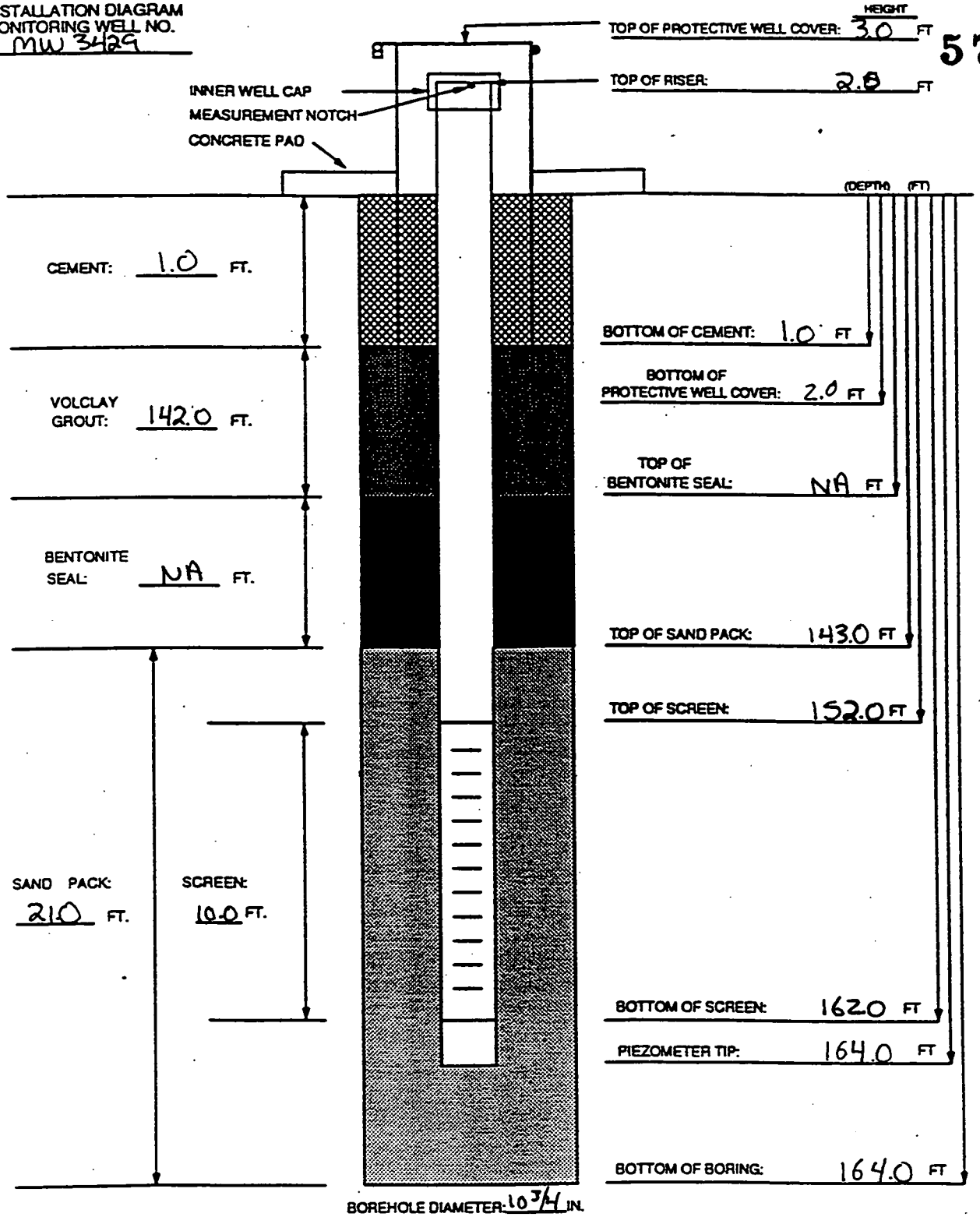
402-11-86

~~19 of 19~~ 26 of 12-93

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. MW 3429

INSTALLATION DATE: 6-10-93 → 7-23-93

5711



MATERIALS USED

SAND TYPE AND QUANTITY: 6 bags fine, 13 bags coarse
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 40 bags
AMOUNT OF CEMENT: 7.5 bags
AMOUNT OF WATER USED: 1240 gal
OTHER: 22 drums soil, 2 drums H_2O
TASK: 04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 79.5 FT/7/26/9
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: B. Yeardley

000318

ASI FORM 0157 REV. (0)

FERNALD RI/FS

Page 14 of 14

~~18 of 19~~ 26 1-17-93

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I — FIELD ENG./GEO. B Yeardley — DATE 7-2[illegible]-9[illegible]

PROJECT NO. 0427 — CHECKED BY ____ — DATE ____

BORING NO. 3429

~~PIEZOMETER~~ M.W. NO. 3429 — DATE OF INSTALLATION 6-10-93 to 7-23-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool

DRILLING FLUID (S) USED:

FLUID H_2O FROM 0.0 ft TO 79.0 ft

FLUID NA FROM NA TO NA

TYPE OF BIT Hammer Percussion Bit

CASING SIZE (S) USED:

SIZE 10.0 in ID FROM 0.0 ft TO 165.0 ft

SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well

DIAMETER OF PERFORATED SECTION 4.0 in ID

PERFORATION TYPE:

SLOTS [X] HOLES [ ] SCREEN [ ]

AVERAGE SIZE OF PERFORATIONS 0.02 in

TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel

RISER PIPE DIAMETERS:

O.D. 4 3/8 in I.D. 4.0 in

LENGTH OF PIPE SECTIONS 1-10', 15-10', 1-2', 1-2' (1-2' sump)

JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.

PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION hinged locking cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.0			
BOREHOLE FILL MATERIALS:				
GROUT / ~~SLURRY~~ Concrete	Top TOP 0.0 / 1.0	Bottom BOTTOM 1.0 / 143.0	TOP	BOTTOM
BENTONITE NA	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND fine sand	TOP 143.0	BOTTOM 147.5	TOP	BOTTOM
~~GRAVEL~~ course sand	TOP ~~143.0~~ 147.5	BOTTOM ~~147.5~~ 164.0	TOP	BOTTOM
PERFORATED SECTION	TOP 152.0	BOTTOM 162.0	TOP	BOTTOM
PIEZOMETER TIP	~~163.0~~ 164.0			
BOTTOM OF BOREHOLE	164.0 ft			
GWL AFTER INSTALLATION	79.4 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS

000319

MW 3429

Methodology for sand pack and sieve determination
(from R Scheper paper)

① WEMCO grain size
40% = .066 in
50% = .043 in
90% = .007 in

② 40% 90% Ratio (uniformity coefficient)
.066/.007 = 9.4 > 3 ∴ use 4 factor

③ 50% value × 4
.043 × 4 = 0.172

④ Look at distribution curves. 0.172 falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in) screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

DATE 06-JUL-93
TIME 13:25:46

WORK CARD REPORT
INORGANICS-EPM

PAGE 1

SAMPLE ID: 200003928

USER SAMPLE ID: 105307
SAMPLE FAMILY NO: 9307020730

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: CRU-5 / RCRA PHASE I
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 1000000938
RELEASE NUMBER:
CHARGE NUMBER: RCC01
DATE SAMPLED: 01-JUL-93
SPL RECEIVED: 02-JUL-93
LOGGED SINCE:

COMMENT: No comments entered.

****

TASK ID: 300005304

DUE DATE: 13-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	7	070893-002	T.O.M.	

TASK ID: 300005305

DUE DATE: 13-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	43	070893-002	T.O.M.	

TASK ID: 300005306

DUE DATE: 13-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

MW 3429 - SIEVE RESULTS

RCRA Phase I Program (04.27)

5711

DATE 06-JUL-93
TIME 13:25:46

WORK CARD REPORT
INORGANICS-EPM

SAMPLE ID: 200003928

USER SAMPLE ID: 105307
SAMPLE FAMILY NO: 9307020730

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	66	070893-002	T.O.M.	

3 TASKS PRINTED

*** END OF REPORT ***

Customer Number: 200003928

MATERIAL: _____ SAMPLE NUMBER: _____

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 137.41

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	49.43	35.97	35.97	78.7
20	24.22	17.63	53.60	33.5
40	25.26	18.38	71.98	16.7
60	18.74	13.64	85.62	9.3
100	8.62	6.27	91.89	5.9
200	6.06	4.41	96.30	3.0
Pan	4.58	3.33	99.63	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by: Tom McCullough | Checked by: [signature] | Date analyzed: 7-8-93

Grain Size Retained

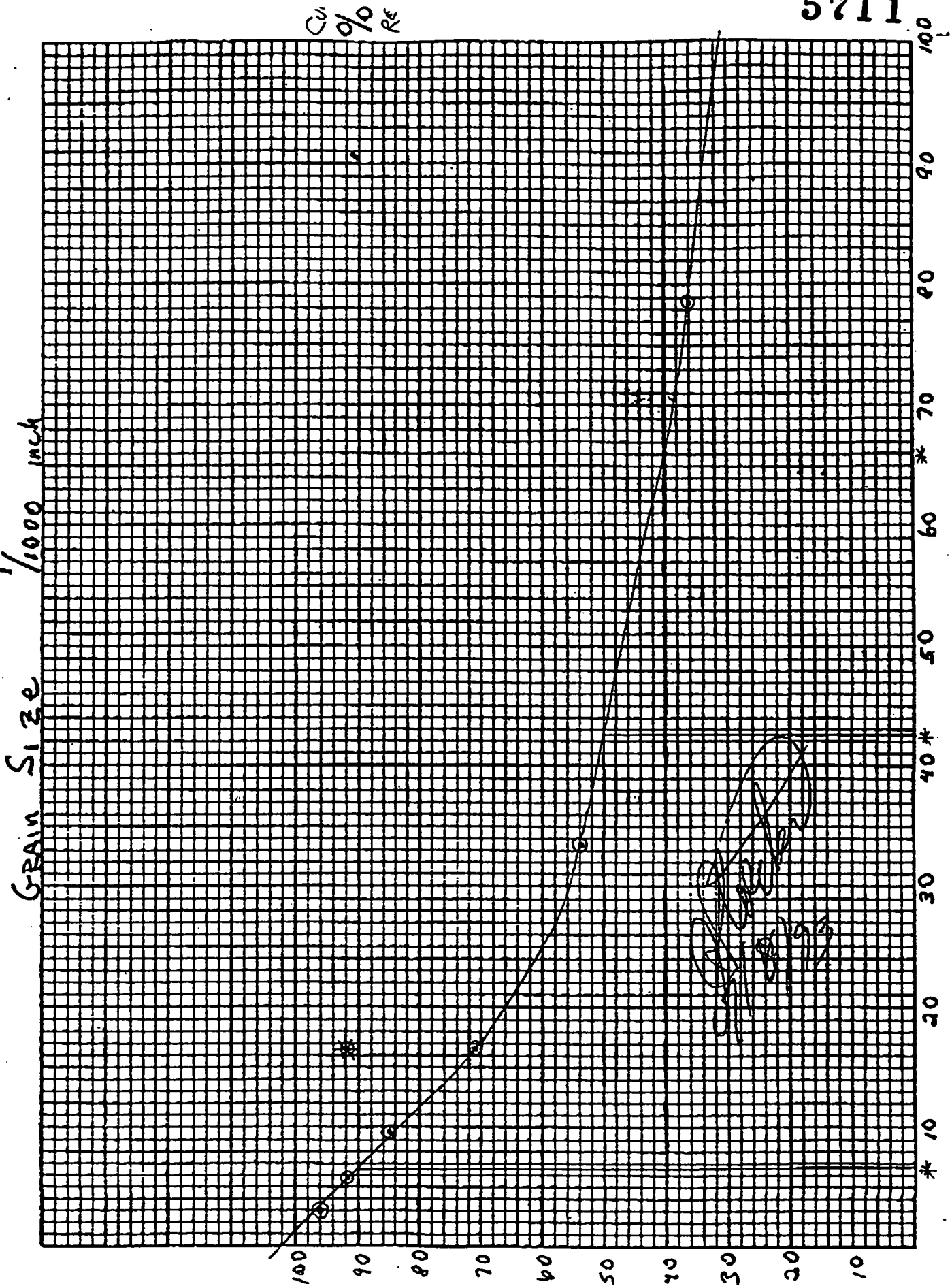
40 % 66

50 % 43

90 % 7

1003928
200044135 T.O.M.
Tom McCullough 7-8-93
001: 0.0000 #
002: 137.4132 #
003: 0.0001 #
004: 49.4321 #
005: 24.2171 #
006: 25.2629 #
007: 18.7379 #
008: 8.6195 #
009: 6.0570 #
010: 4.5859 #
011: #

5711



NO. 340J-10 DIETZGEN GRAPH PAPER 10 X 10 PER INCH
EUGENE DIETZGEN CO. MADE IN U.S.A.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2430	COORDINATES:	DATE 10/30/92	
ELEVATION:	GWL: Depth 75.0 ft Date/Time 11/10/92	DATE STARTED: 10/30/92	
ENGINEER/GEOLOGIST: B Yeardley	Depth Date/Time	DATE COMPLETED: 11/10/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 11	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0910 104655 10/30/92	27 37 40	18	V. Hard brownish yellow 10YR (6/6) mottled gray 10YR(5/1) silty clay w/ some gravel, med plast, dry Rock Slag	CL NA	>4 NA	HNU = 0 ppm αβ = 40 cpm HNU = 0ppm αβ = 60-80 cpm
2 3	0917 104656 10/30/92	24 17 26	18	Hard yellowish brown 10YR(5/6) silty clay w/ some gravel, med plast, ~~dry~~ moist - BY 12/1/92	CL	2.5	HNU = 0ppm αβ = 60-80 cpm
4	0921 104657 10/30/92	15 20 24	6	Hard yellowish brown 10YR(5/6) silty clay w/ some gravel, med plast, ~~dry~~ moist BY 12/1/92	CL	2.75	HNU = 0ppm αβ = 50-80 cpm
5 6	0925 104658 10/30/92	14 20 23	17	Hard yellowish brown 10YR(5/6) silty clay w/ some gravel, med plasticity, ~~dry~~ moist - BY 12/1/92	CL	3.5	HNU = 0ppm αβ = 40-60 cpm
7	0933 104659 10/30/92	21 27 29	6	Hard yellowish brown 10YR(5/6) silty gravelly clay, med. plasticity, ~~dry~~ moist - BY 12/1/92	CL	2.25	HNU = 0 ppm αβ = 40-60 cpm
8 9	0945 104660 10/30/92	31 50 50/5	18	Hard yellowish brown 10YR(5/6 silty gravelly clay, med. plasticity, ~~dry~~ moist - BY 12/1/92	CL	3.0	HNU = 0 ppm αβ = 60 cpm
10	1000 104661 10/30/92	50 50 50	18	Hard yellowish brown 10YR(5/6) silty clay, med. plasticity, ~~dry~~ moist BY 12/1/92 V. Hard gray 10YR(5/1) silty, gravelly clay, med. plasticity, ~~dry~~ moist BY 12/1/92	CL CL	>4 3.5 BY 11/1/92 >4	HNU = 0 ppm αβ = 60 cpm
11 12	1520 104662 10/30/92	25 30 45	15	V. Hard yellowish brown 10YR(5/6) silty, gravelly clay, med. plasticity, ~~dry~~ moist BY 12/1/92	CL	>4	HNU = 0 ppm αβ = 60 cpm
13	1525 104663 10/30/92	11 15 50/4	16	Hard yel. brown 10YR (5/6) mottled (6/8) silty, gravelly clay, med. plasticity, ~~dry~~ moist BY 12/1/92	CL	3.0	HNU = 0 ppm αβ = 60 cpm
14 15	1535 104664 10/30/92	11 17 20	12	Hard yel. brown 10YR (5/6) silty gravelly clay, med. plasticity, ~~dry~~ moist BY 12/1/92 Hard 10YR (5/1) gray silty, gravelly clay med plasticity, ~~dry~~ moist 12/1/92	CL CL	2.5 2.5	HNU = 0 ppm αβ = 40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 38 Cyclone

Driller: Chris Coulter, David Holmes

SAA = Same as above

NA = Not Applicable

Samples collected per ASTM standard practice

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.0427	PROJECT NAME. RCRA Phase I		
BORING NUMBER: ~~3733~~ 2430 BW 11/2/92	COORDINATES:		DATE 10/30/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/30/92
ENGINEER/GEOLOGIST. B. Yeardley	Depth	Date/Time	DATE COMPLETED: 11/10/92
DRILLING METHODS: Cable Tool			PAGE 7 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1550 104665 10/30/92	10 10 7	8	Firm 10YR (5/1) gray silty, gravelly clay, med plasticity, ~~dry~~ moist BW 12/1/92	CL	1.75	HNU = 0ppm αβ = 60 cpm
17 18	1615 104666 10/30/92	11 13 17	18	Hard 10YR (5/1) → gray silty, gravelly clay, minor sand, med plasticity ~~dry~~ moist 12/1/92	CL	2.5	HNU = 0 αβ = 60cpm
19	1620 104667 10/30/92	3 7 17	8	Firm 10YR (5/1) → gray silty, gravelly clay, med. plasticity, ~~dry~~ moist 12/1/92	CL	1.75	HNU = 0 αβ = 60
20 21	1630 104668 10/30/92	3 7 13	18	Firm 10YR (5/1) → gray silty, gravelly, med plasticity, ~~dry~~ moist BW 12/1/92	CL	1.5	HNU = 0 ppm αβ = 60
22	1645 104669 10/30/92	3 8 16	10	Firm 10YR(5/1) → gray silty, gravelly med. plasticity, ~~dry~~ moist BW 12/1/92	CL	1.5	HNU = 0ppm αβ = 40cpm
23 24	1345 104670 11/2/92	10 11 24	12	Firm, SAA, moist	CL	1.5	HNU = 0 αβ = 40cpm
25	1445 NA ~~104671~~ BW 11/12/92 11/2/92	9 6 9	0	No Recovery	NA	NA	HNU = ~~0ppm~~ αβ = 40 By 11/5/92 NA
26 27	1505 NA 11/2/92	24 12 3	0	SAA	NA	NA	HNU = ~~0ppm~~ By 11/5/92 NA αβ = NA
28	1515 NA 11/2/92	2 2 2	0	SAA	NA	NA	HNU = NA αβ = NA
29 30	1525 NA 11/2/92	10 12 16	0	SAA	NA	NA	HNU Rods bypassed αβ NA this interval

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 38 Cyclone

Driller: Chris Coulter
David Holmes

SAA = Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

402-11-86

CB 2/3/93

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.0427	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 2430	COORDINATES:		DATE 11/2/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/30/92
ENGINEER/GEOLOGIST. B Yeardley	Depth	Date/Time	DATE COMPLETED: 11/10/92
DRILLING METHODS: Cable Tool			PAGE 3 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1535 NA 11/2/92	27 34 26	0	No Recovery	NA	NA	NA
32 33	1545 10471 11/2/92	12 27 32	16	Firm 10YR (5/1) silty gravelly clay, most plastic ~~dry~~ moist Rig 12/1/92 v. soft yellow-sh brown (5/8) clayey silt, low ~~dry~~ plasticity ~~dry~~ moist 13:45 12/1/92 v. dense 2.5Y (6/6) olive yellow, med. sand w/ some gravel, poorly graded ~~dry~~ moist	CL ML SP	1.5 0 NA	HNU = 0 ppm αβ = 40cpm
				penetrate aquiter begin 5 ft. sampling at 35.0 ft (see next page) 11/2/92			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 38 Cyclone

Driller: Chris Coulter

David Holmes

SAA = Same as above

NA = Not Applicable

Samples collected per ASTM standard practice

Colors identified using Munsell

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase I		
BORING NUMBER ~~3733~~ 2430 By 11/2/92	COORDINATES	DATE 11/2/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/30/92	
ENGINEER/GEOLOGIST B. Yeardley	Depth Date/Time	DATE COMPLETED: 11/10/92	
DRILLING METHODS Cable Tool		PAGE 4 OF 11	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
36.5	1600 1046723 11/2/92	24 34 48	18	V. Dense 2.5Y(6/6) olive yellow, med. sand w/ some gravel, poorly ~~sorted~~ graded, ~~dry~~ moist By 12/1/92	SP	NA	HNU = 0ppm αβ = 40cpm
41.5	1655 1046773 11/2/92	43 50/5	10	V. Dense 2.5Y(6/6) olive yellow, med. sand w/ gravel, poorly graded, ~~dry~~ moist → limestone By 12/1/92	SP	NA	HNU = 0 ppm αβ = 40cpm
46.5	0832 1046784 11/3/92	50/5	5	V. Dense 2.5Y (5/4) lt. olive Brown, gravelly sand, poorly graded, ~~dry~~ moist By 12/1/92	SP	NA	HNU = 0 ppm αβ = 40cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602..04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: By 11/10/92 ~~3733~~ 2430	COORDINATES:		DATE 11/03/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/30/92
ENGINEER/GEOLOGIS Brian Yeardley	Depth	Date/Time	DATE COMPLETED: 11/10/92
DRILLING METHODS: Cable Tool			PAGE 5 OF 11

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
51.5	0900 104675 11/3/92	42 50/5	9	V. Dense 2.5Y (5/4) lt. olive brown med sand w/ some gravel, poorly ~~sorted~~ graded, ~~dry~~ moist Bry 12/1/92 By 11/3/92	SP	NA	HNU: 0ppm αβ: 60cpm
55							
56.5	1410 104676 11/3/92	41 50/5	8	V. Dense 2.5Y (5/4) lt olive brown med. sand w/ minor gravel, poorly graded, ~~dry~~ By 12/1/92	SP	NA	HNU = 0ppm αβ = 60cpm
60							
61.5	1020 104677 11/3/92	20 40 40	14	V. Dense 2.5 (5/4) lt. olive brown, med. sand w/ minor gravel, poorly graded, ~~dry~~ moist 12/1/92	SP	NA	HNU = 0ppm αβ = 60cpm
65							

Pennsylvania Drilling

42 Cyclone

Chris Coulter

David Holmes

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2430	COORDINATES:	DATE 11/3/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/30/92	
ENGINEER/GEOLOGIST Brian Yearsley	Depth Date/Time	DATE COMPLETED: 11/10/92	
DRILLING METHODS: Cable Tool		PAGE 6 OF 11	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
65	1350 104879 11/3/92	100/5	4	v. dense 2.5Y (5/4) lt. olive brown, gravelly sand, poorly graded, dry moist By 11/3/92	SP	NA	HNU=0ppm dB=60cpm
66.5				↓ Begin continuous sample for sieve analysis (next page)			
70							
75							
76.5							

CA 11/30/92

Pennsylvania Drilling

38 Cyclone

Chris Coulter

David Holmes

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

CA 12/3/92

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2430	COORDINATES:		DATE 11/3/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/30/92
ENGINEER/GEOLOGIST: B Yeardley	Depth	Date/Time	DATE COMPLETED: 11/10/92
DRILLING METHODS: Cable Tool			PAGE 7 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
66.5	1420 104680 11/3/92	17 29 50/5	5	V. Dense 2.5Y (5/4) lt. olive brown, gravelly sand, well graded, wet	SW	NA	HNU = 0 ppm αβ = 60 cpm
68.0	1445 104681 11/3/92	10 37 50/5	14	Dense 2.5Y (5/4) lt. olive brown, gravel and sand, well graded, wet	SW	NA	HNU = 0 ppm αβ = 60 cpm
69				V. Dense 2.5Y (5/4) lt. olive brown, med. sand, poorly graded ~~dry~~ moist Bn 11/1/92	SP	NA	
70	1520 104682 11/3/92	12 23 50/5	16	M. Dense 2.5Y (5/4) lt. olive brown, gravel & sand, well graded wet	SW	NA	HNU = 0 ppm αβ = 40 cpm
71				V. Dense 2.5Y (5/4) lt. olive brown, med sand w/ minor gravel, poorly graded ~~dry~~ moist By 11/1/92	SP	NA	
72	1625 104683 11/3/92	38 50/5	12	V. Dense 2.5Y (5/4) light olive brown sand and gravel, well graded, wet.	SW	NA	HNU = 0 ppm αβ = 40 cpm
73	1640 104684 ~~104685~~ ~~CB 11/1/92~~ 11/3/92	50 50/5	12	V. Dense 2.5Y (5/4) lt. olive brown, sand w/ gravel, well graded, wet.	SW	NA	HNU = 0 ppm αβ = 60 cpm
74							
75	1715 ~~CB 11/1/92~~ ~~104686~~ 104685 11/3/92	31 50/5	16	V. Dense 2.5Y (5/4) lt. olive brown, gravel w/ some sand to coarse sand w/ some gravel, well graded, wet	SW	NA	HNU = 0 ppm αβ = 60 cpm
76	1720 ~~CB 11/1/92~~ ~~104686~~ 104686 11/3/92	13 15 16	18	SAA, Dense	SW	NA	HNU = 0 ppm αβ = 60 cpm
77							
78	1000 104687 ~~104688~~ ~~CB 11/1/92~~ 11/4/92	28 31 50/2	14	SAA, Very Dense	SW	NA	HNU = 0 ppm αβ = 60 cpm
79				End of Sampling			
80							
81				~~End of Hole~~ By 11/10/92			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 38 Cyclone

Driller: Chris Coulter, David Holmes

SAA = Same as above

NA - Not Applicable

* Sample # for sieve analysis is 104688 (Depth 65.0-78.5 ft) *

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

402-11-46

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.0427	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 2430	COORDINATES:		DATE 11/4/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/30/92
ENGINEER/GEOLOGIST. B Yeardley	Depth	Date/Time	DATE COMPLETED: 11/10/92
DRILLING METHODS: Cable Tool			PAGE 8 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82	NA	NA	NA	no sample taken	NA	NA	NA
83	NA	NA	NA		NA	NA	NA
84	NA	NA	NA		NA	NA	NA
85	NA	NA	NA		NA	NA	NA
86				End of Hole 86.0 ft			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 38 Cyclone

Driller: Chris Coulter

David Holmes

SAA = Same as above

NA = Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color

2/3/93

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. 602 04.27
BORING NO. 2430
PIEZOMETER NO. 2430

FIELD ENG./GEO. B Yeardley DATE 11[illegible]
CHECKED BY C Brown DATE 12/01/92
DATE OF INSTALLATION 10/30/92 - 11/10/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 75.0 ft
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 86.0 ft
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 1, 2 and 10.0 ft
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged locking cov[illegible] with padlock

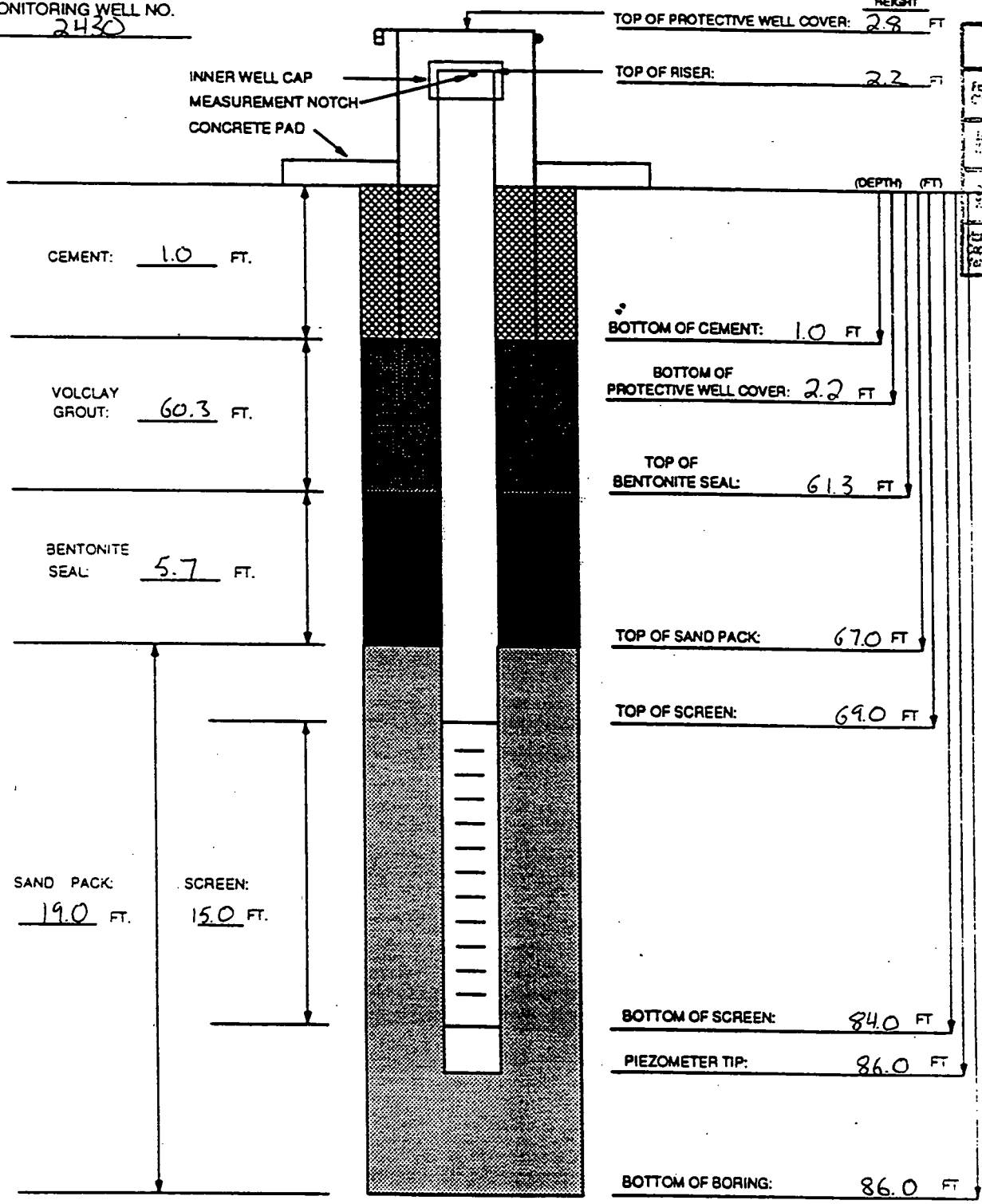
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.2			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Volclay CEMENT GROUT / ~~SLURRY~~ By 11/12/92	TOP 1.0	BOTTOM 61.3	TOP	BOTTOM
BENTONITE	TOP 61.3	BOTTOM 67.0	TOP	BOTTOM
SAND	TOP 67.0	BOTTOM 86.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 69.0	BOTTOM 84.0	TOP	BOTTOM
PIEZOMETER TIP	86.0			
BOTTOM OF BOREHOLE	86.0			
GWL AFTER INSTALLATION	75.0 (11/10/92 from ground surface)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2430

INSTALLATION DATE: 10/30/92 - 11/10/92



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 20 bags 4/30 coarse sand
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 13
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 625 gallons
OTHER: 11 drums Soil, 1 drum water
TASK: 602 0427

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER: Brian Yeardley
4) WATER DEPTH AND DATE 75 11/10/
5) TOP OF CASING IS SECURED W/ STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

mw-2430

Customer Number 1046

MATERIAL: _____ SAMPLE NUMBER: 92 11 05-071

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 171.3

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	63.57	37.1	37.1	78.7
20	36.20	21.1	58.2	33.5
40	27.51	16.1	74.3	16.7
60	20.65	12.0	86.3	9.8
100	8.05	4.7	91.0	5.9
200	7.13	4.2	95.2	3.0
Pan	7.47	4.4	99.6	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:

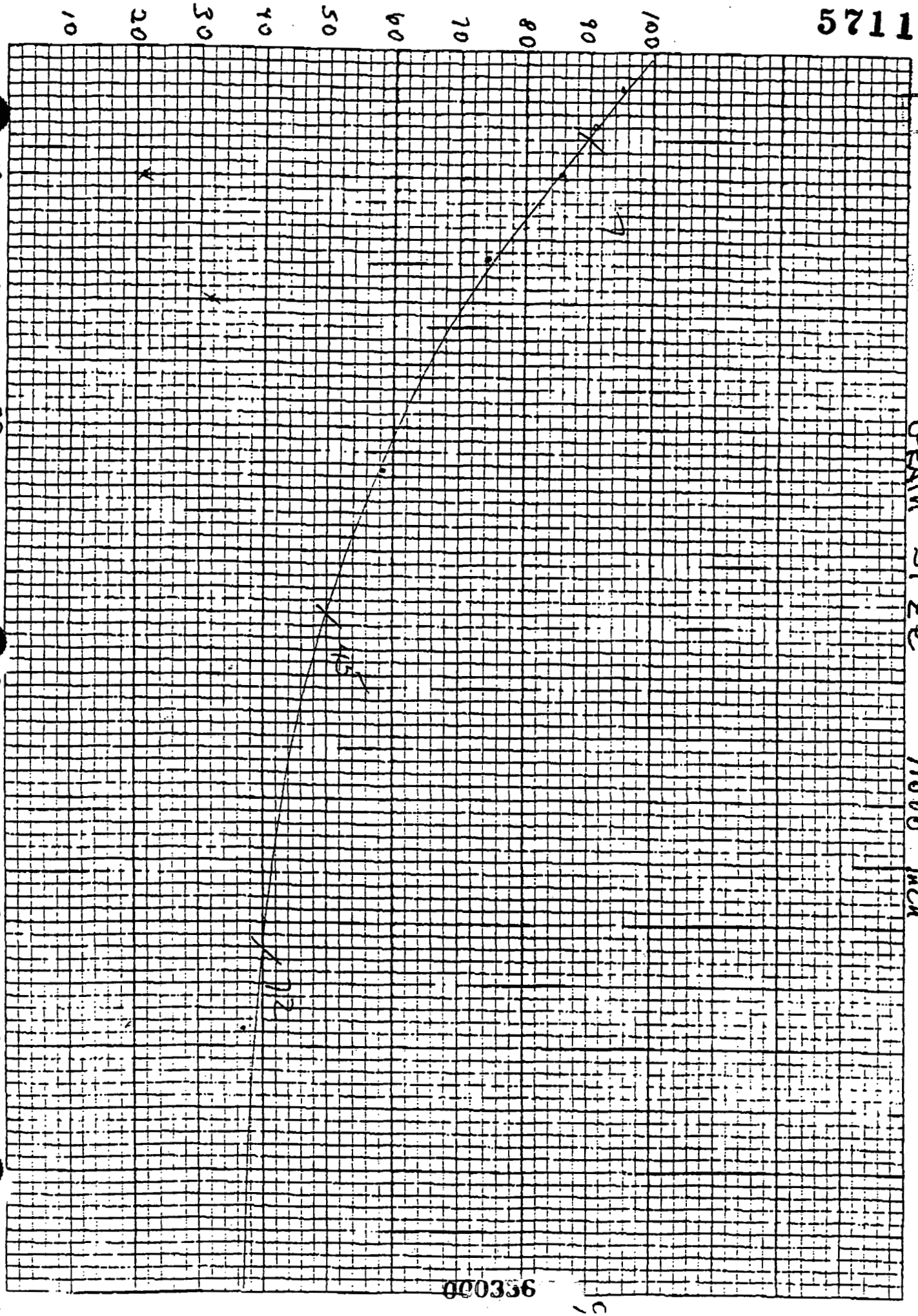
GRAIN SIZE 40% RETAINED 72 .001 in

50% 45

90% 7

CB 3/3/93

5711



Monitor Well #2430 Brian Yeardley

Methodology for sand pack and sieve determination

I. Wemco values for grain size

40% = .072 in

50% = .045 in

90% = .007 in

II 40% / 90% Ratio or Uniformity Coefficient

.072 in / .007 = 10.3

10.3 > 3 ∴ use factor of 4

III 50% value × 4

.045 in × 4 = 0.18

IV 0.18 falls far to the left of the medium and coarse grain curves. However, since this va is closer to the coarse grain curve (50% value we will use the coarse grain sand pack with the 20 slot (0.02 in) screen. This will allow fo maximum flow of water into well and also retain formation.

CB 2/3/93

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2431	COORDINATES:	DATE: 12-3-92
ELEVATION:	GWL: Depth 7.3 ft. Date/Time 12-18-92/1500	DATE STARTED: 12-3-92
ENGINEER/GEOLOGIST: Michael Worley	Depth 73.3 ft Date/Time 12-19-92/0800	DATE COMPLETED: 12-17-92
DRILLING METHODS: Cable Tool		PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				* For soil characterization of 0.0 to 68.0 Ft. see boring log for well # 3431.			
34							
68				* Continuous sampling will begin at 68.0 through 83.0 ft. for sieve screen analysis.			

Initial | Field Check: CB | 1st Key In | 2nd Key In | Hard Copy Verification

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, β γ = 30 cpm, α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 2431	COORDINATES:	DATE 12-7-92	
ELEVATION:	GWL: Depth 73.3 ft. Date/Time 12-18-92/1500	DATE STARTED: 12-3-92	
ENGINEER/GEOLOGIST. Michael Worley	Depth 73.3 ft. Date/Time 12-19-92/0800	DATE COMPLETED: 12-17-92	
DRILLING METHODS: Cable Tool		PAGE 2 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
68							
69	1620 105232 12-7-92	21 45 50/.3	12	Very dense (2.5Y, 5/3) light olive brown well graded gravelly sand, dry	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
70 71	1640 105232 12-7-92	17 22 24	18	Dense (2.5Y, 5/4) light olive brown well graded sand, trace gravel, moist	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
72	0810 105232 12-8-92	18 21 23	18	SAA	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
73 74	1040 105232 12-8-92	50/.5	2	Very dense (2.5Y, 5/4) light olive brown well graded gravel, trace sand, wet	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
75	1330 105232 12-8-92	28 50/.3	8	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
76 77	1415 105232 12-8-92	50/.4	3	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
78	1430 105232 12-8-92	50/.5	3	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
79 80	1440 105232 12-8-92	50/.5	3	SAA	GW	N/A	Bγ = 0 cpm OVM = 30 ppm α = 0 cpm
81	1500 105232 12-8-92	49 34 36	8	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
82 83	1510 105232 12-8-92	45 37 40	6	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile

Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

* Samples Collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2431	COORDINATES:	DATE 12-8-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 12-18-92/1500	DATE STARTED: 12-3-92
ENGINEER/GEOLOGIST: Michael Worley	Depth 73.3 FT Date/Time 12-19-92/0800	DATE COMPLETED: 12-17-92
DRILLING METHODS: Cable Tool		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				* Bottom of sampling at 83.0 ft			
84							
85				* Bottom of boring at 85.0 ft.			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 speedstar

Driller: Joe Barile
Rick Pierce

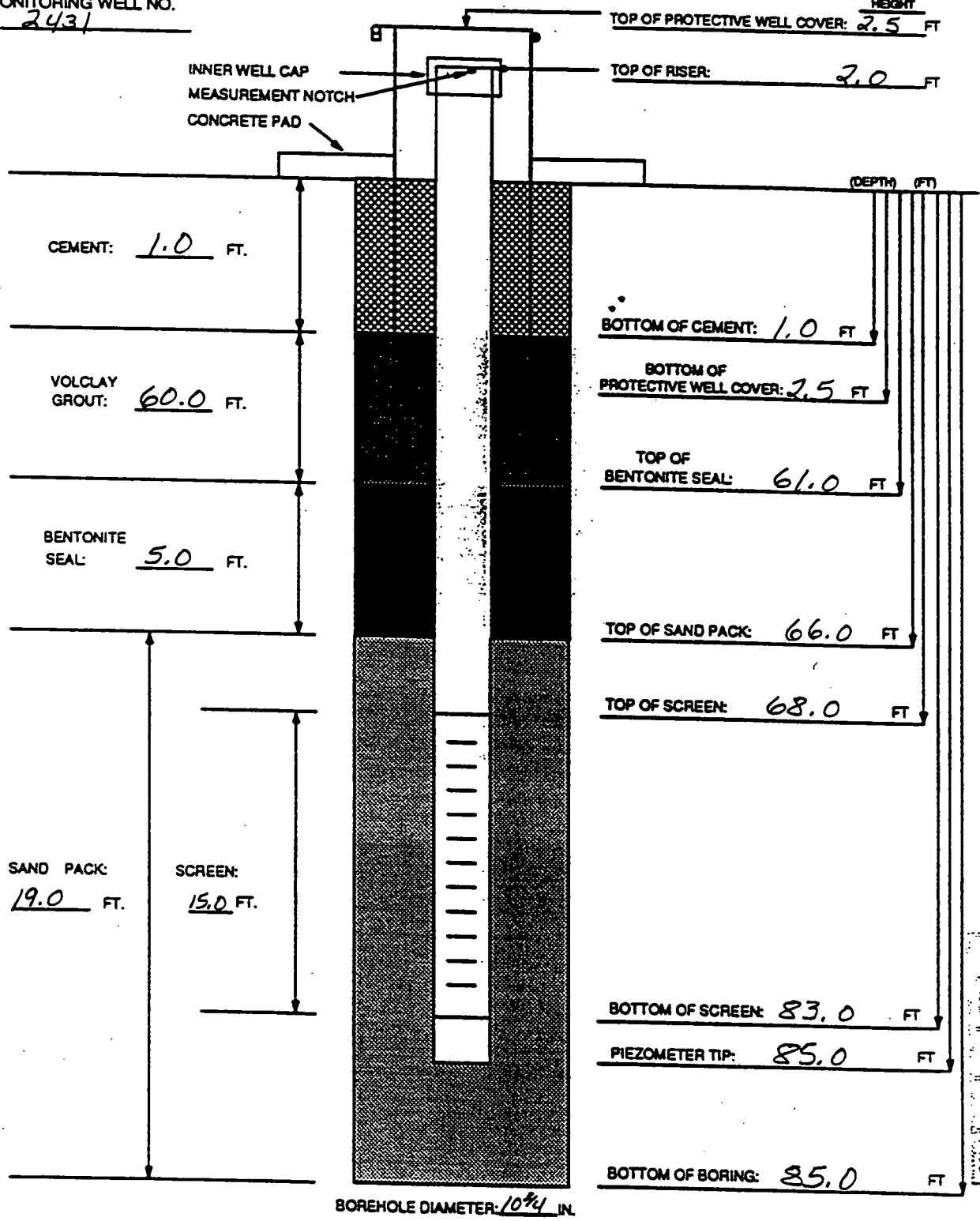
SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm
β = 30 cpm
α = 0 cpm

* Samples Collected per ASTM standard Penetration Test
* All colors identified by the Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2431

INSTALLATION DATE: 12-17-92



BOREHOLE DIAMETER: 10¾ IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30, 22-50lb.
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 18 - 50 lbs.
AMOUNT OF CEMENT: 1 - 80lb. bag
AMOUNT OF WATER USED: 1,500 gallons
OTHER: 1-water drum, 14 soil drums
TASK: RCRA phase I, 602.04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 71.3 FT/12-18-
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH B GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Michael Worley

ASI FORM 0157 REV. (0)

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. 602.04.27
BORING NO. 2431
PIEZOMETER NO. 2431

FIELD ENG./GEO. Michael Worley DATE 12-20-
CHECKED BY C Brien DATE 12/30/92
DATE OF INSTALLATION 12-~~18~~ 17-92
CBrien 12/30/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 Ft TO 85.0 Ft
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in. I.D. FROM 0.0 FT TO 85.0 F
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. ID.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020
TOTAL PERFORATED AREA 15.0 FT.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 1-2.0 FT., 7-10 Ft.
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.0~~ 2.5 M.W. 12-18-92			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Vol CLAY CEMENT GROUT / ~~SLURRY~~ MW 12-18-92	TOP 1.0	BOTTOM ~~60.0~~ 61.0 MW 12-18-92	TOP	BOTTOM
BENTONITE	TOP ~~60.8~~ MW 12-18-92	BOTTOM 66.0	TOP	BOTTOM
SAND	TOP 66.0	BOTTOM 85.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 68.0	BOTTOM 83.0	TOP	BOTTOM
PIEZOMETER TIP	85.0			
BOTTOM OF BOREHOLE	85.0			
GWL AFTER INSTALLATION	73.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed 0.0 Ft to 1.0 FT. to hold protective cover in place.

409

Boring # 2431
Screen Sieve Analysis

12-18-92

1. 90% = .007
2. 50% = .073
3. 40% = >.100

2. $\frac{>.100}{.007}$ = 14.3, so use a factor of 4.

3. 4 X .073 = > 0.29

4. 0.29 most closely fits the curve for coarse (4/30) sand and ~~medium~~ CB 7/22/93 (0.020) screen.

Boring #2431

5711

Customer Number 105232

MATERIAL: _____ SAMPLE NUMBER: 921208-153

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 191.6

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	93.06	48.6	48.6	78.7
20	31.90	16.6	65.2	33.5
40	25.00	13.0	78.2	16.7
60	16.95	8.8	87.0	9.8
100	7.72	4.0	91.0	5.9
200	6.15	3.2	94.2	3.0
Pan	11.77	6.1	100.3	

$\frac{W_2 \times 100\%}{W_1} = R$ | $\frac{\text{Original} - \text{Duplicate}}{\text{Average}}$ | $\times 100\% = RPD$

Analyzed by: Robert | Checked by: [illegible] | Date analyzed: 12-9-92

GRAIN SIZE 40% RETAINED 100 .001 inch

50% 73

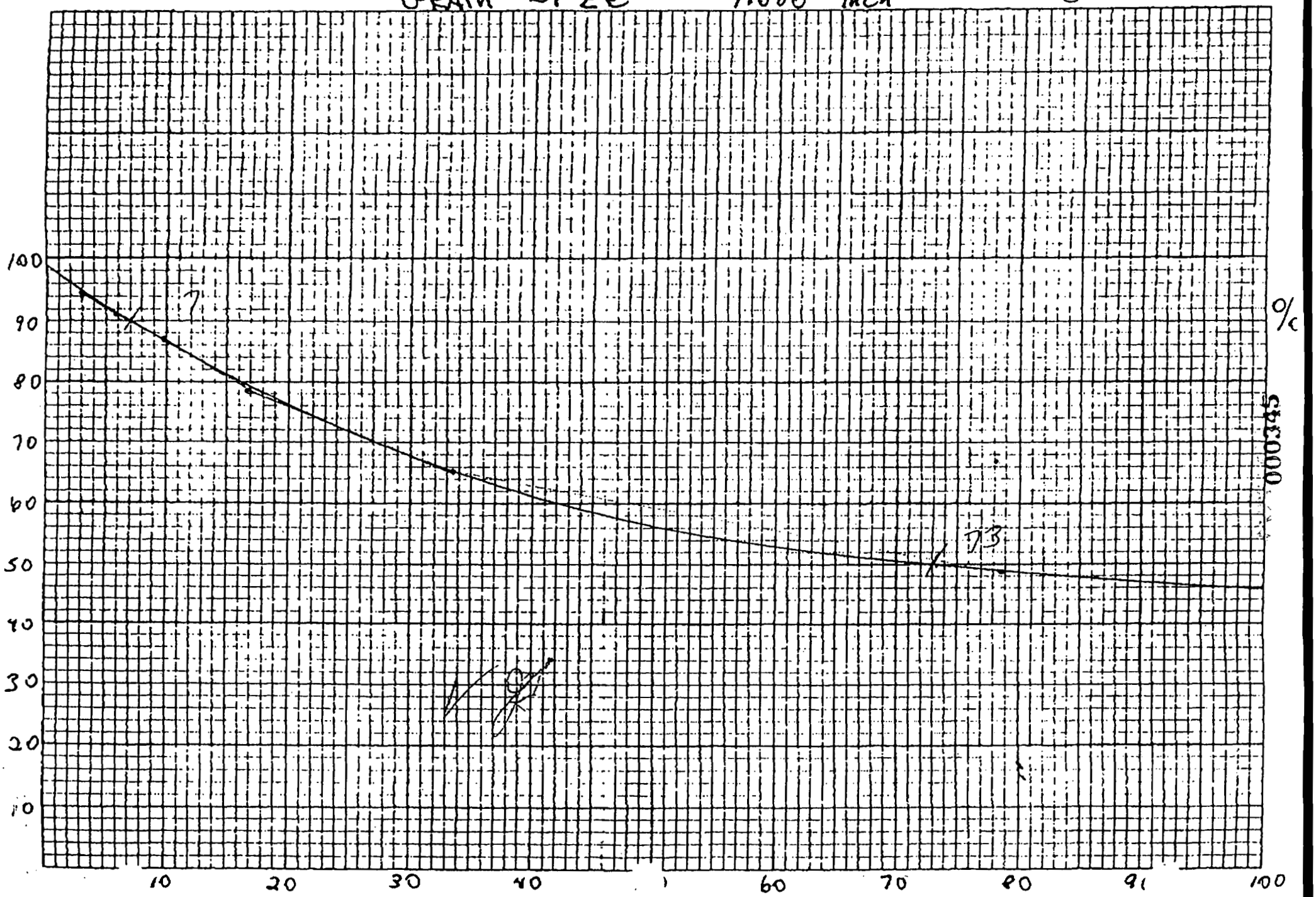
90% 7

NO 340/ 10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

Grain Size 1/1000 inch

Boring-2431



000345

RWFS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-4-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1400	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth: Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 1 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0920 103215 11-4-92	3 4 7	15	medium stiff (10YR, 4/4) dark yellowish brown silty clay, trace organics, moist, medium plasticity	Cl	1.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
2 3	0925 103216 11-4-92	5 14 14	10	~~SAA~~ Medium stiff (10YR, 5/6) yellowish brown silty clay, medium plasticity, moist	Cl	1.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
4	0930 103217 11-4-92	14 26 50/.4	8	stiff (10YR, 5/6) yellowish brown clay, trace gray mottling, low plasticity, trace limestone gravel, slightly moist	Cl	2.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
5 6	0935 ~~103~~ 11-4-92 11-4-92	50/0	0.	NO RECOVERY	N/A	N/A	OVM = N/A ppm Bγ = N/A cpm α = N/A cpm
7	1300 103218 11-4-92	12 28 36	5	stiff (10YR, 5/6) yellowish brown silty clay, trace gravel, low plasticity, slightly moist	Cl	2.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
8 9	1305 103219 11-4-92	50/.3	6	Very stiff, SAA	Cl	2.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
10	1330 103220 11-4-92	10 17 25	14	SAA, gray mottling	Cl	3.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
11 12	1340 103221 11-4-92	16 26 40	16	Very stiff (10YR, 5/1) gray clay trace gravel, low plasticity, slightly moist	Cl	3.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
13	1400 103222 11-4-92	16 21 26	18	Very stiff ~~SAA~~ (10YR, 4/1) dark gray clay, trace gravel, low plasticity, slightly moist	Cl	3.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
14 15	1410 103223 11-4-92	40 50 36	18	Very stiff (10YR 4/1) dark gray ~~SAA~~ silty clay, trace gravel, low plasticity, slightly moist	Cl	3.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Banile, Rick Pierce

& Samples collected per ASTM Standard Penetration Test

* All Colors identified by Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 20 cpm, α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-4-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 2 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1420 103224 11-4-92	13 26 21	12	Very stiff (10YR, 5/1) gray Clay, trace sand and gravel, low plasticity, slightly moist	Cl	2.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
17–18	1505 103225 11-4-92	7 12 21	12	Very stiff (10YR 5/1) ~~SAA~~ gray silty clay, trace gravel, ~~SAA~~ low plasticity, slightly moist	Cl	2.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
19	1515 103226 11-4-92	18 28 18	12	Very stiff (10YR, 5/1) gray clay trace silt, trace gravel, low plasticity, slightly moist	Cl	2.75	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
20–21	1640 103227 11-4-92	45 10 10	3	Stiff (10YR, 5/1) gray gravely Clay, trace sand, medium plasticity, moist	Cl	1.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
22	1650 N/A 11-4-92	2 5 7	0	NO RECOVERY	N/A	N/A	N/A
23–24	1700 103228 11-4-92	2 5 11	4	medium stiff (10YR, 5/1) gray gravely clay, medium plasticity, moist	Cl	1.0	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
25	1720 103229 11-4-92	6 7 9	3	medium dense (10YR, 5/1) gray Clayey gravel, no plasticity, wet	GC	N/A	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
26–27	1400 N/A 11-5-92	3 5 6	0	NO RECOVERY	N/A	N/A	N/A
28	1410 103230 11-5-92	4 7 11	3	Soft (10YR, 5/1) gray gravely clay, medium plasticity, moist.	Cl	0.5	OVM = 0 ppm Bγ = 20 cpm α = 0 cpm
29–30	1600 N/A 11-5-92	5 5 9	0	NO RECOVERY	N/A	N/A	OVM = N/A ppm Bγ = N/A cpm α = N/A cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE: 11-5-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST: Michael Werley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 3 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1605 103231 11-5-92	14 12 12	12	Stiff (10YR, 5/1) gray clay, trace sand, trace gravel, medium plasticity, moist	CI	1.0	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm Base of fill
32 33	1620 103232 11-5-92	31 50/.4	8	Very dense (2.5Y, 5/6) light olive brown well graded sand, trace gravel, dry	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
34 35				* Next sample at 35.0 feet. Samples will be collected at 5.0 feet intervals from 35.0 feet.			
36	1645 103233 11-5-92	50/.5	3	Very dense (2.5Y, 5/6) light olive brown well graded sand, trace gravel, dry	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
37 38 39 40							
41	0950 103234 11-6-92	5 50/.4	5	Very dense (2.5Y, 5/6) light olive brown well graded coarse sand, trace gravel, dry	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
42 43 44 45							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speed star

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 30 cpm, α = 0 cpm

* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-6-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth: Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 4 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECIVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1320 103235 11-6-92	13 50/.4	6	Very dense (2.5Y, 5/6) light olive brown well graded gravelly sand, slightly moist	SW	N/A	ovm = 0 ppm Bγ = 30 cpm α = 0 cpm
47							
48							
49							
50							
51	1355 103236 11-6-92	18 45 40	18	SAA	SW	N/A	ovm = 0 ppm Bγ = 30 cpm α = 0 cpm
52							
53							
54							
55							
56	1500 103237 11-6-92	7 50/.4	6	Very dense (2.5Y, 5/4) light olive brown well graded sand, trace gravel, slightly moist	SW	N/A	ovm = 0 ppm Bγ = 30 cpm α = 0 cpm
57							
58							
59							
60							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { ovm = 0 ppm, Bα = 30 cpm, α = 0 cpm

*Samples collected per ASTM Standard Penetration Test
*Colors identified by the Munsell Color Chart

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-6-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 5 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
61	1530 103238 11-6-92	14 40 40	15	Very dense (2.5Y, 5/3) light olive brown well graded sand, trace gravel, slightly moist	SW	N/A	OVM = 0 ppm βγ = 30 cpm α = 0 cpm
62							
63							
64							
65	1630 103239 11-6-92	7 40 50/.0	12	Very Dense (2.5Y 5/3) light olive brown, SAA, well graded gravelly sand, slightly moist.	SW	N/A	OVM = 0 ppm βγ = 30 cpm α = 0 cpm
66							
67							
68							
69							
70	1720 103240 11-6-92	10 50/.4	10	SAA, moist	SW	N/A	OVM = 0 ppm βγ = 30 cpm α = 0 cpm
71							
72							
73							
74							
75				▼ * water table at 75.0 FT			

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, βγ = 30 cpm, α = 0 cpm

* Samples collected per ASTM standard Penetration Test
* Colors identified by the Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-18-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS. Cable Tool		PAGE 6 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	1425 105201 11-10-92	21 50/.4	8	Very dense (2.5Y, 5/3) light olive brown well graded gravel, trace sand, wet	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
77							
78							
79							
80							
81	1615 105202 11-10-92	40 21 20	10	SAA	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
82							
83							
84							
85							
86	0950 105203 11-11-92	50/.3	2	Very dense (2.5Y, 5/3) light olive brown clayey gravel, wet.	GC	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
87							
88							
89							
90							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bα = 30 cpm, α = 0 cpm

* Samples collected per ASTM Standard Penetration Test
* Colors identified by the Munsell Color Chart

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-11-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 7 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	1020 105204 11-11-92	26 31 27	13	Very dense (2.5Y, 5/3) light olive brown, well graded sand, trace gravel, wet	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
92							
93							
94							
95							
96	1320 105205 11-11-92	50/3	4	SAA	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
97							
98							
99							
100							
101	1345 105206 11-11-92	5 17 21	8	Dense (2.5Y, 5/3) light olive brown well graded gravel, trace coarse sand, wet	GW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
102							
103							
104							
105							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile

Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bα = 30 cpm, α = 0 cpm

* Samples collected per ASTM Standard Penetration Test
* Colors identified by the Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I		
BORING NUMBER: 3431	COORDINATES:	DATE 11-11-92	
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92	
ENGINEER/GEOLOGIST. Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92	
DRILLING METHODS: Cable Tool		PAGE 8 OF 13	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	1510 105207 11-11-92	50/.3	4	Very dense (2.5Y, 5/3) light olive brown poorly graded coarse sand, trace gravel, wet	SP	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
107							
108							
109							
110	1550 105208 11-11-92	25 25 25	7	Dense (2.5Y, 5/3) light olive brown gravely sand, well graded, wet MW 11-13-92	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
111							
112							
113							
114							
115	0900 105211 11-13-92	10 29 36	14	Very dense (2.5Y, 5/3) light olive brown well graded sand, trace gravel, wet	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
116							
117							
118							
119							
120							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile, Rick Pierce

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bα = 30 cpm, α = 0 cpm

*Samples collected per ASTM standard Penetration Test

* Colors identified by the Munsell Color Chart

/FS

5711

VISUAL CLASSIFICATION OF SOILS

NUMBER: 602.94.27	PROJECT: RCRA Phase I		
NUMBER: 3431	COORD:	DATE	11-13-92
	GWL: Date/Time 11-24-92/1430	DATE STARTED:	11-4-92
GEOLOGIST: Michael Manley	Date/Time	DATE COMPLETED:	11-24-92
METHOD: Cable Tool		PAGE 9	OF 13

	BLOWS/6 SAMPLER (LBS)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	3 7 9	6	Medium dense (2.5Y 5/4) light olive brown well graded sand, trace gravel. Moist	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
	3 6	8	SAA	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm
		12	Very dense, SAA	SW	N/A	OVM = 0 ppm Bγ = 30 cpm α = 0 cpm

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bα = 30 cpm, α = 0 cpm

Pennsylvania Drilling
22 Speedstown
Basile
Mark Rebold
Samples collected per ASTM standard Penetration Test
Identified by the Munsell Color Chart

000354

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE: 11-16-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 10 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
136	1025 105216 11-16-92	12 15 42	18	Very dense (2.5Y, 5/3) light olive brown well graded sand, trace gravel, wet	SW	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
137 138	N/A	N/A	N/A	Continuous sampling will resume at 138.0 - 148.0 FT for screend interval of this well.	N/A	N/A	OVM Bq α N/A
139	1100 105217 11-16-92	21 35 42	18	Very dense (2.5Y, 5/3) light olive brown poorly graded sand, wet	SP	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
140 141	1525 105218 11-16-92	25 50/.2	9.	SAA, trace gravel	SP	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
142	1615 105219 11-16-92	50/.4	5	SAA	SP	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
143 144	1630 105220 11-16-92	50/.5 50/0	6	SAA	SP	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
145	1645 105221 11-16-92	50/.5 50/.2	9	Very dense (2.5Y, 5/4) light olive brown well graded sand, trace gravel, wet	SW	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
146 147	1715 105222 11-16-92	25 32 45	15	SAA	SW	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
148	1725 105223 11-16-92	50/.4	7	Very dense (2.5Y, 5/4) light olive brown poorly graded sand, trace gravel, wet	SP	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
149 148 11-16-92 150	N/A	N/A	N/A	NO SAMPLE TAKEN. NEXT SAMPLE AT 150.0 - 151.5 FT	N/A	N/A	N/A

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile
Rick Pierce

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { HNU = 0 ppm, Bq = 30 cpm, α = 0 cpm

L Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3431	COORDINATES:	DATE 11-17-92
ELEVATION:	GWL: Depth 73.3 FT Date/Time 11-24-92/1430	DATE STARTED: 11-4-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 11-24-92
DRILLING METHODS: Cable Tool		PAGE 11 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	1500 105225 11-17-92	39 40 31	18	Very dense (2.5Y, 5/3) light olive brown well graded sand, trace gravel, wet	SW	N/A	OVM = 0 ppm Bq = 30 cpm α = 0 cpm
152				Bottom of sampling at 151.5 FT			
153							
154							
155				Bottom of boring at 155.0 FT			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile

Rick Pierce

* Samples collected per ASTM Standard Penetration Test
* Colors identified by the Munsell Color Chart

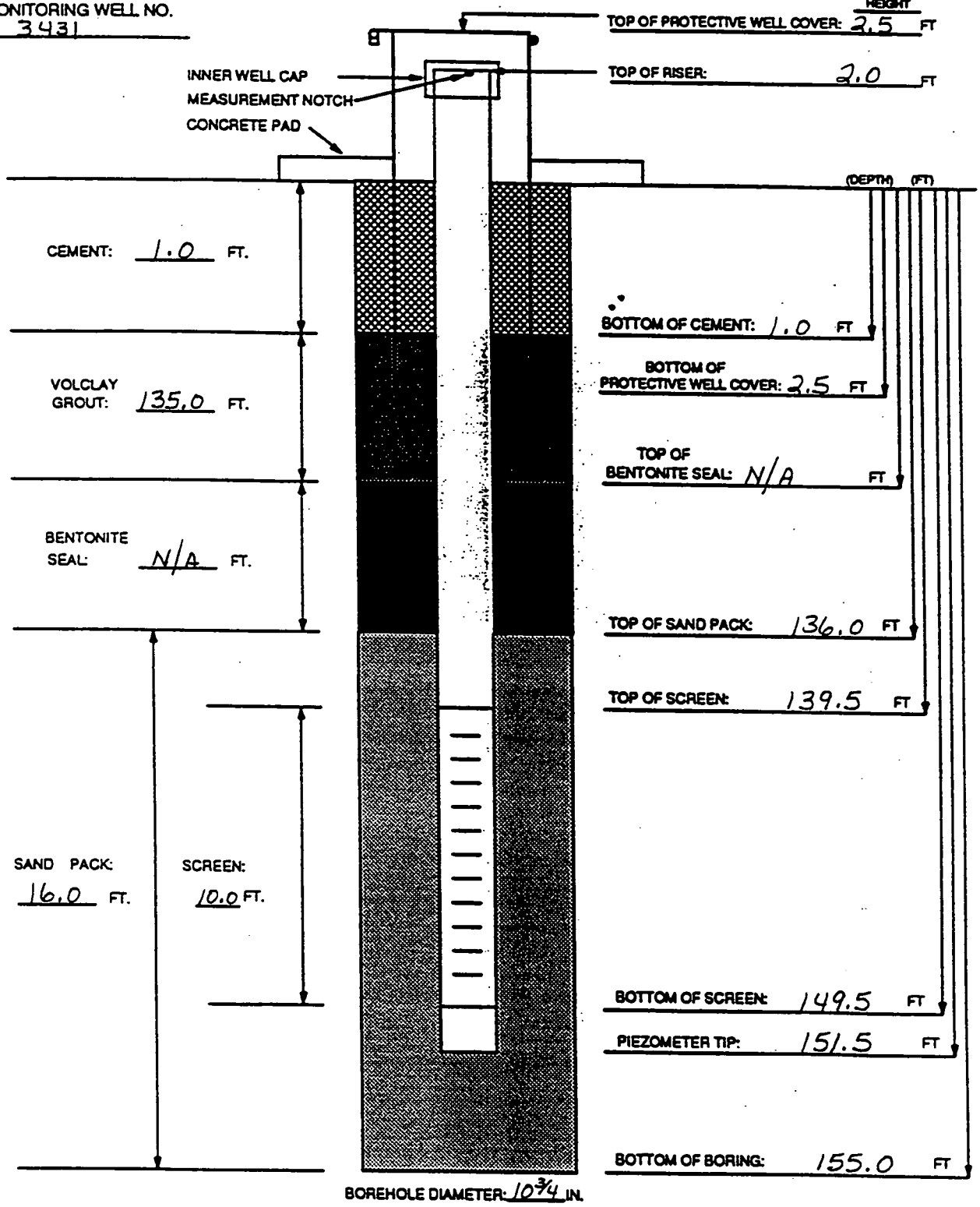
SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bq = 30 cpm, α = 0 cpm

Field Check: CB

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3431

INSTALLATION DATE: 11-24-92



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20, 10 bags
BENTONITE PELLETS (5-GALLON BUCKETS): NONE USED
BAGS OF VOLCLAY GROUT: 30 - 50 lb.
AMOUNT OF CEMENT: 80 lbs.
AMOUNT OF WATER USED: 1,800 gallons
OTHER: 1 water drum, 26 soil drums
TASK: RCRA Phase I

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 73.3 FT/ 11-24
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Michael Worley

ASI FORM 0157 REV. (0)

PIEZOMETER INSTALLATION SHEET

5711

PROJECT NAME RCRA Phase I
PROJECT NO. 602.04.27
BORING NO. 3431
PIEZOMETER NO. 3431

FIELD ENG./GEO. Michael Worley DATE 11-24-
CHECKED BY C. Brier DATE 12/02
DATE OF INSTALLATION 11-24-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT TO 150.0 FT.
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in I.D. FROM 0.0 FT TO 155.0 F
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 Stainless Stee
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 1-1.5 FT, 1-2 FT, 14-
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	CB 2-22-93 ~~2.5~~ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: VOLCLAY GROUT / ~~SLURRY~~ CEMENT M.W. 11-24-92	TOP 0.0 FT TOP 1.0 FT	BOTTOM 1.0 FT BOTTOM 136.0 FT	TOP	BOTTOM
BENTONITE NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND 10/20	TOP 136.0 FT	BOTTOM 152.0 FT	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 139.5 FT	BOTTOM 149.5 FT	TOP	BOTTOM
PIEZOMETER TIP	151.5 FT			
BOTTOM OF BOREHOLE	155.0 FT			
GWL AFTER INSTALLATION	73.3 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS Cement placed 0.0 to 1.0 FT to hold protective cover in place.

Field Check
1st Rev.
2nd Rev.
Final Check

Boring - #3431

Screen Sieve Analysis

11-18-92

1. 90% = .006

   50% = .018

   40% = .022

2. $\frac{.022}{.006} = 3.7$, 3.7 > 3 so use a factor of 4.

3. 4 x .018 = .072

4. .072 most closely fits the curve for ~~fine~~ medium sand pack with a .010 slotted well screen

CB 6/22/93

5711

MW-3431

Customer Number 105124

MATERIAL: _____ SAMPLE NUMBER: 921117-137

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 233.5

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	11.35	4.9	4.9	78.7
20	18.66	8.0	12.9	33.5
40	84.74	36.3	49.2	16.7
60	73.15	31.3	80.5	9.8
100	22.12	9.5	90.0	5.9
200	12.55	5.4	95.4	3.0
Pan	9.91	4.2	99.6	

$\frac{W_2 \times 100\%}{W_1} = R$ $\left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = RPD$

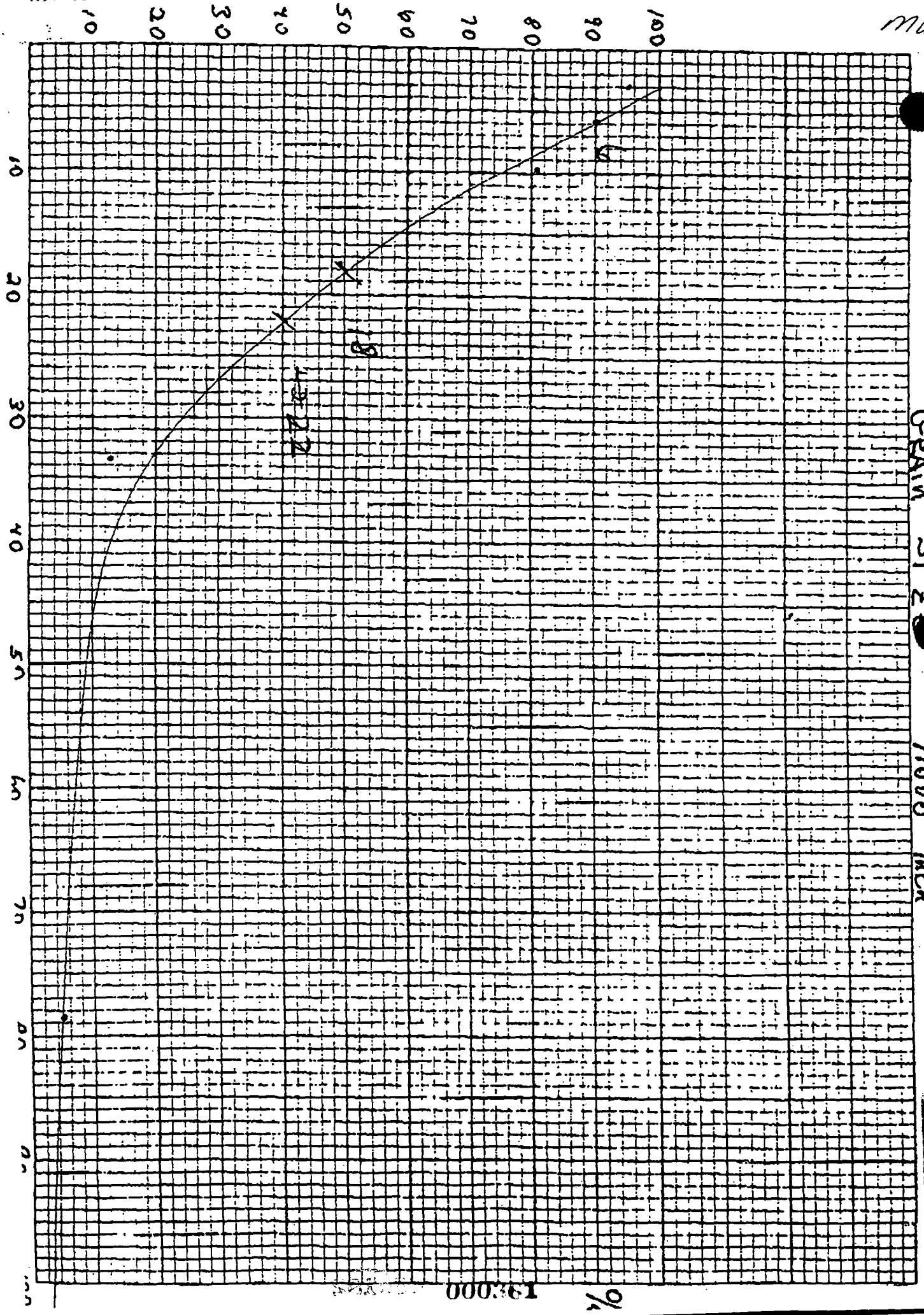
Analyzed by: John Roberts | Checked by: OK | Date analyzed: 11-17-92

GRAIN SIZE 40% RETAINED 22 .001 inch

50% 18

90% 6

MW-


10
20
30
40
50
60
70
80
90
100
GRAIN SIZE
1/1000 inch
MW 3431
1st Key in
2nd Key in
Hard Copy Verification
%

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 65 RCA 1:27 WEA 05	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 2432	COORDINATES:	DATE: 1-14-93
ELEVATION:	GWL: Depth 15.5 FT(GL) Date/Time: 1-25-93/1100	DATE STARTED: 1-14-93
ENGINEER/GEOLOGIST: K. Payne	Depth 82.6 FT(GL) Date/Time: 1-27-93/1625	DATE COMPLETED: 1-27-93
DRILLING METHODS Cable Tool		PAGE 1 OF 8 KP 1-22-93

DEPTH (Ft.)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				*For Soil Classification from 0.0 to 78.0 feet, see Boring Log of monitoring well 4432.			
78				Continuous Sampling will begin at 78.0 feet and continue to 93.0 feet for sieve analysis.			

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGloklin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27 WEA 05	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2432	COORDINATES:	DATE: 1/19/93
ELEVATION:	GWL: Depth See p. 1 Date/Time:	DATE STARTED: 1/14/93
ENGINEER/GEOLOGIST: K. Payne	Depth See p. ~~1~~ 21 CB 2/4/93 Date/Time:	DATE COMPLETED: 1/27/93
DRILLING METHODS Cable Tool		PAGE 2 OF 8

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
79	104882 1330 1-20-93	65/.6	5	Very Dense (10YR, 4/6) Yellowish Brown, Well Graded Gravely Sand, Dry	SW ~~GW~~ CB 2/1/93	N/A	HNU = 0 ppm Bγ = 40-60 cpm
80	104883 1350 1-20-93	10 16 50/.5	6	Very Dense (10YR, 5/4) Yellowish Brown, Well Graded Coarse Gravely Sand, moist	SW ~~GW~~ CB 2/1/93	N/A	HNU = 0 ppm Bγ = 40-60 cpm
81 82	104884 1450 1-20-93	15 65/.5	6	Very Dense (2.5Y, 5/3) light olive Brown, Well Graded Fine Sand, Moist	SW ~~GW~~ CB 2/1/93	N/A	HNU = 12 ppm Bγ = 60-80 cpm
83 84	104885 1530 1-20-93	20 65/.6	8	Very Dense (2.5Y, 6/3) light yellowish brown, Well Graded medium Sand, wet	SW	N/A	HNU = 5 ppm Bγ = 60-80 cpm
85	104886 1555 1-20-93	15 27 33	13	Very Dense (2.5Y, 4/3) Olive Brown, Well ~~Graded~~ KP 1-22-93 Graded gravely Sand, wet	SW	N/A	HNU = 2 ppm Bγ = 80-100 cpm
86 87	104887 1645 1-20-93	27 45 50/.5	16	Very Dense (2.5Y, 5/3) light Olive Brown, Well Graded gravely Sand, wet	SW	N/A	HNU = 1 ppm Bγ = 60-80 cpm
88	104888 1650 1-20-93	27 45 41	18	Very Dense (2.5Y, 5/4) light olive Brown, poorly graded Sand, wet	SP	N/A	HNU = 0 ppm Bγ = 60-80 cpm
89 90	104889 0945 1-22-93	15 25 20	12	Dense (2.5Y, 4/3) olive Brown Well ~~Graded~~ KP 1-22-93 graded medium Sand, wet	SW ~~SP~~ 2-1-93	N/A	HNU = 0 ppm Bγ = 60-80 cpm
91	104890 0905 1-22-93	15 15 15	16	~~Very Dense (2.5Y, 4/3) olive~~ Dense (5Y, 4/3) olive, poorly ~~Well~~ KP 1-22-93 ~~Graded~~ medium sand, wet	SP	N/A	HNU = 0 ppm Bγ = 60-80 cpm
92 93	104891 0950 1-22-93	65 85	7	Very Dense (2.5Y, 4/3) olive Brown, well graded sandy Gravel, wet	GW ~~SW~~ KP 1-22-93	N/A	HNU = 0 ppm Bγ = 60-80 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Lonnie McGlokl.n
Kevin Cavenaugh

SAA - Same as above
NA - Not Applicable
* Sieve Analysis sample #104892 collected from 78.0-93.0 ft
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
1/19/93 HNU = 0 ppm
Bγ = 60-80 cpm
1/22/93 HNU = 0 ppm

CB 2/4/93

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27 WEA 05	PROJECT NAME: RCRA Phase I	5711
BORING NUMBER: 2432	COORDINATES:	DATE: 1/22/93
ELEVATION:	GWL: Depth See p. 1 Date/Time:	DATE STARTED: 1/14/93
ENGINEER/GEOLOGIST: K. Payne	Depth See p. 1 Date/Time:	DATE COMPLETED: 1-27-93
DRILLING METHODS Cable Tool		PAGE 2 OF 8

DEPTH (Ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
93				For Visual Description of soils from 93.0 to 97.0 ft, see Visual Classification of soils for MW-4432			
94							
95							
96							
97				Bottom of Boring 97 ft			

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGlocklin

SAA - Same as above

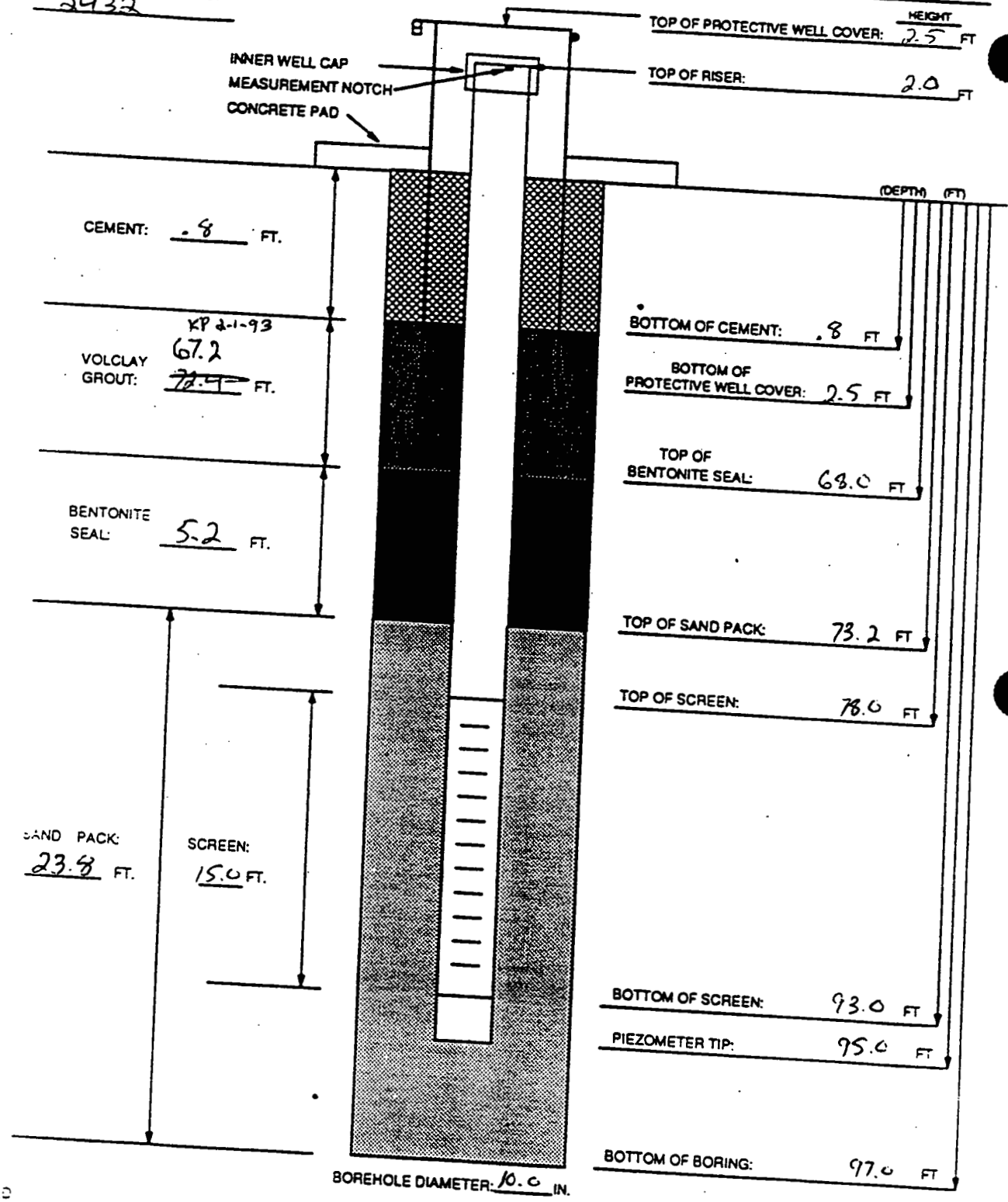
NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2432

INSTALLATION DATE: 1/27/93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

TYPE AND QUANTITY: 24 bags 4/30 sand
BENTONITE PELLETS (5-GALLON BUCKETS): 5 buckets
TYPE VOLCLAY GROUT: 19 - 50 lb Bags
TYPE OF CEMENT: 1 - 80 lb Bag
WATER USED: 1400 gallons
18 Drums Soil, 1 Drum Alconox/Water
602.04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 54.6 FT. (Top of Riser) 1-27-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

Date 2/9/93

REV. (0)

000365

RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. 602.04.27
BORING NO. 2432
PIEZOMETER NO. 2432

FIELD ENG./GEO. K. Payne DATE 1-27-9
CHECKED BY C Brick DATE 2/1/9
DATE OF INSTALLATION 1-27-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 97.0 FT
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE D.O. ID FROM 0.0 FT TO 97.0 FT
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 8 - 10 FT
JOINING METHOD Screw type-flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (~~ft~~)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	Top 0.0	Bottom 0.8		
Cement + Volclay GROUT / ~~SLURRY~~ KP 1-27-93	TOP 0.8	BOTTOM 68.0	TOP	BOTTOM
BENTONITE	TOP 68.0	BOTTOM 73.2	TOP	BOTTOM
SAND	TOP 73.2	BOTTOM 97.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 78.0	BOTTOM 93.0	TOP	BOTTOM
PIEZOMETER TIP	95.0			
BOTTOM OF BOREHOLE	97.0			
GWL AFTER INSTALLATION	84.6 (Top of Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS Cement placed from 0.0 to 0.8 FT to hold protective cover in pla

Customer Number: 104892

MATERIAL: _____ SAMPLE NUMBER: 930122-045

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 153.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	32.05	20.8	20.8	78.7
20	37.87	24.6	45.4	33.5
40	44.65	29.0	74.4	16.7
60	21.32	13.9	88.3	9.8
100	8.18	5.3	93.6	5.4
200	3.72	2.4	96.0	3.0
Pan	5.03	3.3	99.3	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
John Robert		1-25-93

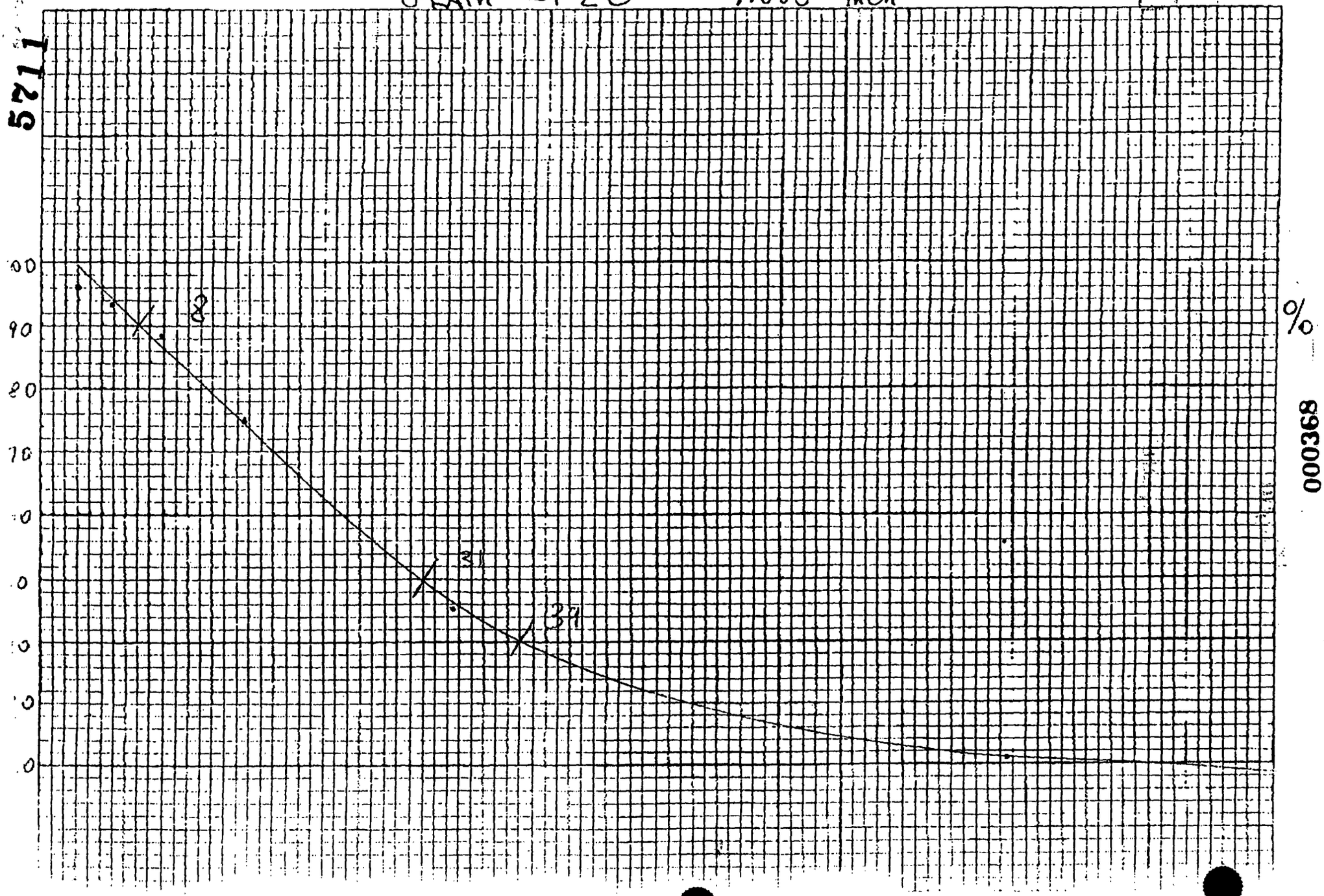
Grain Size Retained

40 %	39
50 %	31
90 %	8

CB 2/9/93

2432

Grain Size 1/1000 inch



5711

000368

Well #2432
Refined Values
90% = .008
50% = .031
40% = .039

$\frac{.039}{.008} = 4.875$ 4.875 > 3 therefore a factor of 4 will be used

$4 \times .031 = .124$

The result most closely fits the coarse sand pack (4/30). Therefore a coarse sand pack along with a 0.020 inch well screen will be used in this monitoring well.

CB 3/6/98

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 3432	COORDINATES:	DATE: 12-7-92
ELEVATION:	GWL Depth: 82.6 Date/Time: 1/14/93	DATE STARTED: 12-7-92
ENGINEER/GEOLOGIST: K. Payne	Depth: Date/Time:	DATE COMPLETED: 1-11-93
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				* For Soil Classification from 0.0 to 148.0 feet, see Boring log of monitoring Well 4432			
74							
				HYDRO PUNCH TAKEN AT 97.0'			
148				* Continuous Sampling will begin at 148.0 and continue to 158.0 feet			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
Lonnie McGlocklin

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Samples collected per ASTM standard penetration test.
Colors identified using Munsell color chart

CB

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 3432	COORDINATES:	DATE 12-15-92
ELEVATION:	GWL Depth Seep. / Date/Time	DATE STARTED: 12-7-92
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 12-1-93
DRILLING METHODS: Cable Tool		PAGE 2 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
149	1410 104880 12-15-92	45 50/.4	7	Very Dense (2.5Y, 4/2) Dark Grayish Brown, medium Gravel with trace sand, non-plastic, wet	GW	N/A	HNU = 0 ppm βγ = 60-80 cpm
150 151	1440 104880 12-15-92	50/.2	2	Very Dense (2.5Y, 4/2) Dark Grayish Brown, Gravely Sand ~~with~~ KP 12-15-92 non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
152	1555 104880 12-15-92	50/.4	3	Very Dense (2.5Y, 4/3) Olive Brown Gravely Sand, non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
153	1620 104880 12-15-92	50/.3	2	Very Dense (2.5Y, 4/3) Olive Brown, medium Gravel with trace sand, non-plastic, wet	GP	N/A	HNU = 0 ppm βγ = 40-60 cpm
154 155	1645 104880 12-15-92	100/.6	6	Very Dense (2.5Y, 4/4) Olive Brown, Gravely Sand, non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
156 157	0840 104880 12-16-92	50/.4	4	Very Dense (2.5Y, 4/4) Olive Brown medium Gravel with trace sand, non-plastic, wet	GW ~~SP~~ CB 2/1/93	N/A	HNU = 0 ppm βγ = 40-60 cpm
158	0900 104880 12-16-92	45 KP 12/17/92 50/.2	7	Very Dense (5Y, 4/3) Olive fine Sand with trace Gravel non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
159 160					~~SP~~ KP 12-16-92	N/A KP 12-16-92	
161							
162				Bottom of Boring at 162.0 Ft			
163							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lennie McGlocklin

Craig Coulter

Kevin Myers

Background Readings
12/15/92 { HNU = 0 ppm, βγ = 60-80 cpm
12/16/92 { HNU = 0 ppm, βγ = 50-60 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

See p. 1

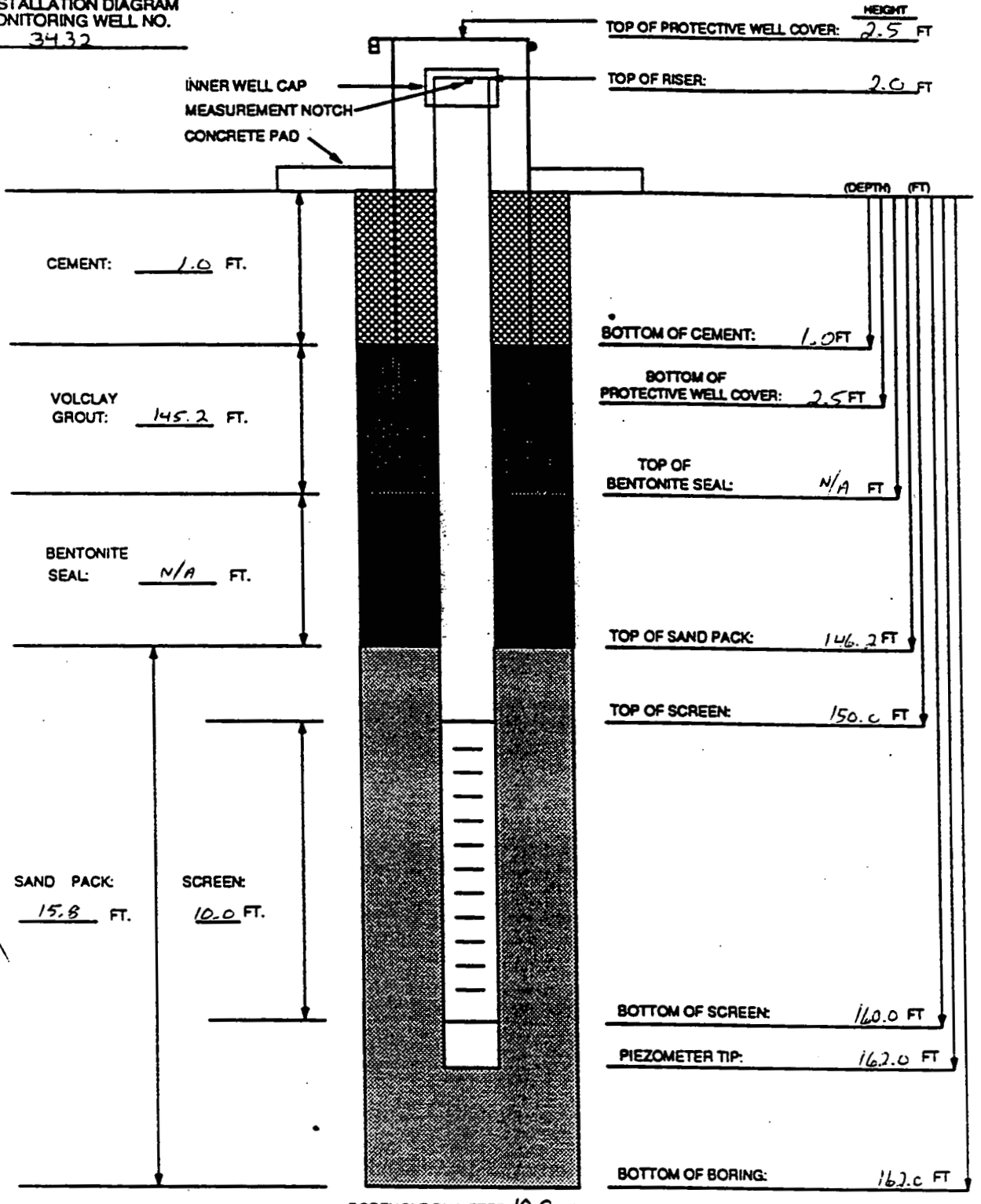
CB 2/1/93

402-11-46

5711

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3432

INSTALLATION DATE: 1/11/92



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	2.5 FT	
TOP OF RISER:	2.0 FT	
BOTTOM OF CEMENT:		1.0 FT
BOTTOM OF PROTECTIVE WELL COVER:		2.5 FT
TOP OF BENTONITE SEAL:		N/A FT
TOP OF SAND PACK:		146.2 FT
TOP OF SCREEN:		150.0 FT
BOTTOM OF SCREEN:		160.0 FT
PIEZOMETER TIP:		162.0 FT
BOTTOM OF BORING:		162.0 FT

BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30 type 12 – 50 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 53 50 lb bags
AMOUNT OF CEMENT: 1 bag 80 lb bag
AMOUNT OF WATER USED: 2500 gallons
26 Drums Soil, 1 Drum Alconox/water, 2 Drums Grout
602.04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.02 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 82.6 FT/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. 602.04.37
BORING NO. 3432
PIEZOMETER NO. ~~N/A~~ 3432

FIELD ENG./GEO. K. Payne DATE
CHECKED BY C Brier DATE
DATE OF INSTALLATION 1/11/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 90.0 FT
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 FT TO 163.0 FT
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well.
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .02 in
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 Stainless Stee
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 15-10FT, 2-2FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	CB 2/1/93 ~~1.5~~ 2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	Top 0.0 FT	Bottom 1.0 FT		
GROUT ~~/SLURRY~~ CEMENT KP 1-12-93	TOP 1.0 FT	BOTTOM 146.2 FT	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 146.2 FT	BOTTOM 162.0 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 150.0 FT	BOTTOM 160.0 FT	TOP	BOTTOM
PIEZOMETER TIP	162.0 '			
BOTTOM OF BOREHOLE	162.0 '			
GWL AFTER INSTALLATION	32.6 '			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed from 0.0 to 1.0 FT to hold protective cover in place

mw - 3432

Customer Number 10488 C

MATERIAL: _____ SAMPLE NUMBER: 92 1216-069

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: ~~153.03~~ 138.3

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	67.36	48.7	48.7	78.7
20	22.04	16.0	64.7	33.5
40	21.60	15.6	80.3	16.7
60	13.24	9.6	89.9	9.8
100	4.45	3.2	93.1	5.9
200	3.56	2.6	95.7	3.0
Pan	5.64	4.1	99.8	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
J Robert		12-18-1992

Grain Size 40% Retained >100 .001 inc

50% 68

90% 8

CB 2/3/93

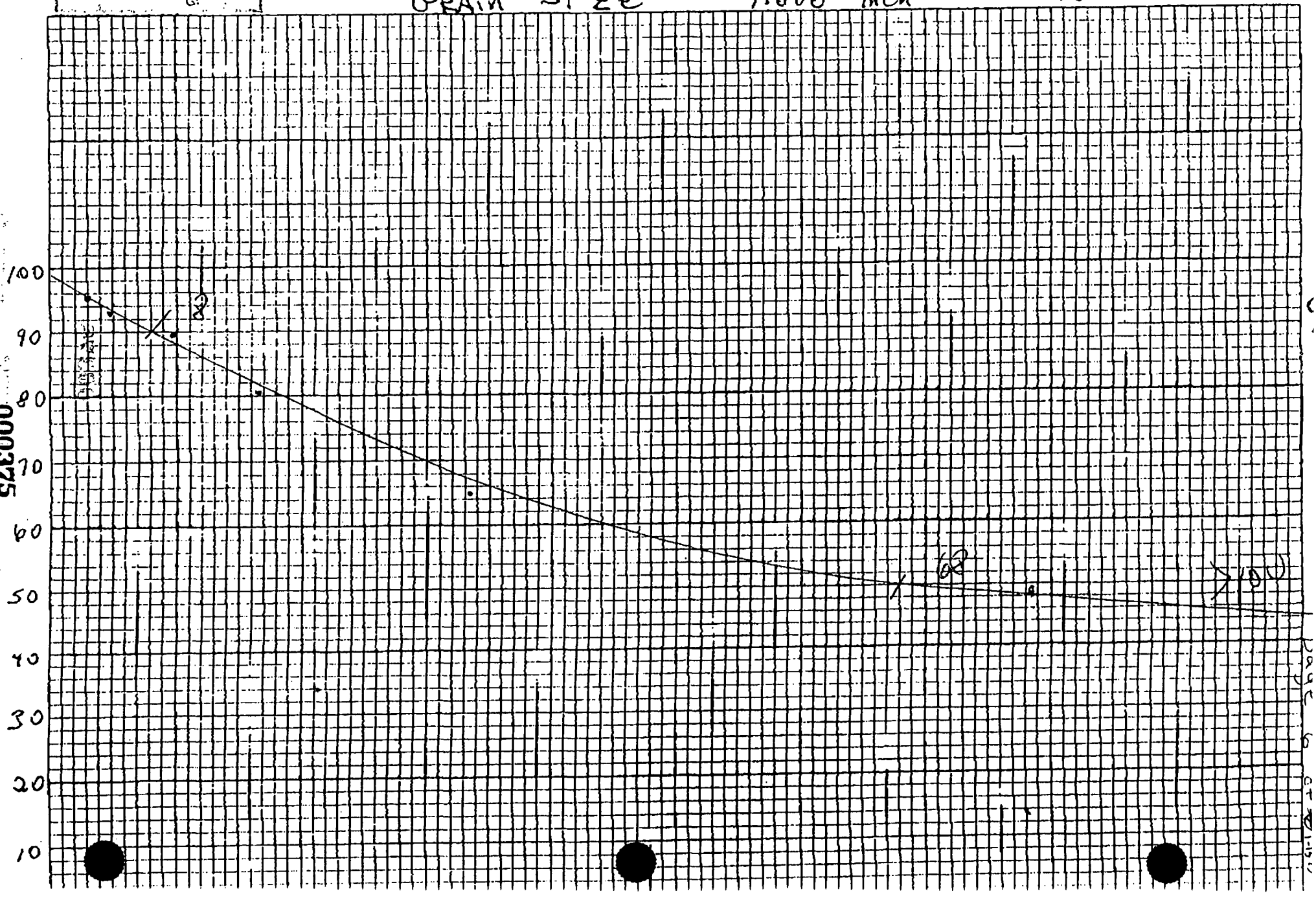
NO. 3407 1-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

MW-3402

Grain Size 1/1000 inch

104320



5711

Well # ~~[illegible]~~ 3432 KP 1-2-93

Retained Values

90% = .008

50% = .068

40% = .100

$\frac{.100}{.008} = 12.5$ 12.5 > 3 therefore a factor of 4 will be

$4 \times .068 = .272$

The result most closely fits the coarse sand pack curve (4/30) Therefore a coarse sand pack along with a 0.020 in. well screen w be used in this monitoring well.

RI/FS

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/20/92
ELEVATION:	GWL: Depth 86.9ft Date/Time 11/6/92/0830	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST: K. Payne	Depth 86.8ft Date/Time 12/3/92/1515	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1625 104801 10-20-92	4 5 7	16	Stiff, (7.5 YR, 5/4) Brown, Silty Clay with roots, Non-plastic, Dry	CL	1.0	HNU = 0 ppm βγ = 80-100 cpm
2 3	1630 104802 10-20-92	5 9 9	16	SAA	CL	1.0	HNU = 0 ppm βγ = 80-100 cpm
4	1635 104803 10-20-92	7 10 17	11	Stiff (7.5 YR, 4/2) Dark Brown, Silty Clay with trace gravel, Non-plastic, Dry.	CL	1.0	HNU = 0 ppm βγ = 40-60 cpm
5 6	1640 104804 10-20-92	14 16 20	17	Very Stiff (10YR, 5/4) Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	3.0	HNU = 0 ppm βγ = 60-80 cpm
7	1700 104805 10-20-92	24 24 33	12	Very stiff (10 YR, 6/4) Light Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	3.5	HNU = 0 ppm βγ = 40-60 cpm
8 9	1710 104806 10-20-92	27 23 26	18	Very stiff (10 YR, 6/4) Light Yellowish Brown, Silty Clay with trace gravel, Non-plastic, Dry	CL	2.5	HNU = 0 ppm βγ = 40-60 cpm
10	1030 104807 10-21-92	6 14 29	15	Very stiff (10 YR, 5/8) Yellowish Brown Silty Clay with trace pea size gravel, Non-plastic, Slightly moist	CL	2.5	HNU = 1 ppm βγ = 60-80 cpm
11 12	1045 104808 10-21-92	13 26 29	14	Hard (10 YR, 5/8) Yellowish Brown Silty Clay with trace gravel, Non-plastic, slightly moist	CL	4.0	HNU = 0 ppm βγ = 60-80 cpm
13	1100 104809 10-21-92	6 10 22	10	Very Stiff (10YR, 5/1) Gray Silty Clay, Non-plastic, slightly moist	CL	3.5	HNU = 0 ppm βγ = 60-80 cpm
14 15	1415 104810 10-21-92	6 14 18	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

10/20/92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

10/21/92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

	Initial	Date
Field Check		2/24/93
Int. Rev'd		
2nd Rev'd		
Final Copy		

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/21/92
ELEVATION:	GWL: Depth see p 1 Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1430 104810 10-21-92	6 9 14	9	Very Stiff (7.5YR, N5/) Gray Clayey silt with trace gravel, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 20-40 cpm
17 16	1500 104811 10-21-92	5 10 18	14	SAA	ML	N/A	HNU = 1 ppm βγ = 40-60 cpm
19	1510 10-21-92	10 16 18	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm
20 21	1650 104812 10-21-92	7 15 23	11	Dense (7.5YR, N5/) Gray Clayey Silt with trace gravel non-plasticity, slightly moist	ML	N/A	HNU = 8 ppm βγ = 40-60 cpm
22	1700 104813 10-21-92	12 15 25	12	Dense (7.5YR, N4/) Dark Gray Clayey silt with trace gravel non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 40-60 cpm
23 24	0830 104814 10-22-92	6 14 33	7	Dense (7.5YR, N4/) Dark Gray Clayey Silt with trace gravel, non-plastic, moist	ML	N/A	HNU = 0 ppm βγ = 40-60 cpm
25	0850 10-22-92	7 17 36	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = cpm
26 27	0910 104815 10-22-92	8 17 17	14	Dense (7.5YR, N5/) Gray Clayey Silt with trace gravel, non-plastic, moist	ML	N/A	HNU = 1 ppm βγ = 20-40 cpm
28	0920 10-22-92	6 10 43	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm
29 30	1030 104816 10-22-92	4 6 13	10	Medium Dense (2.5YR, N5/) Gray Silty Sand, non-plastic, moist	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
Bob Yost

SAA - SAME AS ABOVE
NA - NOT Applicable

10/21/92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

10/22/92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

	Orig
Field Check	03
Int Qa/Qc	
Final Qa/Qc	
Hard Copy Verified	

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER 6P2.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/22/92
ELEVATION:	GWL: Depth sep. Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1040 104817 10/22/92	6 15 13	15	Stiff (2.5YR, N5/) Gray, ~~Silty Sand~~ Silt, Low plasticity, moist KP 10-22-92	ML	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 20-40 cpm
32 33	1050 104818 10/22/92	10 25 13	10	Stiff (2.5YR, N5/) Gray, Clayey Silt with trace gravel, Low plasticity, moist	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 40-60 cpm
34	1305 104819 10/22/92	8 7 14	11	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 40-60 cpm
35 36	1320 104820 10/22/92	9 14 24	17	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 20-40 cpm
37	1330 104821 10/22/92	9 15 18	16	SAA	ML ~~CL~~ KP 10-22-92	N/A ~~1.5~~ KP 10-22-92	HNU = 0 ppm βγ = 60-80 cpm
38 39	1340 104822 10/22/92	7 23 25	14	Very Dense (7.5YR, 5/8) Strong Brown, Sandy Silt, non-plastic, moist	ML ~~SC~~ KP 10-22-92	N/A	HNU = 0 ppm βγ = 20-40 cpm
40	1355 104823 10/22/92	21 27 34	12	Very Dense (10YR, 6/8) brownish yellow, Silty sand, non-plastic, Dry	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm
41 42	1450 104824 10/22/92	10 15 44	9	Very Dense (10YR, 5/6) Yellowish Brown, Silty sand, non-plastic, Dry	SM	N/A	HNU = 0 ppm βγ = 20-40 cpm
43	N/A	N/A	N/A	No Sample Collected Begin Sampling Every 5 Feet	N/A	N/A	N/A
44 45	N/A	N/A	N/A	SAA	N/A	N/A	N/A

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10/22/92 Background Readings: HNU = 0, βγ = 40-60 cpm

	Initial
Field Check	
1st Rev.	
2nd Rev.	
Final Check	

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 4432	COORDINATES:	DATE 10/22/92
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 4 OF 7 KR 12-15-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1510 104825 10-22-92	42 50	9	Very Dense (10YR, 6/3) pale brown Gravely Sand, Non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 20-40 cpm
47							
48							
49							
50							
51	1615 104826 10-22-92	23 50	8	Very Dense (10YR, 7/3) very pale brown Gravely Sand, non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
52							
53							
54							
55	0950 104827 10-23-92	17 50	3	Very Dense (10YR, 6/4) Light Yellowish Brown, Gravely Sand, non-plastic, Dry	SW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
56							
57							
58							
59							
60							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT Applicable

10/22/92 Background Readings: HNU = 0 ppm, Bγ = 40-60 cpm

10/23/92 Background Readings: HNU = 0 ppm, Bγ = 20-40 cpm

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 601.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/23/92
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	0930 104828 10-28-92	30 50	6	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-plastic, Dry	SW ~~GM~~	N/A	HNU = 0 ppm βγ = 60-80 cpm
62							
63							
64							
65							
66	1330 104829 10-28-92	29 50	13	Very Dense (10YR, 5/4) Yellowish Brown Gravely Sand, Non-plastic, Slightly moist	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
67							
68							
69							
70							
71	1410 104830 10-28-92	19 40 42	16	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-plastic, Dry	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
72							
73							
74							
75							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10/23/92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

10/28/92 Background Readings { HNU = 0 ppm, βγ = 60-80 cpm

	Initial	Date
Field Check		
1st Review		
2nd Review		
Final Review		

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10/28/92
ELEVATION:	GWL: Depth Scep.1 Date/Time	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 6 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	1525 10-1831 10/28/92	30 50	3	Very Dense (10YR, 5/3) Brown Gravely Sand, Non-Plastic, Slightly Moist	SW	N/A	HNU = 0 ppm βγ = 60-80 cpm
77							
78							
79							
80							
81	1600 10-1832 10/28/92	12 26 50	7	Very Dense (5YR, 5/8) Yellowish Red Gravely Sand, Non-Plastic, Slightly Moist	SW	N/A	HNU: 0 ppm βγ = 60-80 cpm
82							
83							
84							
85							
86	1100 ~~10-1833~~ 10-30-92	12 50	N/A	No Recovery	N/A	N/A	HNU = ~~0~~ KP 10-30-92 ppm βγ = ~~60-80~~ KP 10-30-92 cpm
87							
88							
89							
90							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
Bob Yost

SAA - SAME AS ABOVE
NA - NOT Applicable

10/28/92 Background Readings { HNU = ppm, βγ = 60-80 cpm

Background Readings { HNU = 0 ppm, βγ = 60-80 cpm

Initial | Field Check | QC Review | 2nd QC Review | Hard Copy Verification

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RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 10-30-92
ELEVATION:	GWL: Depth 86.1 ft Date/Time 11-2-92/1425	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST. K. Payne	Depth See p. 1 Date/Time	DATE COMPLETED: ~~10-30-92~~ 12-3-92
DRILLING METHODS: Cable Tool		PAGE 7 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	1345 104833 10-30-92	12 12 12	13	Medium Dense (10YR, 4/3) Brown medium Sand with trace Gravel, Non-plastic, wet	SP	N/A	HNU = 0 ppm BY = 80-100 cpm
92							
93							
94							
95							
96	1500 10-30-92	10 12 15	N/A	No Recovery	N/A	N/A	HNU = ppm BY = N/A cpm
97							
98							
99							
100							
101	1550 ~~10-30-92~~ ~~104834~~ 10-30-92	7 13 18	N/A	No Recovery	N/A	N/A	HNU = ppm BY = N/A cpm
102							
103							
104							
105							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Bob Yost

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

10-30-92 Background Readings { HNU = 0 ppm, BY = 60-90 cpm

11-2-92 Background Readings { HNU = 0 ppm, BY = 40-60 cpm

	Initial	
Field Check		
QC Rev'd		
Final Rev'd		
Final Copy Produced		

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER: 4432	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth 85.9' Date/Time 11-3-92/0815	DATE STARTED: 10/20/92
ENGINEER/GEOLOGIST. K. Payne	Depth Stop. 1 Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 8 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	0925 1048 36 11-3-92	9 11 38	7	Dense (2.5Y, ~~Dark~~ 4/2) Dark Grayish Brown, well graded gravel, trace sand, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 40-60 ppm
107	~~KP 11-3-92 1049 37~~						
108							
109							
110	1000 1048 37 11-3-92	19 23 21	18	Dense (2.5Y, 4/3) Olive Brown, well graded gravel, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 80-100 ppm
111							
112							
113							
114							
115	1445 1048 38 11-3-92	16 27 39	7	Very Dense (2.5Y, 5/2) Grayish Brown, well graded gravel, non-plastic, wet	GW	N/A	HNU = 0 cpm βγ = 60-80 ppm
116							
117							
118							
119							
120							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 412

Driller: Bob Johnson
Mark Rebold

11-3-92 Background Readings { HNU = 0 ppm
βγ = 40-60 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

	Initial	Date
Field Check		
Lab Review		
Data Entry Verification		

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-3-92
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 9 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121	1520 104839 11-3-92	9 15 23	16	SAA	GW	N/A	HNU = 0 ppm βγ = 80-100 cpm
122							
123							
124							
125							
126	0940 104841 11-4-92	1 12 18	9	Medium Dense (5Y, 4/2) Olive gray well graded ~~medium~~ gravel, non-plastic, wet	GW	N/A	HNU = 0 ppm βγ = 20-40 cpm
127							
128							
129							
130							
131	1020 104842 11-4-92	17 21 25	9	Dense (2.5Y, 5/3) Lt. Olive Brown well graded medium gravel, non-plastic, wet	GW	N/A	HNU = 0 ppm βγ = 60-80 cpm
132							
133							
134							
135							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Mark Rebold

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11-3-92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

11-4-92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

	Initial	Date
Field Check		
Lab Key In		
Data Key In		
Final Ver.		

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-4-92
ELEVATION:	GWL: Depth 85.9 Date/Time 11-4-92/1325	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne	Depth See p.1 Date/Time	DATE COMPLETED: 12/3/92
DRILLING METHODS: Cable Tool		PAGE 10 OF 29

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
136	1445 104943 11-4-92	13 27 28	14	Very Dense (2.5Y, 5/2) Grayish Brown Well graded medium gravel, non-plastic wet	GW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
137							
138							
139							
140							
141	1535 104844 11-4-92	11 21 28	13	SAA	GW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
142							
143							
144							
145							
146	1500 104846 11-5-92	29 48 50/5	10	Very Dense (5Y, 4/2) Olive Gray, Well graded medium gravel, non-plastic, wet	GW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
147							
148							
149							
150							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
Jeff
David Holmes

11-4-92 ~~KP 11-4-92~~ Background Readings { HNU = 0 ppm, Bγ = 20-40 cpm

11-5-92 Background Readings { HNU = 0 ppm, Bγ = 60-80 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

	Initial
Field Check	
Lab Check	
2nd Lab Check	
Nord Geo Technical	

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.27	PROJECT NAME. RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-5-92
ELEVATION:	GWL: Depth 86.3 Date/Time 11-5-92/1340	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST. K. Payne	Depth 86.9 Date/Time 11-6-92/0830	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool	see. p.1	PAGE 11 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	1530 104847 11-5-92	12 25 21	11	Dense (5Y, 4/2) Olive Gray Coarse Sand with trace gravel, non-plastic, wet	SW ~~GW~~ 11-5-92	N/A	HNU = 0 ppm βγ = 60-80 cpm
152							
153							
154							
155							
156	1540 104848 11-6-92	9 23 44	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = cpm
157							
158							
159							
160							
161	1630 104849 11-6-92	30 16 23	17	Very Dense (5Y, 4/2) Olive Gray Poorly Graded medium sand with trace gravel, non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
162							
163							
164							
165							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ~~Bob Johnson~~ KP 11-5-92 Cyclone 42

Driller: Bob Johnson
David Holmes
John Vandine

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11-5-92 Background Readings { HNU = 0 ppm, βγ = 60-80 cpm

11-6-92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

	Initial	D
Field Check		
Lab Key In		
Data Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4432	COORDINATES:	DATE	11-9-92
ELEVATION:	GWL Beg. Date/Time	DATE STARTED:	10-20-92
ENGINEER/GEOLOGIST: K. Payne	GWL End Date/Time	DATE COMPLETED:	12-3-92
DRILLING METHODS: Cable Tool		PAGE 12	OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166	1000 104849 11-9-92	50/4	4	Very Dense (10YR, 5/3) Brown Poorly graded medium sand with trace gravel, non plastic, wet	SP	N/A	HNU = 0 ppm βγ = 20-40 cpm
167							
168							
169							
170							
171	1050 104850 11-9-92	20 32 45	17	Very Dense (5Y, 4/2) Olive Gray Coarse Sand poorly graded, non plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
172							
173							
174							
175							
176	1100 11-10-92 ~~11-10-92~~ 11-9-92	50/1	N/A	No Recovery	N/A	N/A	HNU = βγ = N/A
177							
178							
179							
180							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Lonnie McGloklin

SAA - SAME AS ABOVE
NA - NOT Applicable

11-9-92 Background Readings: HNU = 0 ppm, βγ = 20-40 cpm

11-10-92 Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 4432	COORDINATES:	DATE: 11/16/92	
ELEVATION:	GWL: Date/Time:	DATE STARTED: 10/20/92	
ENGINEER/GEOLOGIST: K. Payne	Date/Time:	DATE COMPLETED: 12-3-92	
DRILLING METHODS: Cable Tool		PAGE 13 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INS	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
181	1540 104852 11-16-92	15 42 5/3	18	Very Dense (2.5Y, 4/3) Olive Brown Poorly Graded Medium Sand, non plastic, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
182							
183							
184							
185							
186	1655 11-16-92 ~~104853~~ 11-16-92	28 23 24	N/A	No Recovery	N/A	N/A	HNU = N/A ppm βγ = N/A cpm
187							
188							
189							
190							
191	0905 ~~KP 11-17-92~~ ~~104853~~ 104853 11-17-92	9 15 15	6	Medium Dense (2.5Y, 4/3) Olive Brown Poorly Graded Medium Sand, non plastic, wet	SP	N/A	HNU = 0 ppm (used for Sieve Analysis) βγ = 80-100 cpm
192							
193							
194							
195							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Lennie McGlocklin, David Holmes

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

11/16/92 Background Readings: HNU = 0 ppm; βγ = 60-80 cpm

11/17/92 Background Readings: HNU = 0 ppm; βγ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase I	
BORING NUMBER: 4432	COORDINATES:	DATE 11-17-92
ELEVATION:	GWL: Depth Seep. Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool		PAGE 14 OF 20

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196	0945 KP 11-19-92 104854 104853 11-17-92	10 11 30	5	Dense (2.5Y, 5/3) Light Olive Brown Silty Sand with trace layer of (2.5Y, N2/) Black organics, non-plastic, wet	SM	N/A	HNU = 0 ppm (used for sieve analysis) βγ = 100-120 cpm
197							
198							
199							
200							
201	1440 KP 11-19-92 104856 104852 11-17-92	6 12 20	8	Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ medium sand non-plastic, wet	SP	N/A	HNU = 0 ppm (used for sieve analysis) βγ = 80-100 cpm
202				Resume Continuous Sampling for Sieve Analysis			
203							
204	1520 104857 11-17-92	19 27 35	10	Very Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ Fine sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
205	1700 104858 11-17-92	35 30 28	16	Very Dense (2.5Y, 4/2) Dark grayish brown, Poorly ~~Graded~~ Fine Sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
206							
207	0920 104859 11-18-92	45 43 50/5	18	Very Dense (2.5Y, 4/3) Olive Brown Poorly ~~Graded~~ Silty Fine Sand non-plastic, wet	SP SM	N/A	HNU = 0 ppm βγ = 40-60 cpm
208	0955 104860 11-18-92	23 33 28	16	Very Dense (2.5Y, 4/4) Olive Brown Poorly ~~Graded~~ Silty Fine Sand non-plastic, wet	SM	N/A	HNU = 0 ppm βγ = 40-60 cpm
209							
210	1025 104861 11-18-92	28 47 50/5	12	Very Dense (5Y, 4/4) Olive Poorly ~~Graded~~ Fine Sand non-plastic, wet	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, David Holmes, Lonnie McGlocklin

11-17-92 Background Readings { HNU = 0 ppm, βγ = 40-60 cpm

11-17-92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Field Check

Int. Key In

Rev. Data Validation

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase	
BORING NUMBER: 4432	COORDINATES:	DATE: 11-18-92
ELEVATION:	GWL: Depth see p. / Date/Time	DATE STARTED: 10-20-92
ENGINEER/GEOLOGIST: K. Payne	Depth / Date/Time	DATE COMPLETED: 12-3-92
DRILLING METHODS: Cable Tool		PAGE 15 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211	1040 104862 11-18-92	14< 28 38	18	Very Dense (2.5Y, 4/3) Olive Brown Poorly ~~Sorted~~ Graded Medium Sand, non-plastic, wet KP 12-31-92	SP	N/A	HNU = 0 ppm βγ = 60-80 cpm
~~212~~ 213	1350 104863 11-18-92	28 50/1	KP 11-18-93 ~~12~~ 6	(2.5Y, 4/4) olive Brown Poorly ~~Graded~~ Graded medium Sand, KP 12-31-92 Bedrock - graystale	SP SH	N/A N/A	HNU = 0 ppm βγ = 40-60 cpm
214				Bottom of Boring - 213 Ft			
215							
216							
217							
218							
219							
220							
221							
222							
223							
224							

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cyclone 42
Bob Johnson
Lonnie McGlocklin

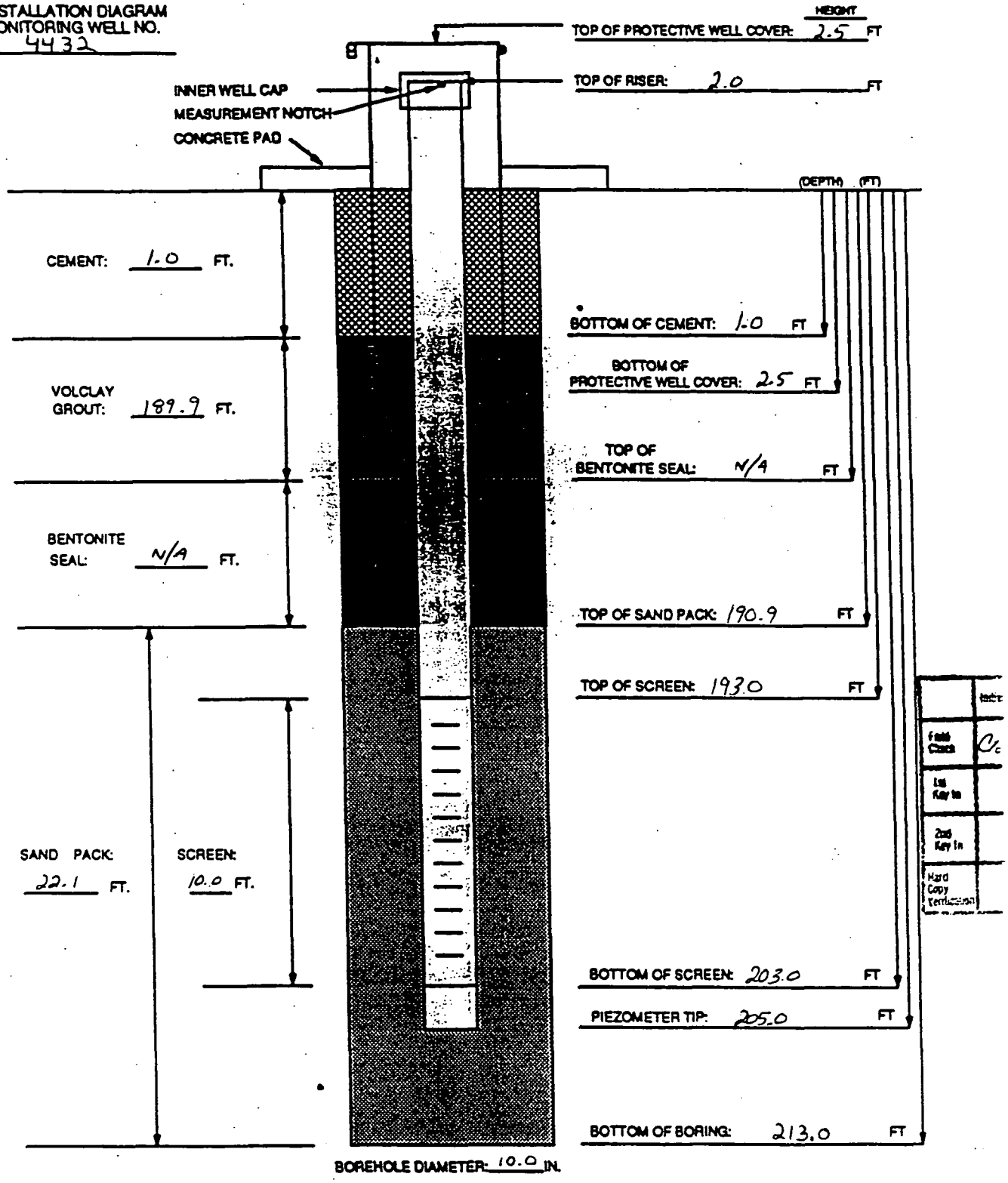
SAA - SAME AS ABOVE
NA - NOT Applicable

11-18-92 Background Readings { HNU = 0 ppm, βγ = 20-40 cpm

	Initial
Field Check	CS
1st Review	
2nd Review	
Hard Copy Transmittal	

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4432

INSTALLATION DATE: 12/3/92



MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 13 - 50 lb. bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 48 - 50 lb. bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2500 gallons
OTHER: 35 Drums Soil; 3 Drums Alconox/Water
TASK: 602.04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.01 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 86.8 FT/ 12/3
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

3 lb. Stainless steel pipe sections: 19 - 10.0 ft; 1 - 10.0 ft. screen with 2.0 ft. sump

ASI FORM 0157 REV. (0)

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Keith Payne DATE 12-3-9
PROJECT NO. 602.04.27 CHECKED BY C. Brill DATE 12/31/9
BORING NO. 4432
~~PIEZOMETER NO.~~ MONITOR WELL NO. ~~N/A~~ 4432 DATE OF INSTALLATION 12-3-92
CB 12/31/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 120.0 FT
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 IN ID FROM 0.0 FT TO 213.0 FT
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE ~~Cable Tool~~ KS 12/31/92 Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 In
TOTAL PERFORATED AREA 10.0 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 19 - 10 FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft.
PROTECTIVE PIPE O.D. 10 3/4 IN.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0 FT			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0 Ft TOP 1.0 FT	BOTTOM 1.0 Ft BOTTOM 190.9 FT	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 190.9 FT	BOTTOM 213.0 FT	TOP	BOTTOM
GRAVEL None Used	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 193.0 FT	BOTTOM 203.0 FT	TOP	BOTTOM
PIEZOMETER TIP	205.0 FT			
BOTTOM OF BOREHOLE	213.0 FT			
GWL AFTER INSTALLATION	86.8 FT			

Initials
Field Check CB
1st Key In
2nd Key In
Hard Copy Verification

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed from 0.0 to 1.0 FT to hold protective cover plac

5711

MW-4432.

NOV-19-92 THU 17:55 WMCO ANALYTICAL FAX NO. 5137386667 P. 01

9.72

Customer Number 10485

MATERIAL: _____ SAMPLE NUMBER: 921119-033

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 166.2

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	12.58	7.6	7.6	78.7
20	16.88	10.2	17.8	33.5
40	40.75	24.5	42.3	16.7
60	18.51	11.1	53.4	9.8
100	41.01	24.7	78.1	5.9
200	24.09	14.5	92.6	3.0
Pan	11.50	6.9	99.5	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = RPD$$

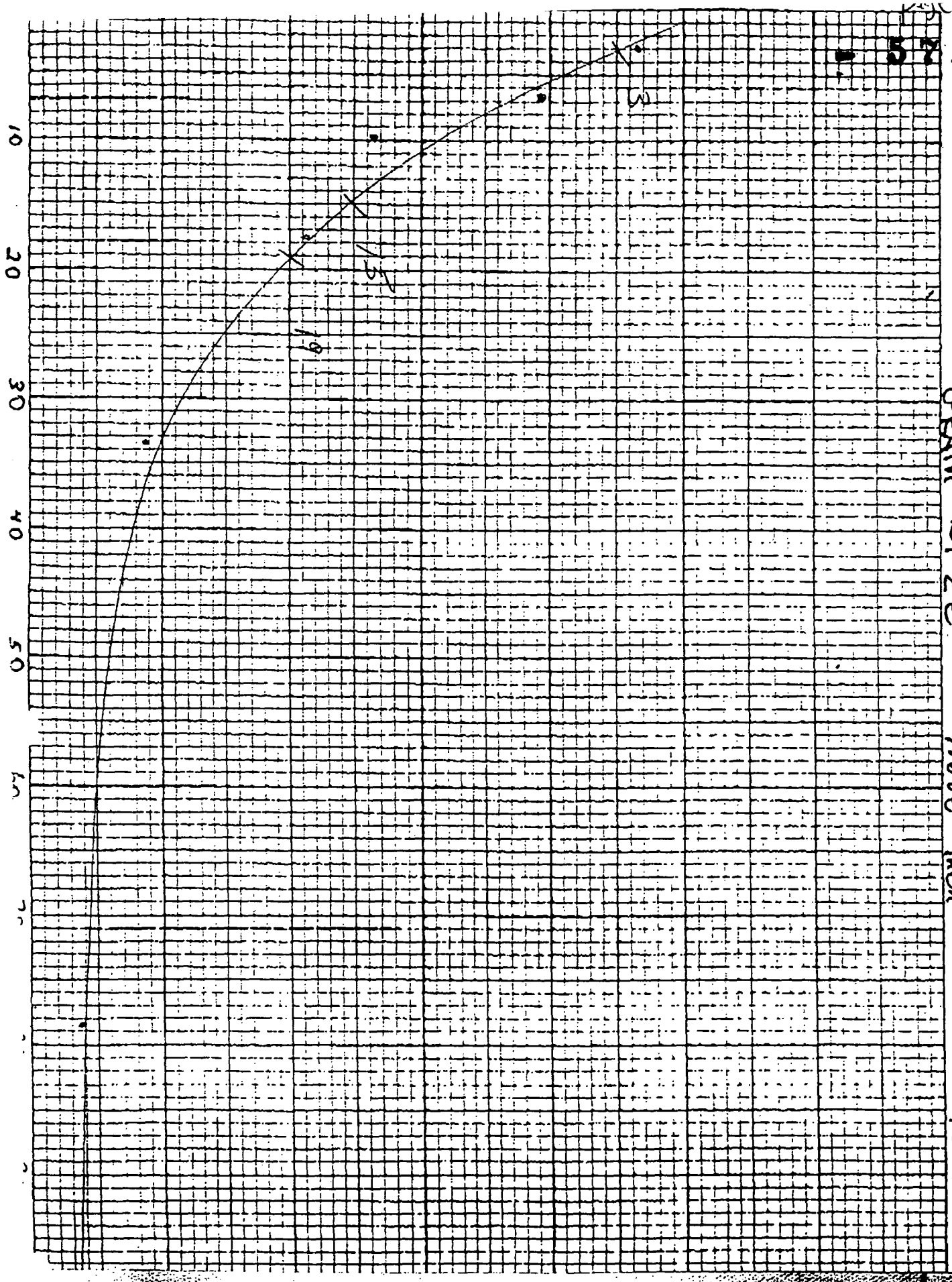
Analyzed by: John Roberts | Checked by: | Date analyzed: 11-18-92

Grain Size 40% Retained 19 .001 inch

50% 15

90% 3

5711



MW-4432

104853

000395

Well #4432

Retained Values

90% = .003

50% = .015

40% = .019

$\frac{40\%}{90\%} = \frac{.019}{.003} = 6.33$ 6.33 > 3 ∴ use factor of 4

(50%) .015 × 4 = .06

Since .06 is closer to the medium (10/20) sand curve than the coarse (4/30) sand curve; therefore, medium sand was choosen as a result. A 0.01 well screen will also be used.

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.20.0309	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1433	COORDINATES:		DATE: 7-29-92
ELEVATION:	GWL: Depth N/A	Date/Time N/A	DATE STARTED:
ENGINEER/GEOLOGIST: Ken Marion	Depth N/A	Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: Hollow Stem Auger			PAGE: 1 OF

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0.0	047016 0955 7-29-92	3	6	Medium dense dark brown (10YR, 4/3) clayey silt fill with root fragments, a little gravel, trace fly ash, moist	ML	N/A	N/A	Hnu = 2.0 ppm Bγ = 100 cpm α = 0 cpm
	047017 0955 7-29-92	50	6	Medium dense dark brown (10YR, 4/3) clayey silt fill with root fragments, a little gravel, trace fly-ash and concrete at the bottom, moist	ML	N/A	N/A	Hnu = 2.0 ppm Bγ = 100 cpm α = 0 cpm
1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Note: Concrete down hole prevented the split spoon from driving past 1.0 ft.
1.5	047018 1000 7-29-92	5	6	Medium dense, dark brown (10YR, 4/3) clayey silt fill with root fragments, a little gravel and concrete, trace flyash, moist	ML	N/A	N/A	Hnu = 2.0 ppm Bγ = 190 cpm α = 0 cpm
	047019 1000 7-29-92	7	6	Same As Above	ML	N/A	N/A	Hnu = 2.0 ppm Bγ = 210 cpm α = 0 cpm
	N/A	10	0	No Recovery	N/A	N/A	N/A	
3.0	047019 047020 1020 7-29-92	2	6	Stiff brown (10YR, 5/3) silty clay fill with some sand, gravel, and trace concrete, low plasticity, moist	CL	1.25	N/A	Hnu = 2.5 ppm Bγ = 200 cpm α = 0 cpm
	047021 047019 1020 7-29-92	4	4	Same As Above	CL	1.25	N/A	Hnu = 2.5 ppm Bγ = 140 cpm α = 0 cpm
	N/A	5	0	No Recovery	N/A	N/A	N/A	
4.5	047022 047019 1000 7-29-92	3	6	Stiff light olive brown (2.5Y, 5/3) silty clay fill with trace gravel, low plasticity, moist	CL	1.5	N/A	Hnu = 1.0 ppm Bγ = 160 cpm α = 0 cpm
				Black Asphalt	N/A	N/A	N/A	
	047023 1030 7-29-92	5	3	Stiff light olive brown (2.5Y, 5/3) Gravelly clay fill, low plasticity, moist	CL	1.5	N/A	Hnu = 1.0 ppm Bγ = 160 cpm α = 0 cpm
	N/A	5	0	No Recovery	N/A	N/A	N/A	
6.0	047024 1045 7-29-92	3	6	Medium stiff light olive brown (2.5Y, 5/3) clay fill with sand and gravel, trace asphalt, medium plasticity, wet	CL	.75	N/A	Hnu = 2.5 ppm Bγ = 150 cpm α = 0 cpm
	N/A	5	0	No Recovery	N/A	N/A	N/A	
	N/A	4	0	No Recovery	N/A	N/A	N/A	

NOTES:

Contractor: Pennsylvania Drilling

Equipment: Acker Auger Rig

Logging: Coulter

Scribe: Vandine

Grouted: Hole

Samples Collected per ASTM Standard Penetration Test

Colors Identified using Munsell Color chart

N/A = Not Applicable

Hnu S/N: A01343 — 1.0 ppm

Bγ S/N: 50746 — 100-160 cpm

α S/N: 50767 — 0 cpm

Background Levels

	Initial	Date
1st Key In	Lou	8-31-92
2nd Key In		
Hard Copy Verification		

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.20D3.04	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1433	COORDINATES:		DATE: 7-29-92
ELEVATION:	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 7-29-92
ENGINEER/GEOLOGIST: Ken Marion	Depth N/A	Date/Time N/A	DATE COMPLETED: 7-29-92
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
7.5	047025 1100 7-29-92	2	3	Medium stiff light olive brown (2.5Y, 5/3) clay fill with gravel, brick, asphalt and concrete fragments, high plasticity, very moist	CL	.5	N/A	Hnu = 1.5 ppm Bg = 180 cpm α = 0 cpm
	N/A	4	0	No Recovery	N/A	N/A	N/A	
9.0	N/A	7	0 K.M. 07-29-92	No Recovery	N/A	N/A	N/A	
Hom of fill → 9.5	047026 1115 7-29-92	3	6	Stiff dark brown (10YR, 4/3) clay fill with a little sand and gravel, high plasticity, very moist	CL	1.5	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
	047027 1115 7-29-92	4	6	Very stiff yellowish brown (10YR, 5/6) silty clay with sand and gravel, non plastic, slightly moist	CL	3.5	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
10.5	047028 1115 7-29-92	6	6	Hard yellowish brown (10YR, 5/6) silty clay with sand and gravel, non plastic, slightly moist	CL	4.5	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
	047029 1130 7-29-92	6	6	Hard light olive brown (2.5Y, 5/3) silty clay with sand and gravel, low plasticity, slightly moist	CL	4.0	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
	047030 1130 7-29-92	10	6	Same As Above	CL	4.0	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
12.0	N/A	12	0	No Recovery	N/A	N/A	N/A	
12.5	047031 1130 7-29-92	7	6	Hard light olive brown (2.5Y, 5/3) silty clay with sand and gravel, low plasticity, and trace gray (5Y, 6/1) mottling, slightly moist	CL	>4.5	N/A	Hnu = 1.0 ppm Bg = 120 cpm α = 0 cpm
				Bottom of Bore Hole at 12.5 ft.				

REVIEWED BY GA DATE 8/27/92

NOTES:

Drilling Contractor _____

Drilling Equipment _____

Driller: _____

SEE Page 1

	Initial	Date
1st Key In		8-31-92
2nd Key In		
Hard Copy Verification		

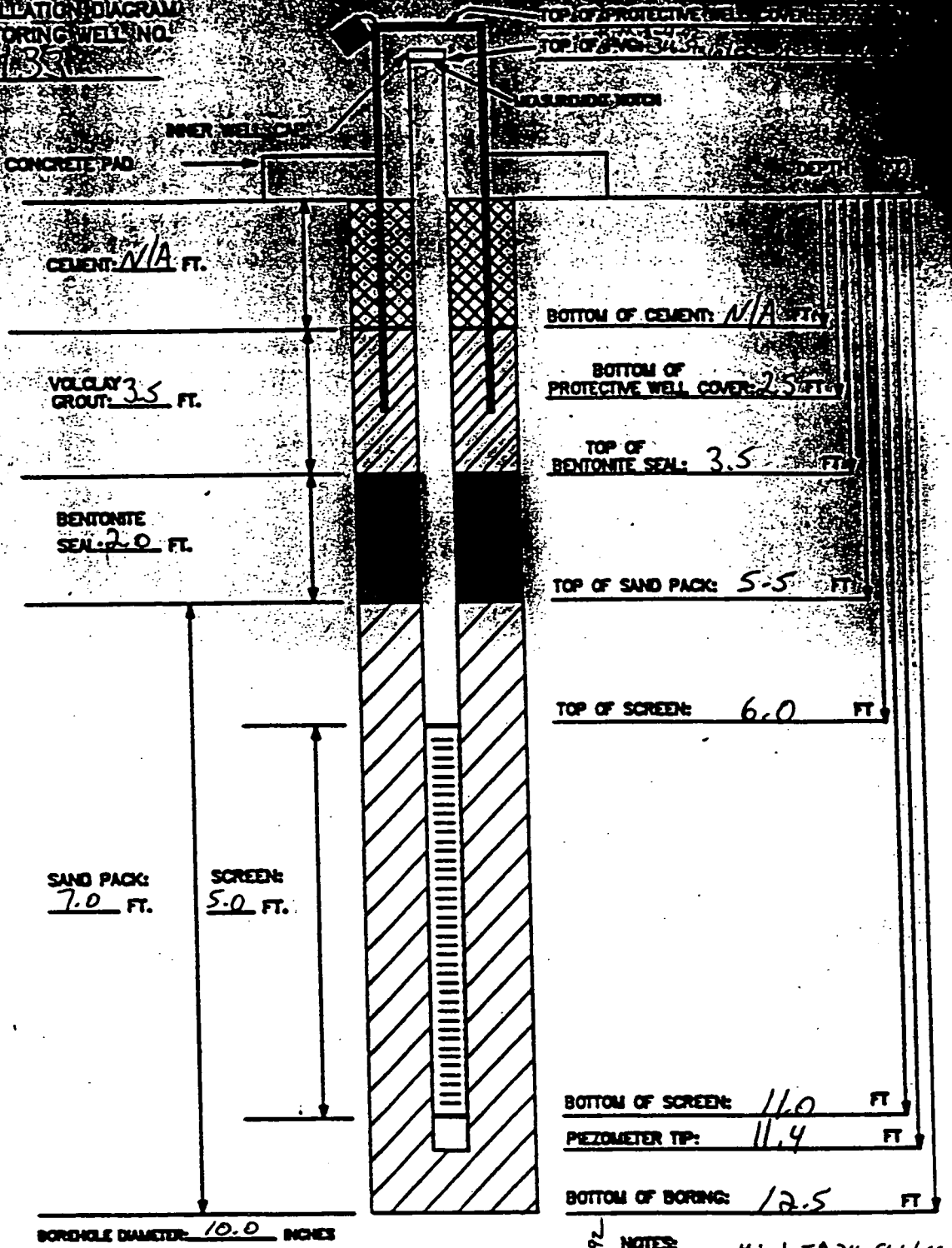
SITE: SINCLAIR

INSTALLATION DATE:

BERNALILLO RIVES

INSTALLATION DIAGRAM

MONITORING WELL NO. 4B



MATERIALS USED:

SAND TYPE AND QUANTITY: 5-80 lb bags of 10/20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 1 Bucket
BAGS OF VOLCLAY GROUT: 1-50 lb. bag
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 30 gallons
OTHER: Two Soil/Fill drums were generated
pipe sections: 4" sump, 5 ft. stainless steel screen, 8 ft. stainless steel riser

NOTES: 4 inch ID 316 stainless steel

1) RISER PIPE IS 6-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 6-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. — 4 inch ID 40/60 chemical pack 0.008 inch slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: Dry Hole/8-4-92

K.M. 8-4-92

TASK: 602.20.03.04

GEOLOGIST/ENGINEER: Ken Marion

REVIEWED BY: DATE:

5211

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: Fernald RI/FS
PROJECT NO: 10.2.6.0.0.04
BORING NO: HB3
PIEZOMETER NO: HB3
BOREHOLE: DRILLING

FIELD ENG/GEO: Ken M.
CHECKED BY: C. Brown
DATE OF INSTALLATION:

DRILLING METHOD: Hollow Stem Auger
DRILLING FLUID(S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT: Drill
CASING SIZE(S) USED:
SIZE N/A FROM N/A TO
SIZE N/A FROM N/A TO

PIEZOMETER DESCRIPTION

TYPE: Monitoring Well
DIAMETER OF PERFORATED SECTION: 4.0 in I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS: 0.008 in
TOTAL PERFORATED AREA: 5.0 ft

RISER PIPE MATERIAL: PVC
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in I.D.
LENGTH OF PIPE SECTIONS: 5 ft Screen, 3 ft
JOINING METHOD: Screw type - flush threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: ~~N/A~~ 5.0 ft K.M. 8-4-92
PROTECTIVE PIPE O.D.: 10 3/4 in. ~~N/A~~ K.M. 8-4-92

OTHER PROTECTION: ~~N/A~~ protective Hinged cover with installed padlock K.M. 8-4-92

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	K.M. 8-4-92 ~~N/A~~ 2.5			
BOREHOLE FILL MATERIALS:				
GROUT ~~SLURRY~~ K.M. 7-29-92	TOP 0.0	BOTTOM 3.5	TOP	BOTTOM
BENTONITE	TOP 3.5	BOTTOM 5.5	TOP	BOTTOM
SAND	TOP 5.5	BOTTOM 12.5	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 6.0	BOTTOM 11.0	TOP	BOTTOM
PIEZOMETER TIP	11.4			
BOTTOM OF BOREHOLE	12.5			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS: Dry Hole as of 8-4-92
A 40/60, 8 Slot-5ft Channel Pack Screen was used

REVIEWED BY: [illegible] DATE: 8/7/92

429-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I Perimeter Well Inst		
BORING NUMBER: 2434	COORDINATES:	DATE 9-10-92	
ELEVATION:	GWL: Depth 57.5 TOC Date/Time 9-21-92/0800	DATE STARTED: 9-10-92	
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 9-21-92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1300 103127 9-10-92	8 12 18	6	Hard (2.5Y, 6/6) ~~light~~ yellow silty clay with organics, non plastic, dry	~~ML~~ ~~CL~~ CI	>4.5	HNU = 0 ppm Bγ = 40 cpm
2 3	1340 103128 9-10-92	18 25 38	16	Very dense (2.5Y, 7/6) mottled yellow silty clay, non plastic, dry	~~ML~~ ~~CL~~	N/A	HNU = 0 ppm Bγ = 40 ppm
4	1355 103129 9-10-92	35 31 31	16	Very dense (2.5Y, 7/6) mottled yellow silty clay, non plastic, dry	ML ~~CL~~	N/A	HNU = 1 ppm Bγ = 40 cpm
5 6	1410 103130 9-10-92	29 30 32	12	SAA	~~CL~~ ML	N/A	HNU = 0 ppm Bγ = 40 cpm
7	1420 103131 9-10-92	5 28 35	18	Hard (2.5Y, 5/4) mottled, ~~light~~ olive brown silty clay with trace coarse sand and gravel, low plasticity, slightly moist	CI	4.0	HNU = 0 ppm Bγ = 40 cpm
8 9	0910 103132 9-14-92	10 16 23	6	Very stiff (2.5Y, 6/4) light yellowish brown silty clay, low plasticity, slightly moist	CI	3.0	HNU = 0 ppm Bγ = 40 cpm
10	0920 103133 9-10-92	5 11 18	4	Very stiff mottled (2.5Y, 6/3) light yellowish brown silty clay with trace gravel low plasticity, slightly moist	CI	2.5	HNU = 0 ppm Bγ = 40 cpm
11 12	0940 103134 9-10-92	10 16 22	18	Hard (2.5Y, N5/) gray clay with trace sand and gravel, medium plasticity, slightly moist	CI	4.5	HNU = 0 ppm Bγ = 40 cpm
13	0950 103135 9-14-92	12 18 27	9	SAA	CI	1.5	HNU = 0 ppm Bγ = 40 cpm
14 15	1000 N/A 9-10-92	29 29 15	0	No Recovery	N/A	N/A	HNU = N/A ppm Bγ = N/A cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable Tool

Driller: Joe Barile, Bob Johnson

SAA - SAME AS ABOVE
NA - NOT Applicable

Background Readings: HNU = 0 ppm, Bγ = 40 cpm

Samples collected per ASTM Standard Penetration Test
Colors identified by Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2434	COORDINATES:	DATE 9-14-92
ELEVATION:	GWL: Depth 57.5 FT. TOC Date/Time 9-21-92/0800	DATE STARTED: 9-10-92
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 9-21-92
DRILLING METHODS: Cable Tool		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1020 103136 9-14-92	6 6 18	11	Stiff (2.5Y, N6/) gray clay, trace gravel, medium plasticity slightly moist	CL	2.0	HNu = 0 ppm Bγ = 40 cpm
17 18	1030 103137 9-14-92	3 7 13	14	SAA - for top 10 in. Bottom 4 in. - Loose (10YR, 5/8) yellowish brown silt, slightly moist	CL/ML	1.75/N/A	HNu = 0 ppm Bγ = 40 cpm
19	1035 N/A 9-14-92	~~13~~ 50/.4 ~~27~~ ~~26~~	0	NO RECOVERY	N/A	N/A	HNu = 0 ppm Bγ = 40 cpm
20 21	1045 103138 9-14-92	13 27 26	8	Very dense (10YR, 6/4) light yellowish brown gravely sand, Dry	GP ~~SW~~ 9-14-92	N/A	HNu = 0 ppm Bγ = 40 cpm
22	1315 103139 9-14-92	7 21 26	12	SAA - slightly moist	GP	N/A	HNu = 0 ppm Bγ = 40 cpm
23 24 25				NEXT sample at 25.0 ft interval, then at every 5.0 ft. interval to 50.0 ft.			
26	1340 103140 9-14-92	45 50/.5	9	Very dense (10YR, 6/4) light yellowish brown sand, trace gravel, Dry	SW	N/A	HNu = 0 ppm Bγ = 40 cpm
27 28 29 30							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: CABLE TOOL

Driller: Joe Barile
Bob JOHNSON

SAA - SAME AS ABOVE
NA - NOT Applicable

Background Readings { HNu = 0 ppm, Bγ = 40 cpm

* Samples collected per ASTM standard Penetration Chart
* Colors identified by the Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2434	COORDINATES:	DATE: 9-14-92	
ELEVATION:	GWL: Depth 57.5 ft TOC Date/Time 9-21-92/0800	DATE STARTED: 9-10-92	
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 9-21-92	
DRILLING METHODS: Cable Tool		PAGE 3 OF 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1445 103141 9-14-92	25 40 50	12	~~Hard~~ Very dense ~~9-10-92~~ (10YR, 5/6) Yellowish brown Coarse sand, trace gravel, dry	SW	N/A	HNU = 0 ppm Bγ = 40 ppm
32							
33							
34							
35							
36	1600 103142 9-14-92	24 30 32	12	SAA - Top 7 inches ~~9-10-92~~ Bottom 5 inches - ~~Hard~~ Very dense (10YR, 5/6) yellowish brown well graded fine sand, slightly moist	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
37							
38							
39							
40							
41	0820 103143 9-15-92	16 26 39	15	~~Hard~~ Very dense ~~9-28-92~~ (10YR, 5/6) yellowish brown fine sand, trace gravel, slightly moist	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
42							
43							
44							
45							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable Tool

Driller: Joe Barile

Bob Johnson

* Samples collected per ASTM Standard Penetration Chart
* Colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background Readings { HNU = 0 ppm, Bγ = 40 cpm

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2434	COORDINATES:	DATE 9-15-92
ELEVATION:	GWL: Depth 57.5 ft TOC Date/Time 9-21-92/0800	DATE STARTED: 9-10-92
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 9-21-92
DRILLING METHODS: Cable Tool		PAGE 4 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECIVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	0930 103144 9-15-92	10 29 50/.4	14	~~Very dense~~ ~~Hard~~ (10YR, 5/4) yellowish brown coarse poorly graded sand, trace gravel, slightly moist	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
47							
48							
49							
50							
51	1020 103145 9-15-92	9 28 49	15	SAA ~~Very dense~~ in 9-28-92	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
52	1100 103146 9-15-92	46 50/.2	15	~~Very~~ ~~Hard~~ (10YR, 5/4) yellowish brown gravely sand, moist	GP	N/A	HNU = 0 ppm Bγ = 40 cpm
53							
54	1315 ~~103146~~ 9-15-92 103147	10 12 27	15	SAA - wet ~~Very dense~~ in 9-28-92	GP	N/A	HNU = 0 ppm Bγ = 40 cpm
55	1330 103148 9-15-92	15 42 50	18	~~Very~~ ~~Hard~~ (2.5Y, 5/2) grayish brown coarse gravely sand, wet ~~Very dense~~ in 9-28-92	GP	N/A	HNU = 0 ppm Bγ = 40 cpm
56							
57	1345 103149 9-15-92	22 24 27	18	~~Very~~ ~~Hard~~ (2.5Y, 5/2) grayish brown poorly graded sand, trace gravel, wet	SP	N/A	HNU = 0 ppm Bγ = 40 cpm
58	1445 103150 9-15-92	24 44 50	15	SAA ~~Very dense~~ in 9-28-92	SP	N/A	HNU = ~~N/A~~ 0 ppm in 9-15-92 Bγ = ~~N/A~~ 40 cpm in 9-15-92
59							
60	1510 103151 9-15-92	30 48 50	18	~~Very dense~~ ~~Hard~~ (2.5Y, 5/2) grayish brown well graded sand, trace gravel, wet	SW	N/A	HNU = 0 ppm Bγ = 40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable Tool

Driller: Joe Barile
Bob Johnson

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background Readings { HNU = 0 ppm, Bγ = 40 cpm

* Samples collected per ASTM Standard Penetration Chart
* Colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 2434	COORDINATES:	DATE 9-15-92	
ELEVATION:	GWL: Depth TOC 57.5 FT. Date/Time 9-21-92/0800	DATE STARTED: 9-10-92	
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 9-21-92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 7	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.5				See page 4 of 7			
61	1530 103152 9-15-92	62 44 47	18	Very dense (2.5Y, 5/2) grayish brown well graded coarse sand, trace gravel, wet	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
62	1650 103153 9-15-92	17 28 37	18	SAA	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
63	1710 103154 9-15-92	24 35 50	18	SAA	SW	N/A	HNU = 0 ppm Bγ = 40 cpm
64				Bottom of sampling 65.0 FT			
65							
66							
67							
68							
69							
70				Bottom of boring 70 FT.			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable Tool

Driller: Joe Barile, Bob Johnson

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

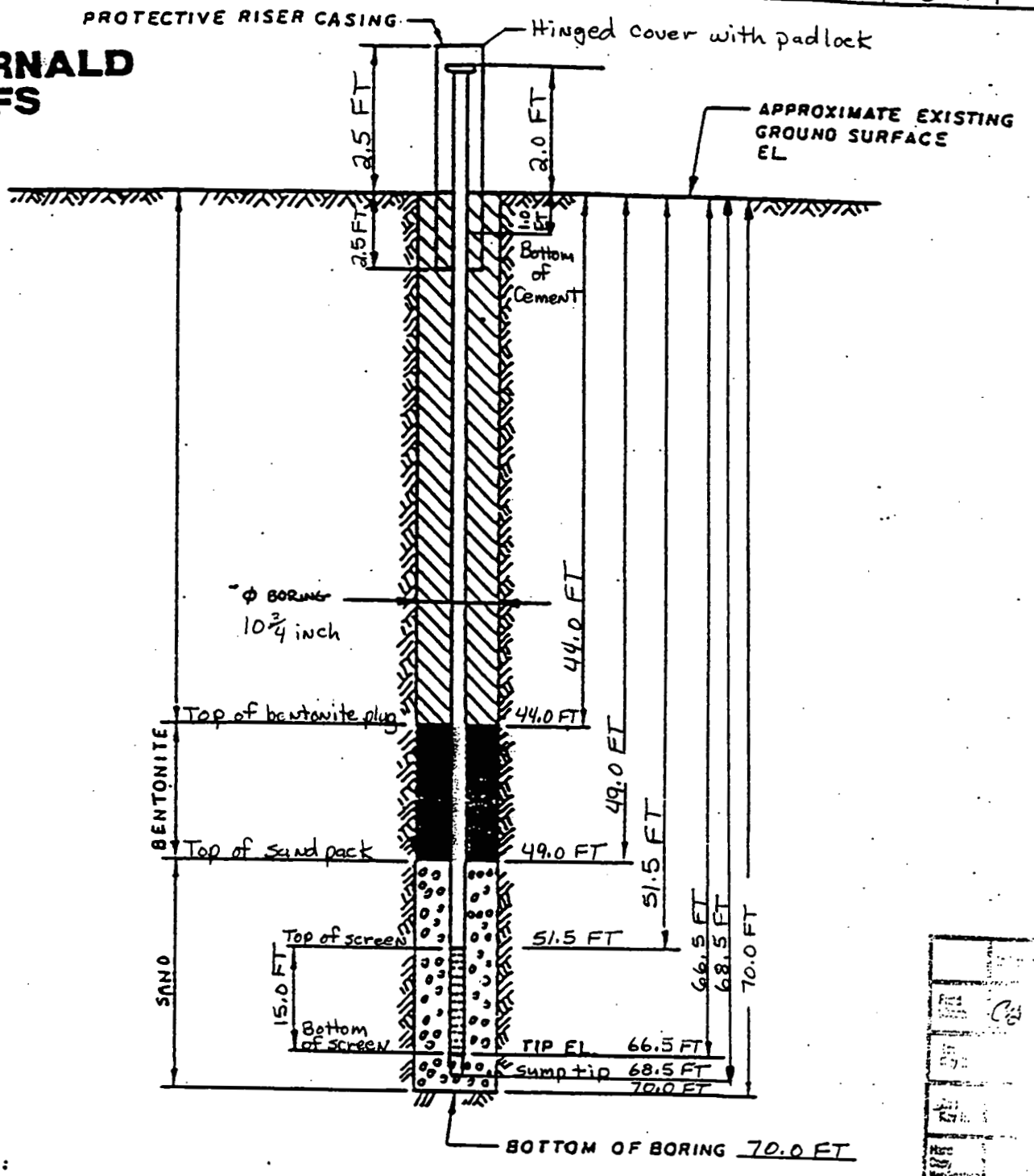
Background Readings { HNU = 0 ppm, Bγ = 40 cpm

* Sieve analysis sample collected from 50.0-65.0 Ft

* Samples collected per ASTM standard Penetration Chart

* Colors identified by the Munsell Color Chart

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D 316 PIPE CONTINUOUS SLOT SCREEN (0.020 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED. (with welded silt trap)
4. ELEVATION OF WATER LEVEL 57.5 (Top of riser)
5. WATER LEVEL READING ON 09-21-92

INSTALLATION DETAILS
MONITORING WELL #2434

PREPARED FOR
FMPC RI/FS

materials used during well installation:

15 80 lb. bags of 10/20 sand
11 50 lb. bags of volclay grout
7 5 gal. buckets of bentonite pellets
500 gallons of water used during grouting and drilling procedures
316 stainless steel pipe screen with 1.5 FT; 1-2 FT; 5-10 FT, 1-15 FT screen with 2 FT silt trap

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I Perimeter Well Installation
FIELD ENG./GEO. Michael Worley DATE 9-2[illegible]
PROJECT NO. 602.04.27
CHECKED BY _____ DATE _____
BORING NO. 2434
PIEZOMETER NO. 2434
DATE OF INSTALLATION 9-21-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 70.0 FT
FLUID N/A FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in. ID FROM 0.0 FT TO 70.0 FT
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 inch
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 inch I.D. 4.0 inch
LENGTH OF PIPE SECTIONS 1-15 FT, 5-10 FT, 1-2 FT, 1-
JOINING METHOD Screw type-flush joint threaded

PROTECTION SYSTEM

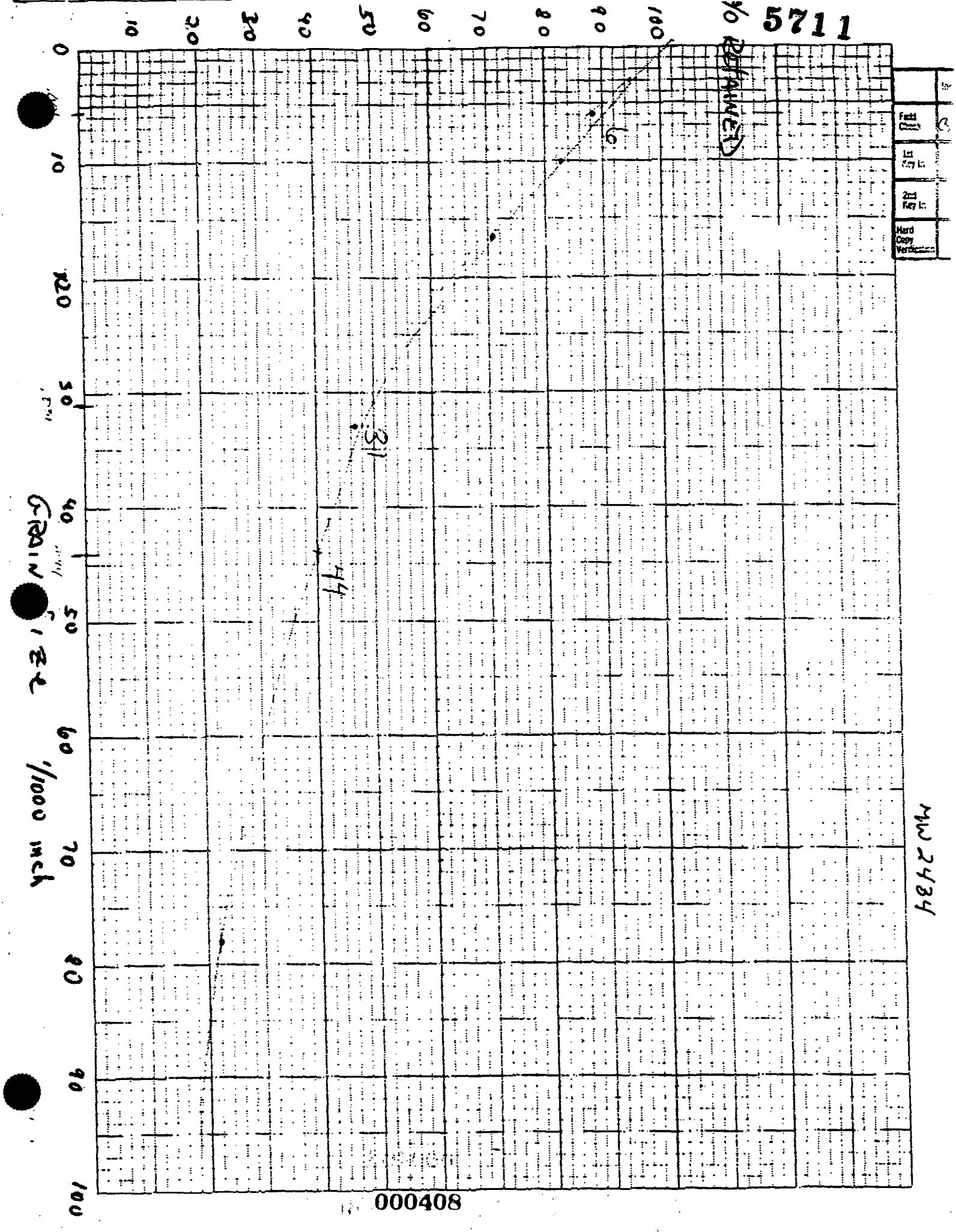
RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 inch

OTHER PROTECTION Hinged locking Cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.5~~ 2.0 m 9-20-92			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
GROUT / ~~SLURRY~~ Cement m 9-21-92	TOP 1.0	BOTTOM ~~42.0~~ 44.0 m 9-21-92	TOP	BOTTOM
BENTONITE PELLETS	TOP 44.0	BOTTOM 49.0	TOP	BOTTOM
SAND 10/20	TOP 49.0	BOTTOM ~~68.5~~ 70.0 m 9-21-92	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 51.5	BOTTOM 66.5	TOP	BOTTOM
PIEZOMETER TIP	68.5			
BOTTOM OF BOREHOLE	70.0			
GWL AFTER INSTALLATION	57.5 (TOC)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed from 0.0 to ~~0.1~~ 1.0 FT to hold protective cover in place. CR 3/4/93

5711


% RETAINED
GRAIN SIZE 1/1000 inch
Field Check
1st Key In
2nd Key In
Hard Copy Verification
MW 2434

ANALYTICAL DATA SHEET

MW - 2434

SAMPLE NO.	DIL.	BLANK OR CORR.	FACTOR OR NORM.	O.D. READ OR VOL. TITRANT	
920916-063			Sample	wt 276.1 - t =	270.21
	Al weighing dish	38270			
		2mm	10	64.8437 - t = 60.9567	22.4
		.85mm	20	70.4254 - t = 66.5384	24.4
		.425mm	40	69.0020 - t = 65.1150	23.9
		.250mm	60	38.6369 - t = 34.7499	12.8
		.150	100	17.6786 - t = 13.7916	5.1
		.075	200	20.6820 - t = 16.8010	6.2
	passes		200 +	10.1144 - t = 6.2274	2.3

WT +5.8878 g
WT +64.8437 g
WT +70.4254 g
WT +69.0020 g
WT +38.6369 g
WT +17.6786 g
WT +20.6820 g
WT +10.1144 g

ANALYZED BY: J Robert CHECKED BY: DATE: 9-17-92

FMPC-SS-2274 (REV. 7/15/91)

ANALYTICAL DATA SHEET Cumulative % Retained

SAMPLE NO.	DIL.	BLANK OR CORR.	FACTOR OR NORM.	O.D. READ OR VOL. TITRANT	
	10		22.4		
	10+20		46.8	Grain size 40 =	44
	10+20+40		70.7	50 =	31
	10+20+40+60		83.5	90 =	6
	10+20+40+60+100		88.6		
	10,20,40,60,100,200		94.8		

	Initial	D
Field Check	OB	
1st Key In		
2nd Key In		
Hard Copy Verification		

ANALYZED BY: J Robert CHECKED BY: 000409 DATE: 9-17-92

FMPC-SS-2274 (REV. 7/15/91)

5711

MW -2434

90% = .006
50% = .031
40% = .044

$\frac{.044}{.006} = 7.3$ 7.3 > 3 so use factor of 4

4 x .031 = .124

.124 more closely fits the curve for medium(
sand with .020 screen.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 2435	COORDINATES:	DATE 10/16/92
ELEVATION:	GWL: Depth 61.97 ft Date/Time 10/27/92	DATE STARTED: 10/16/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Date/Time	DATE COMPLETED: 10/24/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				For Visual Descriptions see Lithologic Description for well 2435			
15'							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Dave Newman
John VanDine

10/16/92
Background Readings
Hnu = 0 ppm
βγ = 60 cpm
α = 0 cpm

Colors Identified using munsell color chart
Samples collected per ASTM standard penetration test

10/19/20
Background Readings
Hnu = 0 ppm
βγ = 60-80 cpm
α = 0 cpm

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 2435	COORDINATES:	DATE 10/19/92
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE STARTED: 10/16/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Date/Time	DATE COMPLETED: 10/27/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15'				see page 1			
30'							

NOTES: See page 1

10/29/92
Background Readings
HNU = 0 ppm
$\beta\gamma$ = 60-80 cpm
α = 0 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.29	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 2435	COORDINATES:	DATE 10/19/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/16/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Date/Time	DATE COMPLETED: 10/27/92
DRILLING METHODS: Cable Tool		PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30'				See Page 1			
45'							

NOTES: See Page 1

Background Readings 10/19/92
HNu = 0 ppm
Bγ = 60-80 cpm
α = 0 cpm

Background Readings 10/20/92
HNu = .1 ppm
Bγ = 60-80 cpm
α = 0 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 2435	COORDINATES:	DATE: 10/20/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/16/92
ENGINEER/GEOLOGIST: Ken Coleigh	Depth Date/Time	DATE COMPLETED: 10/27/92
DRILLING METHODS: Cable Tool		PAGE 4 OF 7

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45'				See page 1			
60'							

NOTES: See page 1

Background Readings
10/20/92
HNU = 1 ppm
Bg = 60 cpm
α = 0 cpm

000414

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I	
BORING NUMBER: 2435	COORDINATES:	DATE 10/21/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 10/14/92
ENGINEER/GEOLOGIST: Ken Geiger	Depth Date/Time	DATE COMPLETED: 10/27/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 7

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60'				see page 1			
				W.L. = 61.97 ft.			
70'							
72'				Bottom of Bore Hole 72.0 ft.			

NOTES:

See Page 1

* Sieve sample # 103200 collected from 57.5 to 72.5 Ft

Background Readings
Hau = 0 ppm
Bγ = 60-80 cpm
α = 0 cpm

000415

402-11-86

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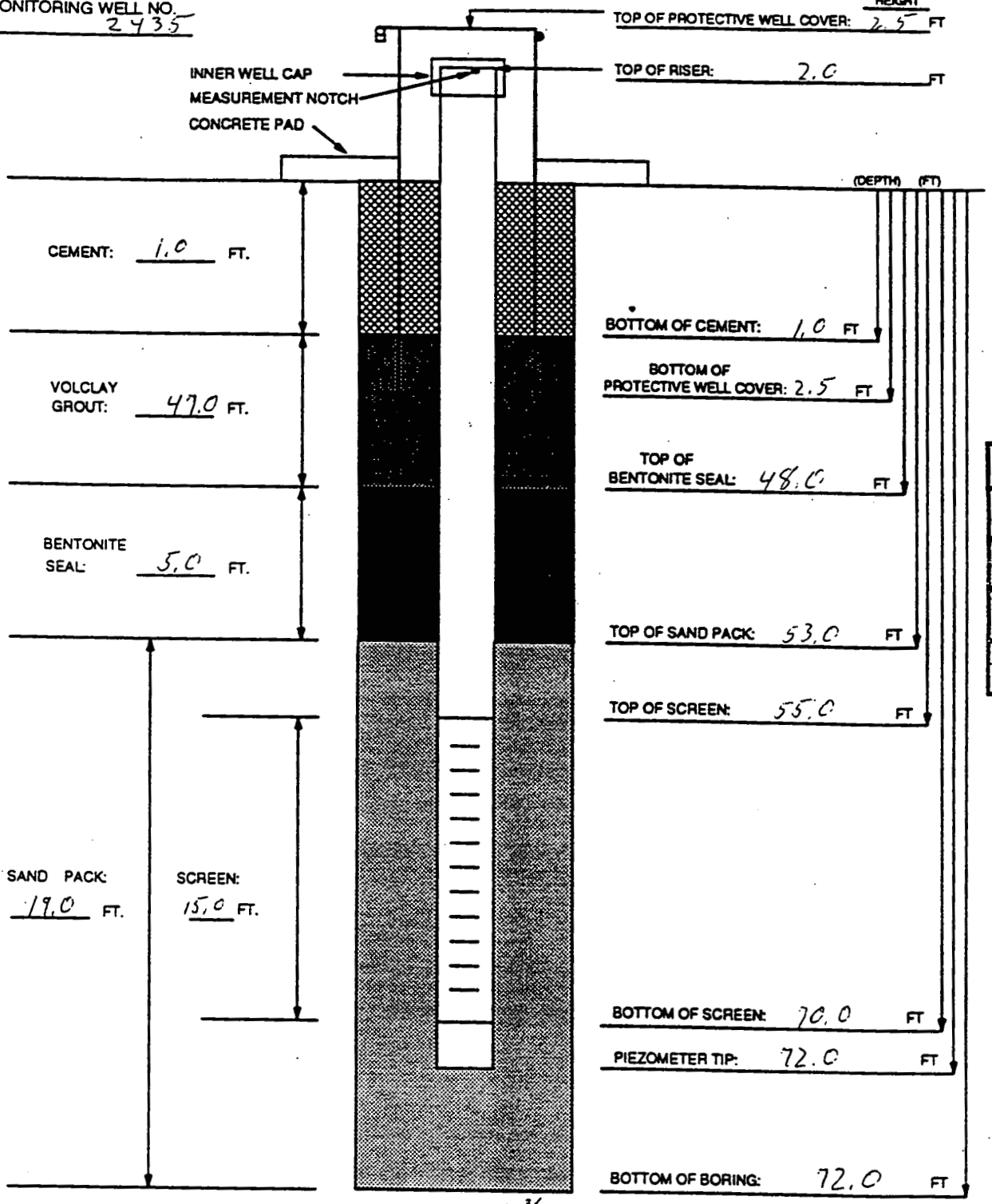
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2435

INSTALLATION DATE: 10/27/92



	Initial
Field Check	CB
1st Key In	
2nd Key In	
Hard Copy Verification	

MATERIALS USED

SAND TYPE AND QUANTITY: 430 Sand / 20-50 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5 Buckets
BAGS OF VOLCLAY GROUT: 9 - 50 lb bags
AMOUNT OF CEMENT: 1.5 Bags
AMOUNT OF WATER USED: 247 gal
[illegible]ER: 12 Soil Drums Generated
[illegible]: (02 04 27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 61.97 FT / 10/27/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Ken Geiger

ASI FORM 0157 REV. (0)

Page 7 of 7

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Geiger DATE [illegible]
PROJECT NO. 002 04.27 CHECKED BY C. Brown DATE 11/04/
BORING NO. 2435
~~PIEZOMETER~~ monitoring well NO. 2435 DATE OF INSTALLATION 10/27/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 ft TO 61.97
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in FROM 0.0 TO 72.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020 in
TOTAL PERFORATED AREA 15.0 ft²

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 5-10 ft, 1-5 ft, 2-2 ft, 1-5 ft
JOINING METHOD Screw Type - flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
CEMENT GROUT/SLURRY	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 48.0	TOP	BOTTOM
BENTONITE	TOP 48.0	BOTTOM 53.0	TOP	BOTTOM
SAND	TOP 53.0	BOTTOM 72.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 55.0	BOTTOM 70.0	TOP	BOTTOM
PIEZOMETER TIP	72.0			
BOTTOM OF BOREHOLE	72.0			
GWL AFTER INSTALLATION	61.97			

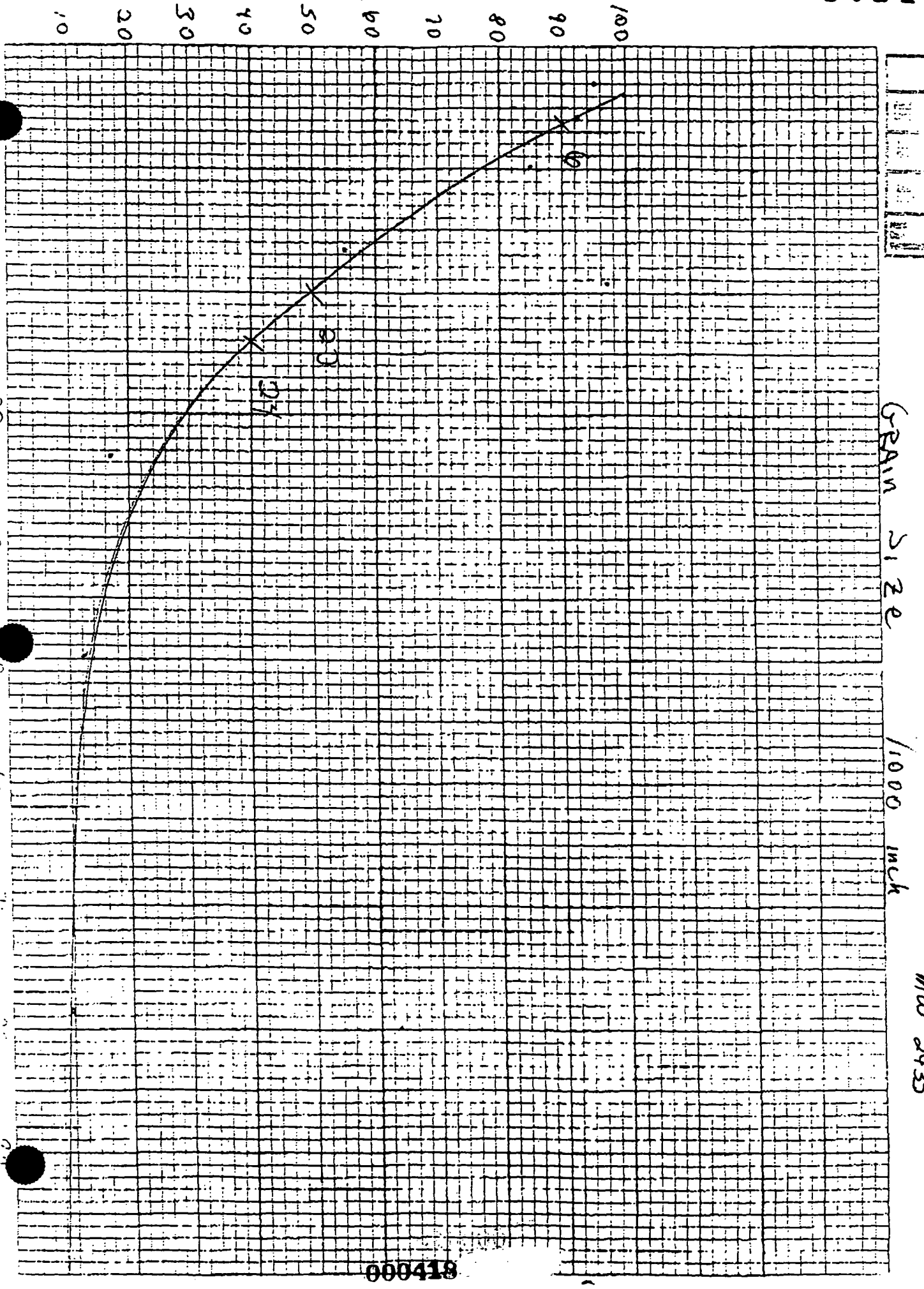
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

000417

409-11-86

5711



B-243

Customer Number 103307

MATERIAL:

SAMPLE NUMBER: 921022-013

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 175.1

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	17.15	9.8	9.8	78.7
20	12.68	7.2	17.0	33.5
40	66.59	38.0	55.0	16.7
60	53.30	30.4	85.4	9.8
100	11.95	6.8	92.2	5.9
200	5.51	3.2	95.4	3.0
Pan	6.71	3.8	99.2	

$\frac{W_2 \times 100\%}{W_1} = R$

$\left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$

Analyzed by:

Checked by:

Date analyzed:

GRAIN SIZE 40% RETAINED 24 .001 inch

50% 20

90% 6

	Initial	Date
Rec'd Check	CB	2/10/93
Rec'd Rev.		
Rec'd Rev.		
Hard Copy Verif.		

Retained Values

40% .024

50% .020

90% .006

$\frac{.024}{.006} = 4$ 4 > 3 use a factor of 4

4 X .020 = .080

.080 most closely fits the coarse grain sand and .020 screen size

	Initial	Date
Field Check	CAB	2/6/93
[illegible]		
[illegible]		
Field Data Verification		

ANALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 002.04.27	PROJECT NAME RCRA Phase 1		
BORING NUMBER: 3435	COORDINATES:	DATE 9-15-92	
ELEVATION:	GWL: Depth 62.5 ft Date/Time 9/22/92/10:00	DATE STARTED 9-15-92	
ENGINEER/GEOLOGIST K. Marrion, K. Grieve	Depth ~~10/20/92~~ 48.45 Date/Time 10/20/92/1100 K.G. 10/20/92	DATE COMPLETED: 10/4/92	
DRILLING METHODS Cable Tool		PAGE 1	OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	103241 9-15-92 1430	4 9 13	14 0.5 ft	Medium dense dark yellowish brown (10YR, 4/4) silty sand with trace gravel, and a little organic matter, moist	SM ~~SC~~ 10/4/92	N/A	Hnu = 0.2 ppm Bγ = 400 cpm α = 0 cpm
				Medium dense light olive brown (2.5Y, 5/6) clayey silt with sand and trace gravel, dry	ML	N/A	
1.5	103242 9-15-92 1445	5 9 13	9	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and a little fine gravel, medium plasticity, moist	CL	2.75	Hnu = .2 ppm Bγ = 400 cpm α = 0 cpm
	103243 9-15-92 1450	7 9 11	15	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand, medium plasticity, moist	CL	2.0	Hnu = .2 ppm Bγ = 110 cpm α = 0 cpm
4.5	103244 9-15-92 1500	9 11 11	18	Medium dense light olive brown (2.5Y, 5/4) clayey silt with sand and fine gravel, trace light brownish gray (2.5Y, 6/2) mottling, moist	ML	N/A	Hnu = .2 ppm Bγ = 100 cpm α = 0 cpm
6.0	103245 9-15-92 1505	9 10 11	18	Medium dense light olive brown (2.5Y, 5/4) clayey silt with sand and gravel, trace light brownish gray (2.5Y, 6/2) mottling, moist	ML	N/A	Hnu = .2 ppm Bγ = 60 cpm α = 0 cpm
7.5							

NOTES:
Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Dave Newman
Jim Saccani

Colors Identified using Munsell Color Chart
Samples Collected per ASTM Standard Penetration Test

Background Readings
Hnu = .2 ppm
Bγ = 50 cpm
α = 0 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-15-92
ELEVATION:	GWL: Depth see pl Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: L. Marion, K. Gustavson	Depth see pl Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 2 OF 14

DEPTH (ft.) 7.5	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	103246 9-15-92 1510	9 12 21	18	Very stiff light olive brown (2.5Y, 5/4) silty clay with sand and gravel, trace gray (10YR, 6/1) mottling, low plasticity, slightly moist	CL	3.5	Hnu = .2 ppm BG = 50 cpm α = 0 cpm
	103247 9-16-92 0950	17 22 33	18	Very dense light olive brown (2.5Y, 5/4) clayey silt with sand and a little gravel, moist	ML	N/A	Hnu = .2 ppm BG = 50 cpm α = 0 cpm
12.0	103248 9-16-92 1000	19 24 33	18 11.5ft	Hard, light olive brown (2.5Y, 5/6) silty clay with a little sand and gravel, non plastic, slightly moist	CL	>4.5	Hnu = .2 ppm BG = 50 cpm α = 0 cpm
				Hard gray (2.5Y, 5/0) silty clay with a little sand and gravel, non plastic, slightly moist	CL	>4.5	
13.5	103249 9-16-92 1015	14 16 23	18	Very stiff gray (2.5Y 5/0) silty clay with sand and trace gravel, medium plasticity, moist	CL	2.0	Hnu = .2 ppm BG = 50 cpm α = 0 cpm
15.0	103250 9-16-92 1025	6 8 11	15	Stiff dark gray (5Y, 4/1) silty clay with sand and trace fine gravel, medium plasticity, moist	CL	1.75	Hnu = .2 ppm BG = 50 cpm α = 0 cpm

NOTES:

SEE Page 1

	Initial	Date
Field Check	CB	10/7/93
1st Key In	602-11-86	
2nd Key In		
Hand		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA - Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-16-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED 9-15-92
ENGINEER/GEOLOGIST: K. Marion, K. Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 3 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	103251 9-16-92 1040	8 9 16	15	K.M. 9-16-92 Stiff dark gray (5Y, 4/1) silty clay with sand and trace fine gravel, medium plasticity, moist	CL	1.5	Hnu = .2 ppm Bγ = 50 cpm α = 0 cpm
16.5	103252 9-16-92 1420	5 7 14	13	Stiff dark gray (5Y, 4/1) silty clay with sand and trace fine gravel, medium plasticity, slightly moist	CL	1.5	Hnu = .2 ppm Bγ = 50 cpm α = 0 cpm
18.5	103253 9-16-92 1435	6 7 14	14	Stiff dark gray (5Y, 4/1) silty clay with sand and trace fine gravel, medium plasticity, moist	CL	1.5	Hnu = .2 ppm Bγ = 50 cpm α = 0 cpm
20.0	103254 9-16-92 1640	6 7 14	18	Stiff dark gray (5Y, 4/1) silty clay with sand and a little fine gravel, medium plasticity, moist K.M. 9-16-92 4/1	CL	1.5	Hnu = .2 ppm Bγ = 50 cpm α = 0 cpm
22.5	103255 9-16-92 1655	8 11 17	18	Stiff dark gray (5Y, 4/1) silty clay with sand and a little gravel and trace fossils, medium plasticity, moist	CL	1.5	Hnu = .2 ppm Bγ = 50 cpm α = 0 cpm

NOTES:

See Page 1

	Initial	Date
Field Check	CB	2/24/93
1st Key In		
Key In	402-01-86	
Hard Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-17-92
ELEVATION:	GWL: Depth See p 1 Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: K. Marion, K. Geiger	Depth See p 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 4 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	103256 9-17-92 0900	3 6 7	17	Stiff dark gray (5Y,4/1) silty clay with sand and trace gravel, medium plasticity, moist	CL	1.5	Hnu = .1 ppm Bγ = 60 cpm α = 0 cpm
24.0	103257 9-17-92 0910	3 9 11	18	stiff dark gray (5Y,4/1) silty clay with sand and gravel, medium plasticity, moist	CL	1.5	Hnu = .1 ppm Bγ = 80 cpm α = 0 cpm
	103258 9-17-92 0940	4 9 11	6	Medium stiff dark gray (5Y,4/1) silty clay with sand and trace gravel, medium plasticity, moist	CL	.75	Hnu = .1 ppm Bγ = 60 cpm α = 0 cpm
27.0	103259 9-17-92 0950	3 6 9	18	Same As Above	CL	.75	Hnu = .1 ppm Bγ = 80 cpm α = 0 cpm
28.5	103260 9-17-92 1000	3 8 8 4	10	Same As Above	CL	.75	Hnu = .1 ppm Bγ = 80 cpm α = 0 cpm
30.0							

NOTES:

See page 1

9-17-92
Background Readings
Hnu = .1 ppm
Bγ = 60 cpm
α = 0 cpm

CB 2/24/93

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-17-92
ELEVATION:	GWL: Depth see p.1 Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: K. Marion, K. Geiger	Depth see p.1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 5 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	103261 9-17-92 1045	3 3 5	3	Soft gray (5Y, 5/1) silty, sandy clay with gravel, medium plasticity, moist	CL	.5	Hnu = .1 ppm Bg = 80 cpm α = 0 cpm
31.5	103262 9-17-92 1100	3 5 8	10	Stiff gray (5Y, 5/1) silty, sandy clay with some gravel, medium plasticity, moist	CL	1.5	Hnu = .1 ppm Bg = 60 cpm α = 0 cpm
0	103264 9-17-92 1430	17 37 42	33 / 18	Very dense gray (5Y, 5/1) well sorted gravel, dry	GP	N/A	Hnu = .1 ppm Bg = 60 cpm α = 0 cpm
				Hard gray (5Y, ~~5/1~~ 4/1) K.M. 9-17-92 silty clay with trace sand and gravel, low plasticity, slightly moist	CL	>4.5	
34.5	103265 9-17-92 1445	20 29 42	10	Very stiff gray (5Y, 5/1) gravelly clay, low plasticity, slightly moist	CL	4.0	Hnu = .1 ppm Bg = 60 cpm α = 0 cpm
36.0	103266 9-17-92 1710	28 36 49	16	K.M. 9-17-92			Hnu = .1 ppm Bg = 60 cpm α = 0 cpm
				Very stiff gray (5Y, 5/1) gravelly clay, low plasticity, slightly moist	CL	3.0	☆ Base of till / Top of aquifer at 37.3 ft
37.5				Very dense yellowish brown (10YR, 5/4) clayey fine sand, moist	SC	N/A	

NOTES:

See page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3735	COORDINATES:	DATE 9-17-92
LOCATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: K Mason, K. Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable tool		PAGE 6 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	103267 9-17-92 1715	19 27 39	18	Very dense yellowish brown (10 YR, 5/8) fine clayey sand, moist	SC	N/A	Hnu = .1 ppm Bγ = 60 cpm α = 0 cpm
39.0	103268 9-18-92 0930	17 37 50	10	Very dense yellowish brown (10YR, 5/8) poorly graded gravelly medium sand, moist	SP ~~SC~~ CB 11/4/92	N/A	Hnu = N/A high humidity prevented accurate reading Bγ = 50 cpm α = 0 cpm
40.5	103269 9-18-92 0945	27 38 46	14	Very dense yellowish brown (10YR, 5/8) gravelly well graded sand, moist	SW	N/A	Hnu = N/A high humidity prevented accurate reading Bγ = 50 cpm α = 0 cpm
42.0				split spoon samples will be taken at 5 ft. intervals starting at 45.0 ft.			
45.0							

NOTES

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CB 2/24/93

402-11-86

2nd Rev in

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-18-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: K. Marion, K. Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 7 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0	103270 9-18-92 1040	36 50/.3	5	Very dense pale yellow (2.5Y, 7/3) gravelly poorly graded sand, dry	SP	N/A	Hnu = N/A ppm BG = 50 cpm α = 0 cpm high humidity prevented accurate Hnu reading
46.5							
50.0	103271 9-18-92 1100	32 50/.4	11	Very dense light yellowish brown (2.5Y, 6/3) Gravelly well graded sand, dry	SW	N/A	Hnu = N/A ppm BG = 50 cpm α = 0 cpm high humidity prevented accurate Hnu reading
51.5							
55.0	103272 9-21-92 1000	21 38 49	16	Very dense light olive brown (2.5Y, 5/4) gravelly well graded sand, very moist	SW	N/A	Hnu = high humidity prevented accurate reading BG = 60 cpm α = 0 cpm
56.5							The moisture content of the sample is due to the water used when drilling and the fact that the hole was left unattended over the weekend
60.0							

NOTES:

See Page 1

Note: Changed Scale as each tick equals 6 inches

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 2	
BORING NUMBER 3435	COORDINATES:	DATE 9-21-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED 9-15-92
ENGINEER/GEOLOGIST K. Murray, K. Geiger	Depth see p. 1 Date/Time	DATE COMPLETED 10/7/92
DRILLING METHODS Cable Tool		PAGE 8 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0	103273 9-21-92 1015	18 37 48	6	Very dense light gray (10YR, 6/1) (poorly graded) well sorted medium sand with trace gravel, dry	SP	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm high humidity prevented accurate Hnu reading
61.5				W.L. = 62.5 ft.			
65.0	103274 9-21-92 1440	14 17 19	18	Dense light olive brown (2.5Y, 5/4) (poorly graded) well sorted coarse sand with trace gravel, wet	SP	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm
66.5							
70.0	103275 9-21-92 1500	9 12 18	18	Medium dense light olive brown (2.5Y, 5/4) (poorly graded) well sorted coarse sand with trace gravel, wet	SP	N/A	Hnu = N/A Br = 60 cpm α = 0 cpm
71.5							
75.0							

NOTES:

SEE Page 1

	Initial	Date
Field Check	CB	9/24/92
1st Rev'd		
2nd Rev'd	402911-86	
Hard Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-22-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED 9-15-92
ENGINEER/GEOLOGIST: K Marion/K Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 9 OF 14

DEPTH Ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75.0	103277 9-22-92 1540 K.M. 9-22-92	17 26 32	15	VERY DENSE Light Olive Brown (2.5Y, 5/4) Poorly ~~sorted~~ graded Very Coarse Gravelly Sand, wet CB 2/24/93	SP	N/A	K.M 9-22-92 Hnu ~~PPM~~ = 0 ppm Br = 60 cpm α = 0 cpm
76.5							
80.0	103278 9-23-92 0920	11 13 17	13	Medium dense light olive brown (2.5Y, 5/3) poorly graded medium sand, wet	SP	N/A	Hnu = .1 ppm Br = 50 cpm α = 0 cpm
81.5				Medium dense light olive brown (2.5Y, 5/3) poorly graded gravelly coarse sand, wet	SP	N/A	
85.0	103279 9-23-92 1030	16 22 35	18	Very Dense Light Olive Brown (2.5Y, 5/3) poorly Graded Gravelly coarse sand wet	SP	NA	Hnu = 0.1 ppm Br = 50 cpm α = 0 cpm
86.5							

NOTES

SEE Page 1

9-22-92 Background Levels
Hnu = 0 ppm
Br = 60 cpm
α = 0 cpm

9-23-92 Background Levels
Hnu = .1 ppm
Br = 50 cpm
α = 0 cpm

CB 2/24/93

402-11-86

FERNALD
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9/23/92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9/15/92
ENGINEER/GEOLOGIST: K Marion, K Geipel	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 10 OF 14

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90.0	103280 9/23/92 1545	18 32 42	16	90.5 Very Dense Light olive Brown (2.5Y, 5/3) poorly Graded Gravelly Coarse Sand wet	SP	N/A	Hnu = .1ppm Bγ = 50cpm α = 0 cpm
91.6				Very Dense Light olive Brown (2.5Y, 5/3) well Graded med Coarse Sand wet	SW	N/A	
95.0	103281 9/24/92 950	9 11 32	15	95.5 Dense Light olive Brown (2.5Y, 5/3) (poorly graded) well sorted med Sand wet	SP	N/A	Hnu = .1ppm Bγ = 50cpm α = 0cpm
96.5				Dense Light olive Brown (2.5Y, 5/3) poorly Graded Gravelly Coarse Sand wet	SP ~~SW~~ GRAVELLY	N/A	
100	103293 9/24/92 1415	12 27 42	17	Very Dense Light olive Brown (2.5Y, 5/3) (poorly graded) well sorted med Sand wet	SP	N/A	Hnu = .1ppm Bγ = 50cpm α = 0 cpm
101.5							
105.0							

	Initial	Date
Field Check	CB	9/24/92
Int. Rev.		
Final Rev.		

NOTES:

SEE Page 1

9/23/92
Background Levels
Hnu = .1ppm
Bγ = 50cpm
α = 0 cpm

9/24/92
Background Levels
Hnu = .1ppm
Bγ = 50cpm
α = 0 cpm

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9-24-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 9-15-92
ENGINEER/GEOLOGIST: K. Morgan, K. Geiger	Depth see p. 1 Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool		PAGE 11 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105.0							
KM. 9-24-92 106.5	103284 9-24-92 1525	9 23 30	18	Very dense light olive brown (2.5Y, 5/3) (poorly graded) well sorted coarse sand, wet, trace gravel	SP	N/A	Hnu = .1 ppm Bγ = 50 cpm α = 0 cpm
110.0	103285 9-24-92 1600	5 9 23	18	Dense light olive brown (2.5Y, 5/3) (poorly graded) well sorted coarse sand with trace gravel, wet	SP	N/A	Hnu = .1 ppm Bγ = 50 cpm α = 0 cpm
111.5							
115.0	103286 9/25/92 1435	18 20 21	18	Dense light olive brown (2.5Y, 5/3) (poorly graded) well sorted med sand with trace of fine gravel, wet	SP	N/A	Hnu = 3 ppm Bγ = 50 cpm α = 0 cpm
116.5	103287 9/25/92 1530	5 19 32	14	Very dense light olive brown (2.5Y, 5/3) (poorly graded) well sorted med sand with trace of fine gravel, wet	SP	N/A	Hnu = 3 ppm Bγ = 50 cpm α = 0 cpm
118.0	103288 9/25/92 1700	13 15 16	18	Dense light olive brown (2.5Y, 5/3) (poorly graded) well sorted med sand with trace of gravel, wet	SP	N/A	Hnu = 3 ppm Bγ = 50 cpm α = 0 cpm
119.5				Continue on Next Page			

NOTES:

See Page 1

9/24/92 Background Levels
Hnu = .1 ppm
Bγ = 50 cpm
α = 0 cpm

9/25/92 Background Levels
Hnu = 3 ppm
Bγ = 50 cpm
α = 0 cpm

CB 3/31/93

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27	PROJECT NAME RCRA Phase 1	
BORING NUMBER: 3435	COORDINATES:	DATE 9/28/92
ELEVATION:	GWL: Depth Seep. 1 Date/Time	DATE STARTED 9/15/92
ENGINEER/GEOLOGIST Kmarion, K.Goings	Depth Seep. 1 Date/Time	DATE COMPLETED 10/7/92
DRILLING METHODS Cable Tool		PAGE 12 OF 14

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
119.5	103289 9/28/92 1030	8 12 18	12	Med Dense Light olive Brown (2.5Y, 5/3) (poorly graded) well sorted medium sand with Trace of Gravel, wet	SP	N/A	Hnu = 0 ppm Bg = 60 cpm α = 0 cpm
121.0	103291 9/28/92 1705	10 19 25	18	EM 4-29-92 Dense Light Olive Brown (2.5Y, 5/3) (poorly graded) well sorted coarse sand with Trace of Gravel, wet	SP	N/A	Hnu = 0 ppm Bg = 60 cpm α = 0 cpm
122.5	103292 9/29/92 0925	6 10 18	13	Medium dense Light olive brown (2.5Y, 5/3) (poorly graded) well sorted coarse sand with trace gravel, wet	SP	N/A	Hnu = 0 ppm Bg = 60 cpm α = 0 cpm
124.0	103293 9/29/92 0945	8 12 17	15	Same As Above	SP	N/A	Hnu = 0 ppm Bg = 60 cpm α = 0 cpm
125							The Blue clay was thought to be at 125 ft, We discovered it at 129 ft. A shelby tube was driven at 129 ft. only 1 ft. could be sampled. This was not enough for a geotechnical analysis, so we saved it as an archive.
129.0	103295 9/29/92 1500	Shelby N/A Tube	12 (129.5 ft)	Stiff very dark gray (5Y, 3/1) sandy clay with a little gravel, low plasticity, moist; stiff dark gray (5Y, 4/1) clay, medium plasticity, moist	CL	1.5	Hnu = 0 ppm Bg = 60 cpm α = 0 cpm Blue clay
129.5							
130.0							
131.0	103294 10-2-92 1040	Shelby N/A Tube	24	Stiff dark gray (5Y, 4/1) clay, medium plasticity, moist	CL	1.5	Drove 36 in shelby tube 2 ft. into the blue clay.
133.0				Bottom of bore hole Drilled to 131.0 ft. Drove shelby tube 2 ft. to 133.0 ft.			

NOTES:

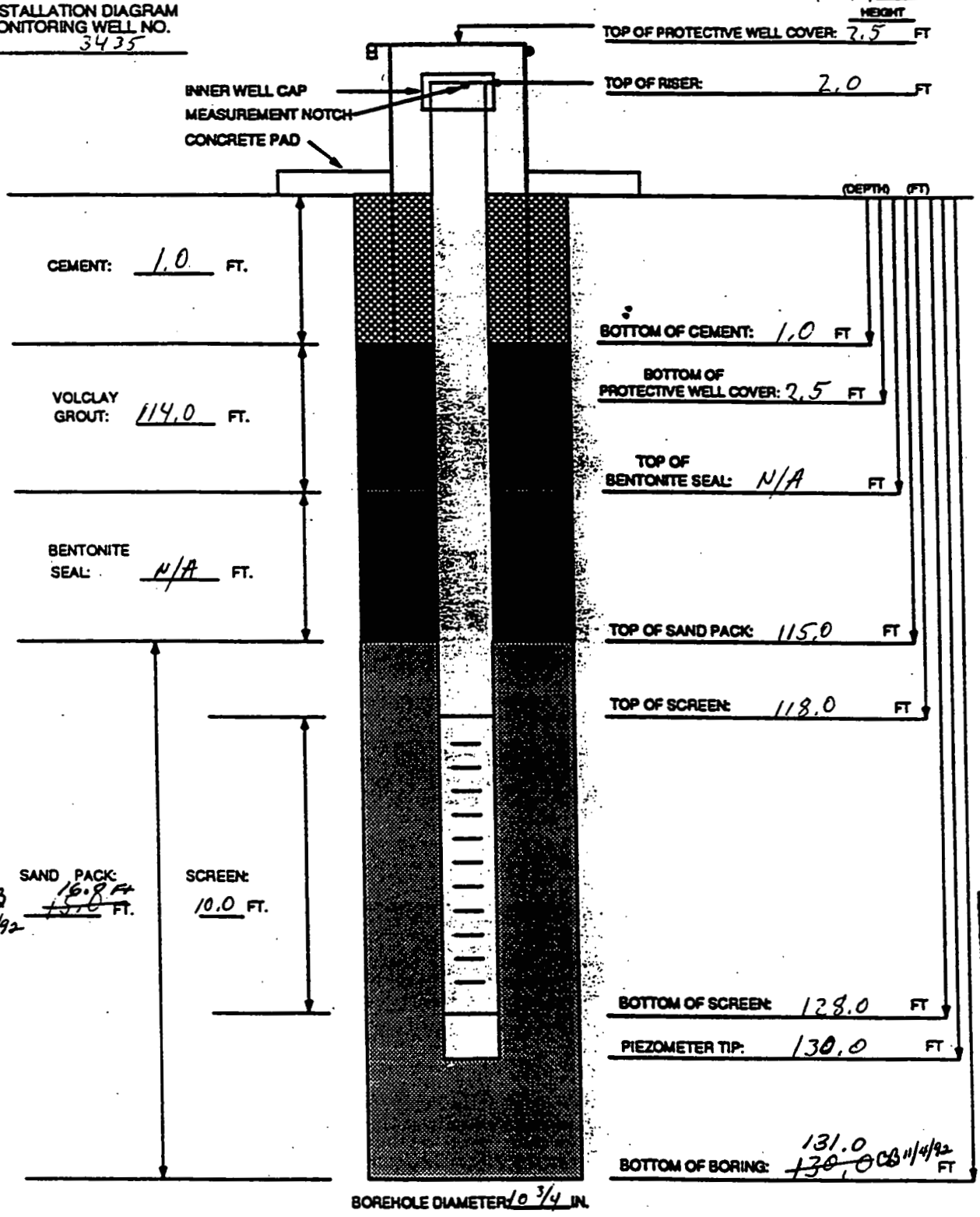
Background Levels 9/28/92
Hnu = 0 ppm
Bg = 60 cpm
α = 0 cpm

see page 1

	Initial	Date
Field Geologist	CH	12/31/92

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3435

INSTALLATION DATE: 10/7/92



	Initial	Date
Field Check	CB	9/24/93
Ext Key In		
Ext Key In		
Field Copy Verified		

MATERIALS USED

SAND TYPE AND QUANTITY: 430 Sand / 20-50lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 28 - 50lb bags
AMOUNT OF CEMENT: 1.5 Bags
AMOUNT OF WATER USED: 769 gal
OTHER: 30 Soil Drums Generated / 1 Decon Water Drum
TASK: 602.04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 6.25 FT / 9/22/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Kent Griger

FORM 0157 REV. (0)

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase 1 FIELD ENG./GEO. Ken Geiger DATE 10/7/92
PROJECT NO. 602.04.27 CHECKED BY C Brier DATE 11/4/92
BORING NO. 3435
~~PIEZOMETER~~ monitoring well NO. 3435 DATE OF INSTALLATION 10/7/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer Percussion Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0 ft TO 65.0 ft	SIZE 10.0 in ID FROM 0.0 TO ~~130.0~~ 131.0 CB 11/4/92
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 1-2 ft, 13-10 ft, 1-1 ft
AVERAGE SIZE OF PERFORATIONS .020 in	JOINING METHOD Screw type - flush Joint
TOTAL PERFORATED AREA 10.0 ft	Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Hinged well cover
PROTECTIVE PIPE O.D. 10 3/4 in	with Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 115.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 115.0	BOTTOM ~~130.0~~ 131.0 CB 11/4/92	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 118.0	BOTTOM 128.0	TOP	BOTTOM
PIEZOMETER TIP	CB 11/4/92 ~~130.0~~ 130.0			
BOTTOM OF BOREHOLE	CB 11/4/92 ~~130.0~~ 131.0			
GWL AFTER INSTALLATION	~~62.5 ft~~ 46 10/19/92 48.45 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

CB 9/24/93

409-11-86

WELL 2435 - K. MARION

NO 3001 .10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

92 0930-025

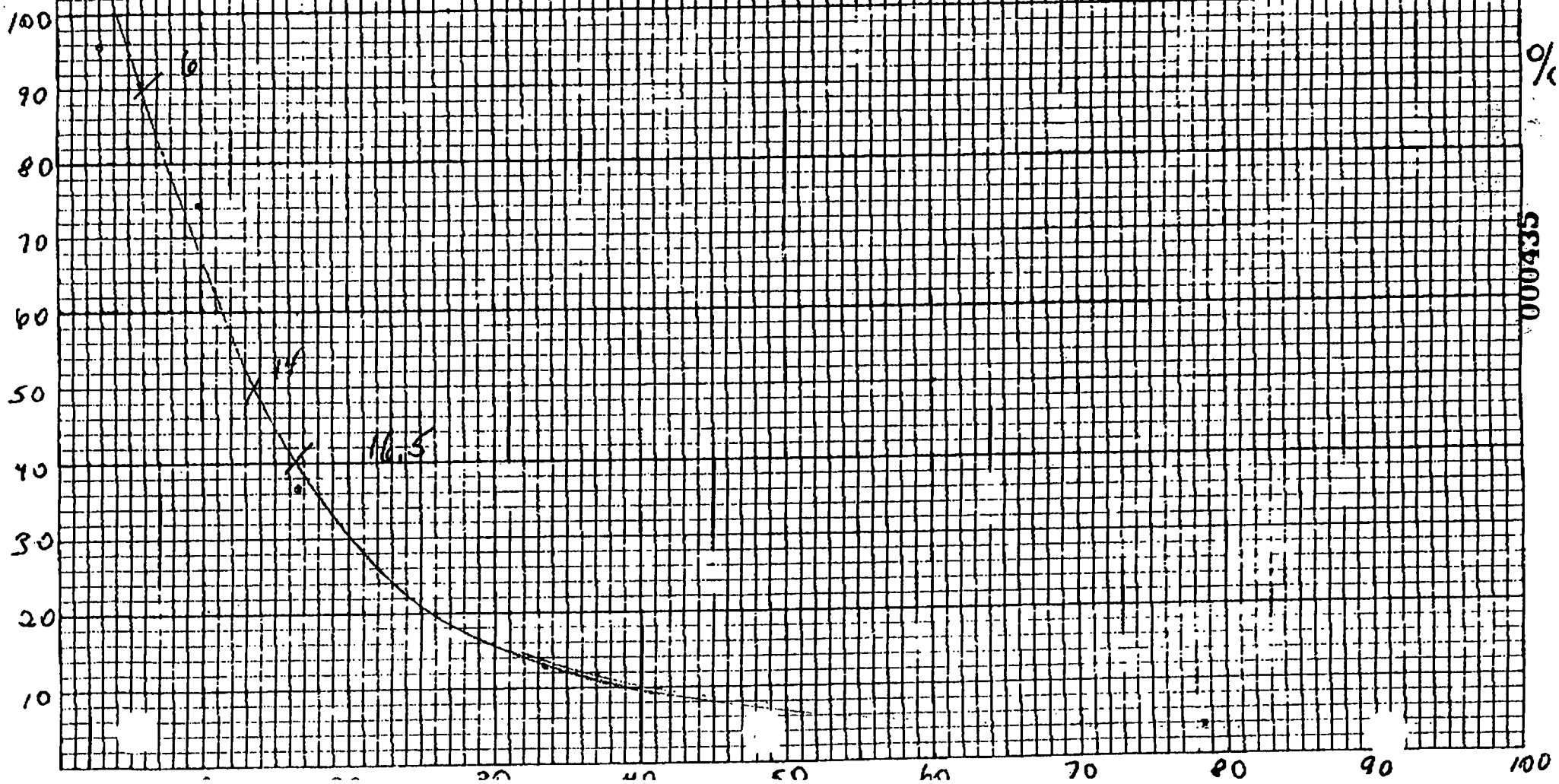
Grain Size 1/1000 inch

40% / 70% OR 16.5/6

16.5/6 = 2.75

.014 (50% range) X 5 = .07 in

Coarse Sand Pack



000435

5711

WELL 3435, K. MARION

103294

MATERIAL: _____ SAMPLE NUMBER: 920930-025

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 305.4

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	12.2	4.0	4.0	78.7
20	26.2	8.6	12.6	33.5
40	73.6	24.1	36.7	16.7
60	114.3	37.4	74.1	9.8
100	50.1	16.4	90.5	5.9
200	16.1	5.3	95.8	3.0
Pan	6.2	2.0	97.8	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
J Robert		10-1-92

CB 2/24/93

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: LWBA-40	PROJECT NAME: RCRA Phase II 35 Well		
BORING NUMBER: MW 2436	COORDINATES:	DATE: 5-26-93	
ELEVATION:	GWL: Depth 70.9 ft Date/Time 5-27-93 0800	DATE STARTED: 5-25-93	
ENGINEER/GEOLOGIST: B. Yearsley	Depth Date/Time	DATE COMPLETED: 6-2-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 4	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS
0.0				See Description for 4436			βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
							βγ= HNU=
650							βγ= HNU=

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Jim Saccani
Helper : Jeff Cheehan

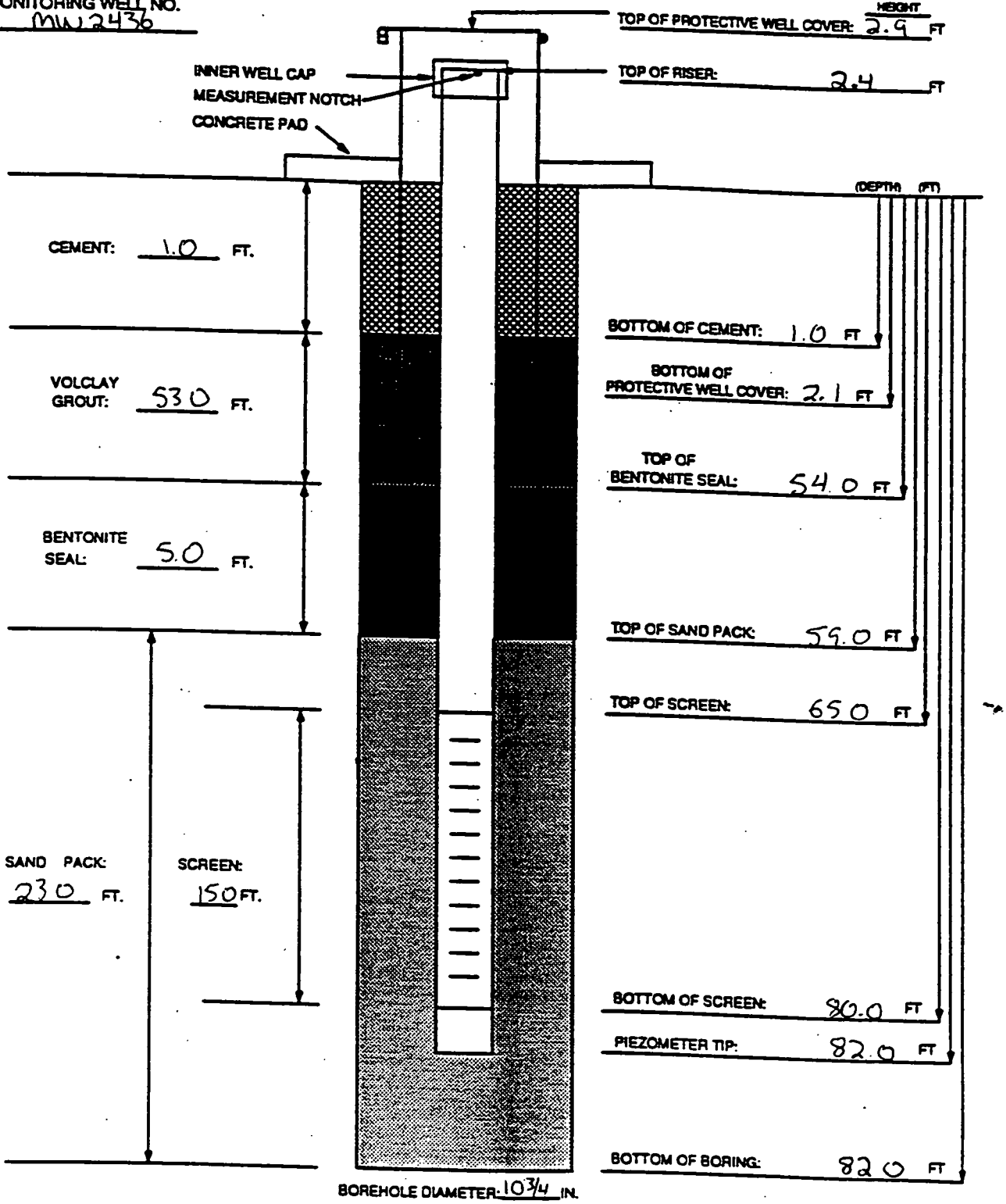
SAA = Same As Above
N/A = Not Applicable
Background = NA

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

5711

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. MW2436

INSTALLATION DATE: 5-25-93 to 6-2-93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 24 bags 430
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: 14
AMOUNT OF CEMENT: 650 cycs 5 bags
AMOUNT OF WATER USED: 4 gals 6/2/93
12 Drums Sand 1 Drum H_2O
TASK: WBA-40 662.04.25

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH O AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 70.9 FT/ 5-27-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeardley

ASI FORM 0157 REV 10)

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II FIELD ENG./GEO. B. Yeardley DATE 6/[illegible]/3
PROJECT NO. WBA-40 CHECKED BY DATE
BORING NO. 2436
PIEZOMETER NO. 2436 DATE OF INSTALLATION 5-25-93 to 6-2-93

BOREHOLE DRILLING

DRILLING METHOD	TYPE OF BIT Percussion Hammer Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 ft TO 71.0 ft.	SIZE $10^{3/4}$ OD FROM 0.0 ft TO 80.0 ft.
FLUID — NA FROM — NA TO — NA	SIZE — NA FROM — NA TO — NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless
DIAMETER OF PERFORATED SECTION 4.0 in I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 6-10 ft, 1-5 ft, 1-2 ft
AVERAGE SIZE OF PERFORATIONS 0.020	JOINING METHOD Screw type - flush joint
TOTAL PERFORATED AREA 15.0 ft	threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Hinged locking
PROTECTIVE PIPE O.D. 10 3/4 in	cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.4			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.1			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT / ~~SLURRY~~ NG 7-28-93	TOP 1.0	BOTTOM 54.0	TOP	BOTTOM
BENTONITE	TOP 54.0	BOTTOM 59.0	TOP	BOTTOM
SAND ~~NONE~~ NG 7-28-93	TOP ~~NA~~ 59.0 NG 7-28-93	BOTTOM ~~NA~~ 65.0 NG 7-28-93	TOP	BOTTOM
GRAVEL	TOP ~~59.0~~ NG 7-28-93 NA	BOTTOM ~~65.0~~ NG 7-28-93 NA	TOP	BOTTOM
PERFORATED SECTION	TOP 65.0	BOTTOM 80.0	TOP	BOTTOM
PIEZOMETER TIP	82.0			
BOTTOM OF BOREHOLE	82.0			
GWL AFTER INSTALLATION	70.9			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

MW 2436

Customer Number 10754

MATERIAL: RCRA Phase II 35 Well SAMPLE NUMBER: 930527-024

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 183.48

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	55.55	30.28	30.28	78.7
20	25.96	14.15	44.43	33.5
40	46.32	25.24	69.67	16.7
60	35.43	19.31	88.98	9.8
100	6.98	3.80	92.78	5.9
200	6.43	3.50	96.28	3.0
Pan	6.32	3.44	99.72	

$\frac{W_2 \times 100\%}{W_1} = R$

$\left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$

Analyzed by: Tom McCullough

Checked by: [signature]

Date analyzed: 052793-002 5-27-93

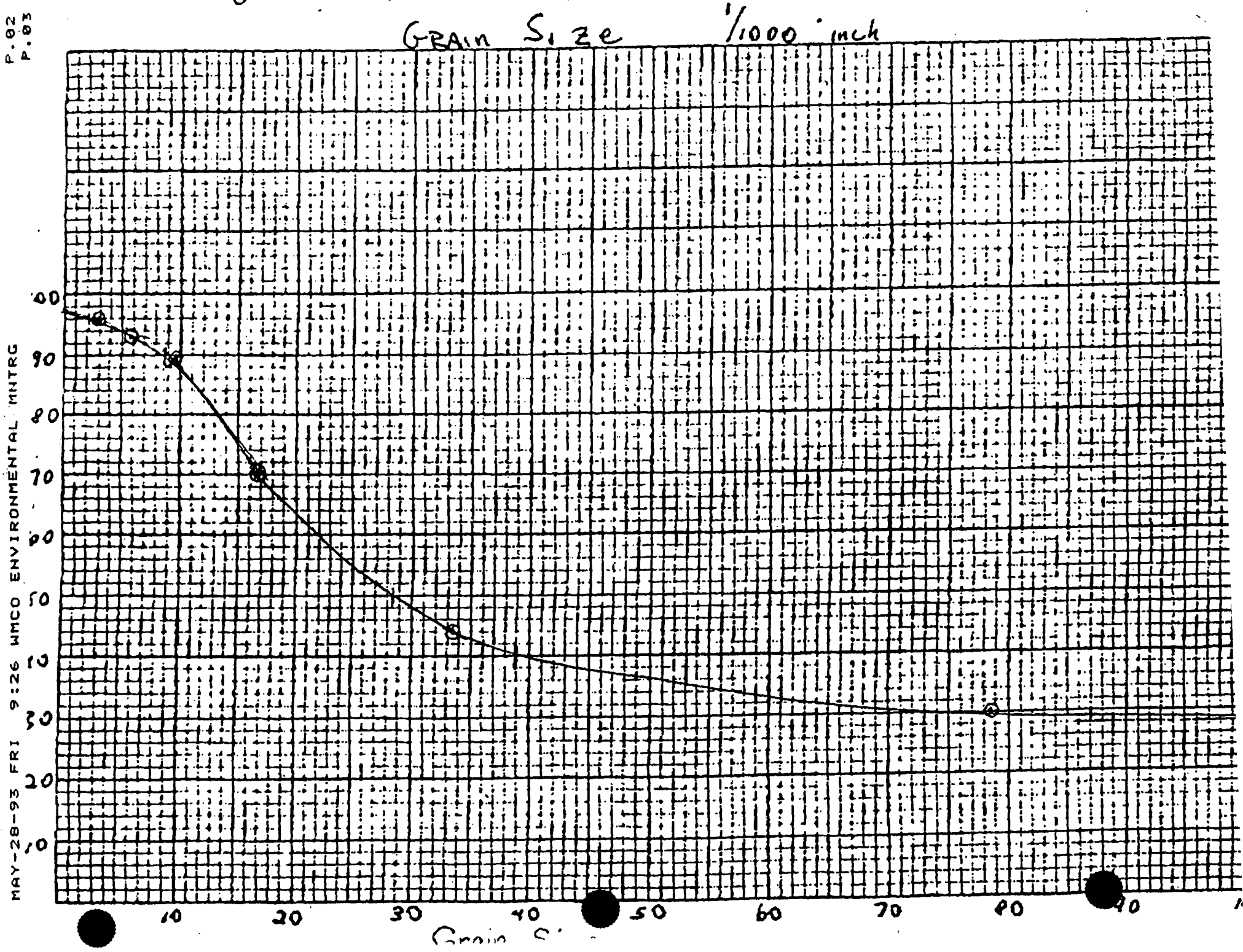
GRAIN SIZE 40% RETAINED 39 .001 inch

50% 28

90% 9

EUGENE DIETZGEN CO. No. 10457 EUGENE DIETZGEN CO MADE IN U.S.A.

5-27-93



000441

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/8/93	
ELEVATION:	GWL: Depth 72 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS Cable Tool		PAGE 1 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1350 101400 2/8/93	3 5 7	3	Stiff 10YR(3/2) V. Dark grayish brown silty clay with organics dry. no plasticity	CI	1.5	HNu= 0 ppm BG= 20 cpm
2 3	1352 101401 2/8/93	4 8 10	12	Stiff 10YR(5/8) Yellowish brown silty clay with organics, dry no plasticity	CI	1.5	HNu= 0 ppm BG= 10 cpm
4	1355 101402 2/8/93	4 4 4	15	SAA	CI	2.0	HNu= 0 ppm BG= 10 cpm
5 6	1355 101403 2/8/93	4 3 5	10	SAA	CI	1.5	HNu= 0 ppm BG= 10 cpm
7	1400 2/8/93	2 5 6	0	No Recovery	NA	NA	HNu= NA BG= NA
8 7	1405 101404 2/8/93	11 12 16	15	Stiff 10YR(6/6) Brownish yellow clay, trace gravel, moist no odor.	CI	1.0	HNu= 0 ppm BG= 10 cpm
10	1405 2/8/93	2 4 10	0	No Recovery	NA	NA	HNu= NA BG= NA
11 12	1410 101405 2/8/93 1420	4 6 8	6	Med. Dense 10YR(6/6) Brownish yellow clayey med. to coarse sand w/gravel moist. pool. odors	SP	NA	HNu= 0 ppm BG= 10 cpm
13	101406 2/8/93 1430	7 9 11	12	Med Dense 2.5Y(5/3) Light olive brown sand poorly graded with trace gravel, moist	SP	NA	HNu= 0 ppm BG= 10 cpm
14	101407 2/8/93	7 8 12	16	SAA	SP	NA	HNu= 0 ppm BG= 20 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: ~~Craig Coulter~~ ~~Kevin Myers~~

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/8/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 2/8/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS Cable Tool		PAGE 2 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1615 10H03 2/8/93	4 5 4	6	Loose 2.5Y(6/6) Light olive brown, very fine sand, poorly graded, slightly moist. V. stiff 2.5Y(5/1) Gray, sandy clay, slightly moist	SP CL	NA 2.5	HNu= 0 ppm BG= 40 cpm
17 18	1625 10H09 2/8/93	3 5 7	13	V. stiff 2.5Y(5/1) Gray clay w/ trace sand, gravel, non plast. moist	CL	2.25	HNu= 0 ppm BG= 40 cpm
19	1635 10H10 2/8/93	5 8 12	10	Stiff 2.5Y(5/1) Gray clay w/ gravel, low plasticity, moist	CL	1.75	HNu= 0 ppm BG= 40 cpm
20 21	1640 10H11 2/8/93	12 15 20	12	SAA, v stiff	CL	2.25	HNu= 0 ppm BG= 40 cpm
22	0945 10H12 2/9/93	4 12 14	11	SAA	CL	2.25	HNu= 0 ppm BG= 40 cpm
23 24	0910 10H13 2/9/93	5 7 12	12	SAA	CL	2.25	HNu= 0 ppm BG= 40 cpm
25	0915 10H14 2/9/93	5 6 12	7	SAA, stiff	CL	1.75	HNu= 0 ppm BG= 40 cpm
26 27	0925 10H15 2/9/93	7 8 12	10	SAA, v stiff	CL	2.75	HNu= 0 ppm BG= 40 cpm
28	0935 10H16 2/9/93	7 8 12	11	SAA	CL	2.25	HNu= 0 ppm BG= 20 cpm
29	0945 10H17 2/9/93	5 8 11	12	SAA	CL	2.5	HNu= 0 ppm BG= 40 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: ~~Craig Coulter~~ ~~Kevin Myers~~

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4436	COORDINATES:	DATE 2/9/93
ELEVATION:	GWL: Depth 7.26 ft Date/Time 3/9/93 1700	DATE STARTED: 2/8/93
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93
DRILLING METHODS Cable Tool		PAGE 3 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1105 10/4/15 2/9/93	12 12 12	8	Stiff. 2.5Y(5/1) Gray clay w/ gravel, low plasticity, moist.	CL	1.75	HNu=0ppm BG=40cpm
32	1115 10/4/19 2/9/93	6 7 12	9	SAA	CL	2.0	HNu=0ppm BG=20cpm
33	1425 10/4/25 2/9/93	4 5 12	16	SAA, v. stiff	CL	3.5	HNu=0ppm BG=40cpm
35	1435 10/4/21 2/9/93	17 22 36	12	SAA, hard	CL	4.5	HNu=0ppm BG=40cpm
36	1445 10/4/22 2/9/93	8 19 21	4	SAA, v. stiff	CL	2.5	HNu=0ppm BG=40cpm
38	1630 10/4/23 2/9/93	43 9 9	4	SAA	CL	2.5	HNu=0ppm BG=10cpm
39	1650 10/4/24 2/9/93	9 9 14	16	SAA, hard	CL	4.5	HNu=0ppm BG=40cpm
41	1705 10/4/25 2/9/93	7 7 9	11	SAA, v. stiff	CL	2.5	HNu=0ppm BG=20cpm
42	1715 10/4/26 2/9/93	7 36 43	15	v. stiff 2.5Y(5/1) Gray clay w/ gravel grading into fine sand, poorly graded, dry. Sand lenses. Begin sampling every 5ft	CL	2.5	HNu=0ppm BG=40cpm
44							HNu= BG=

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: ~~Craig Coulter~~ ~~Kevin Myers~~

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/10/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 4 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
50							
51	0920 1074 27 2/10/93	12 14 50/3	9	V. Dense 2.5Y(5/1) Gray fine sand w/limestone pieces, poorly graded, dry.	SP	NA	HNu= 0ppm BG= 40cpm
52							
53							
54							
55	1020 1074 28 2/10/93	17 49 50/2	3	V. Dense 2.5Y(5/1) Gray med sand with gravel, poorly graded dry	SP	NA	HNu= 0ppm BG= 40cpm
56							
57							
58							
59							
60	1120 1074 29 2/10/93	19 31 49	11	SAA	SP	NA	HNu= 0ppm BG= 40cpm
61							
62							
63							
64							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller DS: ~~Craig Coulter~~ DS: Samples collected per ASTM standard penetration test.

DS: ~~Kevin Myers~~ DS: Soil colors identified with Munsell color chart.

SAA - same as above

NA - not applicable

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4436	COORDINATES:	DATE 2/10/93
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93
DRILLING METHODS: Cable Tool		PAGE 3 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
66.5	1440 101430 2/10/93	21 50/2	8	V. Dense. 2.5Y(5/1) Gray coarse sand & gravel, moist, well graded	SW	NA	HNu= 0ppm BG= 60cpm
70	1515 101431 2/10/93	13 23 30	13	V. Dense. 2.5Y(5/1) Gray coarse sand & gravel, well graded, dry	SW	NA	HNu= 0ppm BG= 40cpm
71.5		2/10/93		▽ WATER TABLE 72.6 ft			
75	1635 101432	3 3 10	3	SAA. wet	SW	NA	HNu= 0ppm BG= 40cpm
76.5	2/10/93						

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller ~~Craig Coulter~~ 2/10/93 ~~Kevin Myers~~ Samples collected per ASTM standard penetration test. Colors identified with Munsell color chart.

SAA - same as above

NA - not applicable

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/10/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 11 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
81.5	1710 107433 2/10/93	12 12 14	16	Mod. Dense 2.5Y(5/1) Gray coarse sand, well graded, wet	SW	NA	HNu= 0ppm BG= 60cpm
85							
86.5	1430 107435 2/11/93	18 22 30	18	V. Dense 2.5Y(5/1) coarse gravel w/ sand, well graded, wet DSO 2/11/93	GW	NA	HNu= 0ppm BG= 40cpm
90							
91.5	1500 107436 2/11/93	8 13 15	18	Mod. Dense 2.5Y(5/1) coarse sand with gravel, poorly graded, wet	SP	NA	HNu= 0ppm BG= 40cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: DSO ~~Craig Coulter~~ J. Saccani 3/4/93 ~~Kevin Myers~~ D. Jamison

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/11/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 7 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
96.5	1640 / D7437 / 2/11/93	21 / 18 / 14	18	Dens: 2.5Y (5/1) Gray coarse gravel w/ sand, well graded, wet. Bottom 5" fine sand poorly graded	GW / SP	NA	HNu= 0 ppm BG= 60 cpm
100	1700 / D7438 / 2/11/93	10 / 12 / 14	18	Med. Dens: 2.5Y (5/1) Gray, coarse sand w/ gravel, poorly graded wet	SP	DSO 2/11/93 NA NA	HNu=0 ppm BG= 60 cpm
105 / 106.5	1413 / D7439 / 2/11/93	31 / 34 / 39	18	V. Dens: 2.5Y (5/1) Gray fine to med. sand, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 60 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: DSO ~~Craig Coulter~~ J Saccani

2/11/93 ~~Kevin Myers~~ D Samson

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/17/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/10/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 8 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
111.5	0935 107441 2/17/93	27 34 39	18	V. Dense 2.5Y (5/1) Gray med to coarse sand w/gravel, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 40 cpm
116.5	0935 107442 2/22/93	50 50/2	DSO 2/22/93 ~~10~~ 7	V. Dense 2.5Y (5/1) Gray coarse sand & gravel, well graded, wet.	SW	NA	HNu= 0 ppm BG= 60 cpm
121.5	1010 107443 2/22/93	9 11 12	DSO 2/22/93 9 11 12	SAA	SW	NA	HNu= 0 ppm BG= 40 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: ~~Craig Coulter~~ J. Sarconi, ~~Kevin Myers~~ D. Jamison

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell Color Chart.

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/22/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 9 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
126.5	1120 107444 2/22/93	7 14 21	18	Dense. 2.5Y(5/1) Gray fine to med sand w/ gravel, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 10 cpm
130	1320 2/22/93	10 10 10	0	No Recovery	NA	NA	HNu= NA BG= NA
135	1715 107447 2/22/93	14 21 24	18	Dense. 2.5Y(5/1) Gray med to coarse sand with gravel, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 10 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller ~~Craig Coulter~~ D. Samson 3/1/93 ~~Kevin Myers~~ D. Samson

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/23/93	
ELEVATION:	GWL: Depth 12.6 ft Date/Time 2/10/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 10 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
141.5	0845 10 1014B 2/23/93	10 10 21	15	Olive (2.5Y (5/1)) Gray, fine sand, poorly graded, wet	SP	NA	HNu= 0ppm BG= 40cpm
146	1100 10144 2/23/93	4 6 14	15	DSO 2/23/93 Olive (2.5Y (5/3)) with blue tints, clay, medium plasticity, moist	CI	2.0	HNu= 0ppm BG= 60cpm
151.5	1135 10145C 2/23/93	14 16 21	18	SAA	CI	2.5	HNu= 0ppm BG= 40cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: DSO 2/23/93 ~~Craig Coulter~~ S. Soccon, ~~Kevin Myers~~ D. Jamison

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.28	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/23/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 11 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	REC(VERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
156.5	1430 107431 2/23/93	14 32 43	10	V. Dense. 2.5Y(5/1) Gray Silt & fine sand, wet.	ml	NA	HNu= 0 ppm BG= 40 cpm
160							
161.5	1730 107433 2/23/93	52 37 21	10	V. Dense. 2.5Y(5/1) Gray mud to coarse sand & gravel, well graded, wet	SW	NA	HNu= 0 ppm BG= 40 cpm
165							
166.5	1100 107434 2/24/93	24 12 3	9 12	SAA	SW	NA	HNu= 0 ppm BG= 40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: ~~Craig Coulter~~ S. Succari ~~2/23/93 Kevin Myers~~ D. Samson

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		DATE 2/24/93
BORING NUMBER: 4436	COORDINATES:		DATE STARTED: 2/8/93
ELEVATION:	GWL: Depth 7.26 ft Date/Time 3/9/93 1400		DATE COMPLETED: 3/9/93
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 12 OF 17
DRILLING METHODS: Cable Tool			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
171.5	1135 1074[illegible] 2/24/93	5 13 32	18	V. Dense. 2.5Y(5/1) Gray, fine to med sand, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 60 cpm
175	1465 1074[illegible] 2/24/93	7 11 18	18	SAA	SP	NA	HNu= 0 ppm BG= 60 cpm
176.5				Begin continuous sampling			
							HNu= BG=

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller ~~Craig Coulter~~ J. Saccani ~~Kevin Myers~~ D. Jamison

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

SAA - same as above

NA - not applicable

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4436	COORDINATES:	DATE 2/24/93
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93
ENGINEER/GEOLOGIST D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93
DRILLING METHODS Cable Tool		PAGE 13 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
177 178	1430 107457 2/24/93	7 11 14	18	Med. Dense. 2.5Y(5/1) Gray medium sand, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 40 cpm
178 179	1435 107458 2/24/93	19 36 67	18	V. Dense. 2.5Y(5/1) Gray medium to coarse sand, well graded, wet	SW	NA	HNu= 0 ppm BG= 60 cpm
180 181	1605 107459 2/24/93	23 30 49	18	SAA	SW	NA	HNu= 0 ppm BG= 60 cpm
182	1650 107460 2/24/93	12 12 12	14	SAA	SW	NA	HNu= 0 ppm BG= 80 cpm
183	NP	NA	0	No Recovery	NA	NA	HNu= NA BG= NA Missed sample
184 185	0930 107462 2/25/93	11 18 47	18	V. Dense. 2.5Y(5/1) Gray fine sand poorly graded, wet	SP	NA	HNu= 0 ppm BG= 40 cpm
186 187	1010 107463 2/25/93	8 16 32	18	Dense 2.5Y(5/1) Gray coarse sand poorly graded, w/ a silt lense, wet	SP	NA	HNu= 0 ppm BG= 40 cpm
188	NP	NA	0	No Recovery	NA	NA	HNu= BG= Missed sample
		~~30~~ DSO 2/25/93		Resume 5ft. sampling			HNu= BG=
							HNu= BG=

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: DSO 3/24/93 ~~Craig Coulter~~ S. Sarcon ~~Kevin Myers~~ D. Jamison

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/25/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 14 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
191.5	1405 107464 2/25/93	30 84/1	DSO 2/25/93 18 +27	V. Dense. 2.5Y(5/1) Gray med to coarse sand, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 40cpm
195	0945 107465 2/26/93	16 34 50/2	12	V. Dense. 2.5Y(5/1) Gray fine sand with silt, poorly graded, wet.	SP	NA	HNu= 0 ppm BG= 60cpm
200	1030 107466 2/26/93	11 12 16	18	Med. Dense. 2.5Y(5/1) Gray medium to coarse sand, poorly graded, wet	SP	NA	HNu= 0 ppm BG= 40cpm
201.5							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller DSO ~~Craig Coulter~~ J. Saccani ~~Kevin Myers~~ D. Jamison

SAA - same as above

NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified with Munsell color chart.

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28	PROJECT NAME. RCRA Phase II		
BORING NUMBER: 4436	COORDINATES:	DATE 2/26/93	
ELEVATION:	GWL: Depth 72.6 ft Date/Time 3/9/93 1400	DATE STARTED: 2/8/93	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/9/93	
DRILLING METHODS: Cable Tool		PAGE 15 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
202	1125	15					
	107467	27	10	V. Dense. 2.5Y(5/1) Gray coarse to fine sand, well graded, wet. Piece of sandstone at bottom of spoon	SW	NA	HNu= 0 ppm BG= 40 cpm
203.5	2/26/93	98					
	1420						
	107468	100/3	2	2.5Y(4/4) Olive shale with sandstone & limestone fragments	NA	NA	HNu= 0 ppm BG= 40 cpm
205	2/26/93						
				Boring terminated at 205.0 ft			Sieve Analysis Sample # 107469
							HNu= BG=
							HNu= BG=

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller ~~Craig Coulter~~ S. Soccani ~~Kevin Myers~~ D. Samson

Samples collected per ASTM standard penetration test.

Colors identified with Munsell Color Chart.

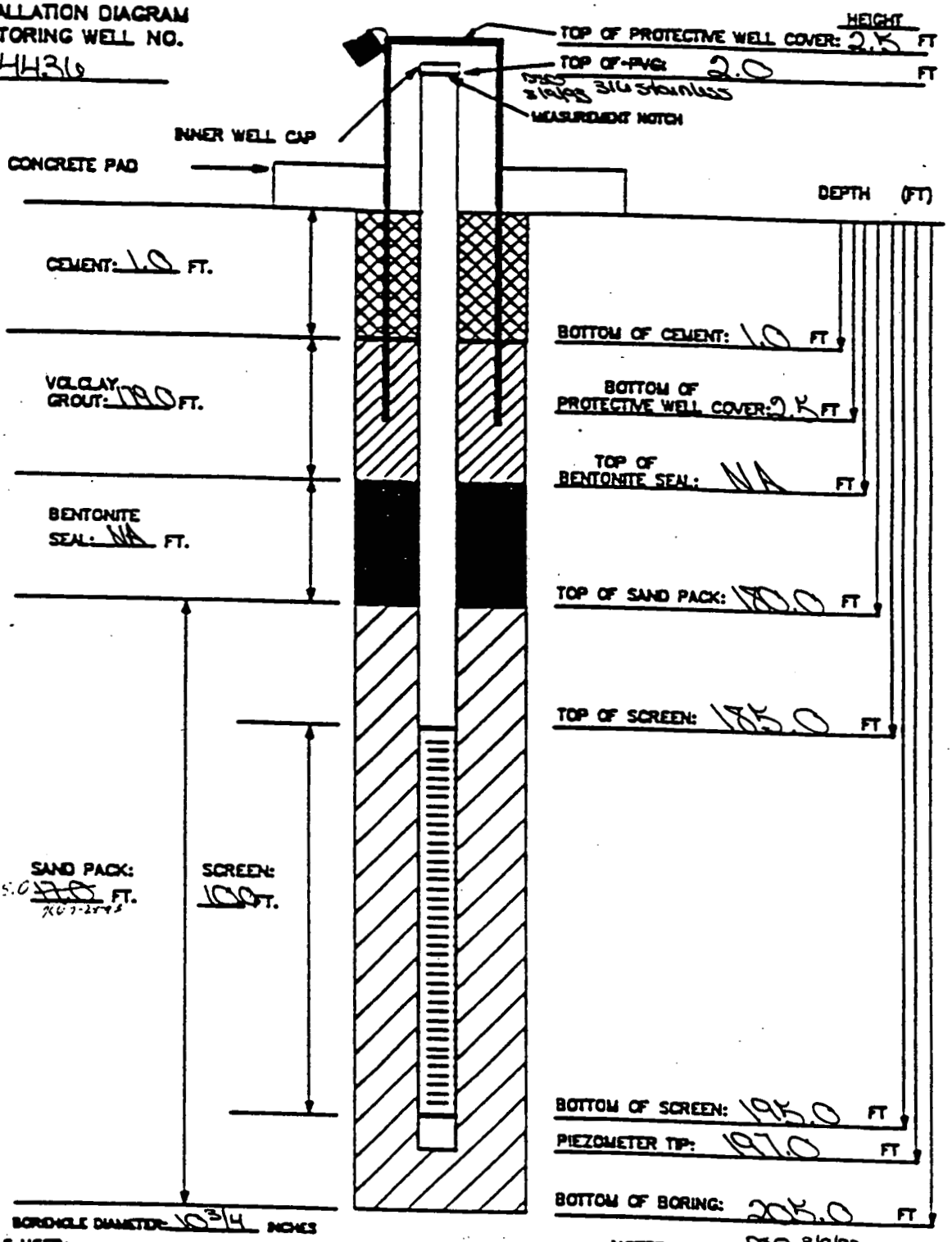
SAA - same as above

NA - not applicable

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 4436

INSTALLATION DATE: 3/9/93



MATERIALS USED:

SAND TYPE AND QUANTITY: 10/20 sand, 29 bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 132 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1350 gallons
OTHER: 1-10 ft 0.010 in 316 screen w/2 ft sump
18-10 ft sections
1-8 ft section
33 sections

NOTES: DSO 3/9/93

1) RISER PIPE IS 4-INCH SCHEDULE-40 316 stainless steel PVC PIPE, FLUSH-THREADED JOINTS. DSO 3/9/93
2) SCREEN IS 4-INCH I.D. SCHEDULE-40 316 st. steel PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 72.6 ft 3/9/93

TASK: 602.04.28

GEOLOGIST/ENGINEER: D. O'Brien

RI/FS

1104 17

PIEZOMETER INSTALLATION SHEET

5711

PROJECT NAME RCRA phase 2 FIELD ENG./GEO. D. O'Brien DATE 3/9
PROJECT NO. 602.04.28 CHECKED BY _____ DATE ____
BORING NO. 44316
PIEZOMETER NO. 44316 DATE OF INSTALLATION 3/9/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 ft TO 75.0 ft
FLUID — FROM — TO —

TYPE OF BIT Churn Bit
CASING SIZE (S) USED:
SIZE 10 in FROM 0.0 TO 205.0
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 stainless st
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 18-10 ft, 1-5 ft, 1-
JOINING METHOD flush joint threa

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION hinged locking cov with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 180.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP 180.0	BOTTOM 197.0	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 185.0	BOTTOM 195.0	TOP	BOTTOM
BOTTOM OF BOREHOLE	197.0			
GWL AFTER INSTALLATION	205.0			
	72.6			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS _____

Customer Number: 107469

MATERIAL: _____ SAMPLE NUMBER: 930226-084

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 200.3108

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	12.52	6.25	6.25	78.7
20	28.07	14.01	20.26	33.5
40	54.90	~~27.53~~ 27.4 JLR	~~47.79~~ 66	16.7
60	58.60	29.25	~~77.04~~ 76.91	9.8
100	23.48	11.72	~~88.76~~ 88.63	5.9
200	11.16	5.57	~~94.33~~ 94.2	3.0
Pan	10.68	5.33	~~99.66~~ 99.53	
	199.4	99.66		

$\frac{W_2 \times 100\%}{W_1} = R$

$\left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$

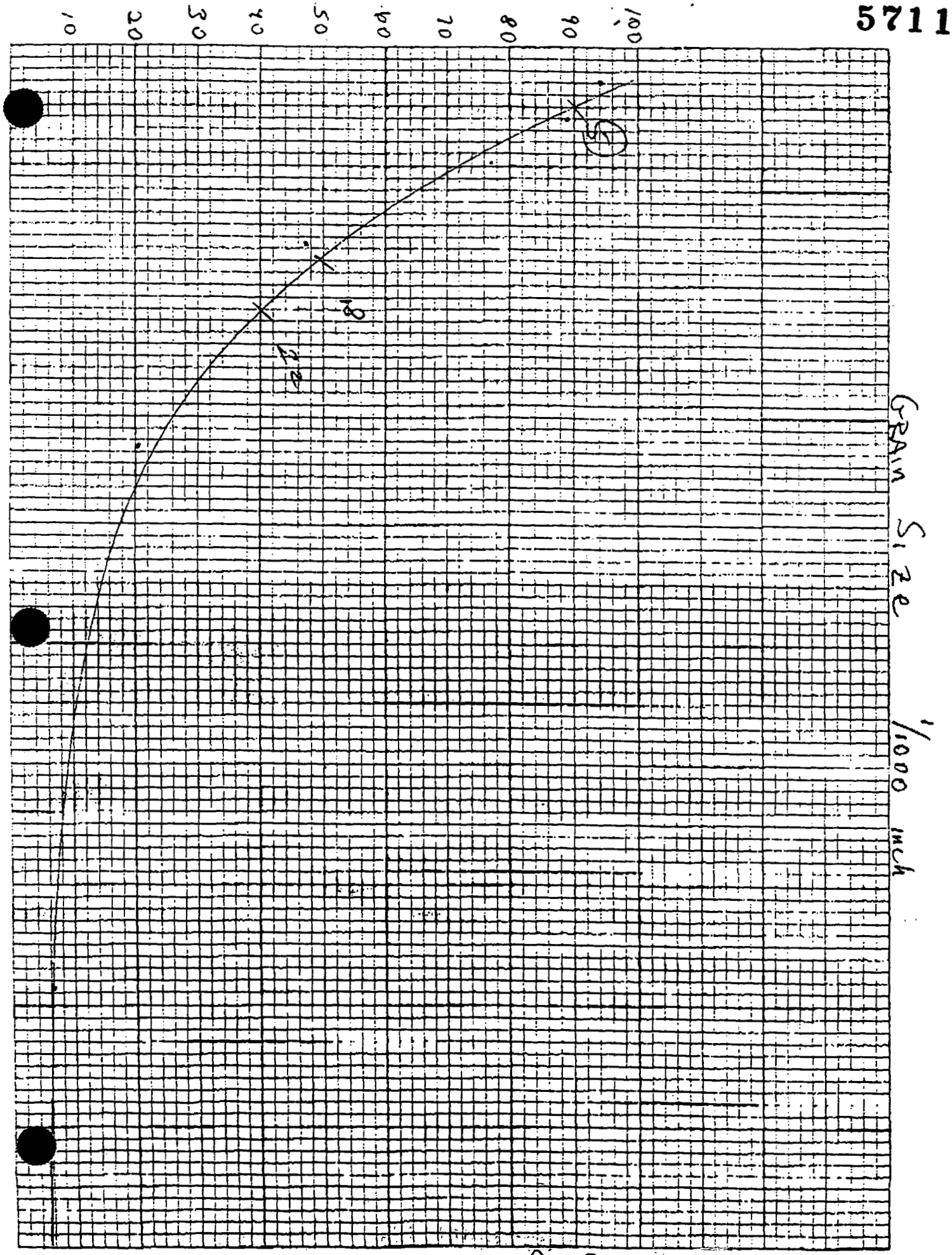
Analyzed by: Thomas McCullough | Checked by: J Roberts | Date analyzed: 3-1-93

Grain Size Retained

40 %	22
50 %	18
90 %	5

4436

5711


10
20
30
40
50
60
70
80
90
100
GRAIN SIZE
1/1000 INCH
NO. 340 10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH
EUGENE DIETZGEN CO.
MADE IN U. S. A.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 (WBA40)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 2439	COORDINATES:	DATE: 3-5-93	
ELEVATION:	GWL: Depth 70.3 ft. Date/Time 3-18-93/0900	DATE STARTED: 3-5-93	
ENGINEER/GEOLOGIST: M. Worley	Depth Date/Time	DATE COMPLETED: 3-16-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				* For soil description from 0.0 ft. to 65.0 ft. see boring 4439			
10							
20							
30							
40							
50							
60							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 42 Cylone
Driller : Craig Coulter
Helper : Kevin Myers

SAA = Same As Above
N/A = Not Applicable

Background = HNU = 0 ppm
Br = 40 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.09.28 (WBA 40)	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 2439	COORDINATES:	DATE: 3-9-93
ELEVATION:	GWL: Depth 70.3 FT. Date/Time 3-18-93/0900	DATE STARTED: 3-5-93
ENGINEER/GEOLOGIST: M. Worley	Depth Date/Time	DATE COMPLETED: 3-16-93
DRILLING METHODS: Cable Tool		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61				* well screen sieve analysis will start at 65.0 FT. and continue through 80.0 FT.			
62							
63							
64							
65							
66	1000 107173 3-9-93	30 50/.4	6	Very dense (2.5Y, 4/4) olive brown well graded gravel, trace sand, moist	GW	N/A	HNU= 0 ppm Bγ= 40 cpm
67	1030 107174 3-9-93	50/.4	3	SAA	GW	N/A	HNU= 0 ppm Bγ= 40 cpm
68	1050 107175 3-9-93	50/.3	3	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	HNU= 0 ppm Bγ= 40 cpm
69	1115 107176 3-9-93	20 38 22	15	SAA	SW	N/A	HNU= 0 ppm Bγ= 40 cpm
70	1330 107177 3-9-93	45 60 75	14	SAA	SW	N/A	HNU= 0 ppm Bγ= 40 cpm
71	1340 107178 3-9-93	22 45 48	16	SAA	SW	N/A	HNU= 0 ppm Bγ= 40 cpm
72	1355 107179 3-9-93	21 50/.4	9	Very dense (2.5Y, 4/4) olive brown well graded sand, trace gravel, wet	SW	N/A	HNU= 0 ppm Bγ= 40 cpm
73							
74							
75							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 42 Cyclone
Driller: Craig Coulter
Helper: Kevin Myers

SAA = Same As Above
N/A = Not Applicable

Background = HNU = 0 ppm
Bγ = 40 cpm

• Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 (WBA40)	PROJECT NAME: RCRA Phase II		
BORING NUMBER: 2439	COORDINATES:	DATE: 3-9-93	
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-18-93/0900	DATE STARTED: 3-5-93	
ENGINEER/GEOLOGIST: M. Worley	Depth Date/Time	DATE COMPLETED: 3-16-93	
DRILLING METHODS: Cable Tool		PAGE 3 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75				See Page 2			
76	1410 107180 3-9-93	26 47 56	10	Very dense (2.5Y, 4/4) olive brown poorly graded sand, trace gravel, wet	SP	N/A	HNu = 0 ppm Bγ = 40 cpm
77							
78	1500 107181 3-9-93	11 17 23	18	dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	HNu = 0 ppm Bγ = 40 cpm
79	1510 107182 3-9-93	9 17 24	18	SAA	SW	N/A	HNu = 0 ppm Bγ = 40 cpm
80							
81				* Bottom of sampling at 80.0 FT.		*	Sieve analysis composite sample # 107183 taken from 65.0 - 80.0 Ft
82							
83							
84							
85				*Bottom of boring at 85.0 FT.			

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cyclone
Driller : Craig Coulter
Helper : Kevin Myers

SAA = Same As Above
N/A = Not Applicable

Background = HNU = 0 ppm, Bγ = 50 cpm

• Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

RI/FS

PIEZOMETER INSTALLATION SHEET

5711

PROJECT NAME RCRA Phase II FIELD ENG./GEO. M. Worley DATE 3-18-
PROJECT NO. 602.04.28 (WBA40) CHECKED BY DATE
BORING NO. 2439
PIEZOMETER NO. 2439 DATE OF INSTALLATION 3-16-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT TO 75.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 8.0 in I.D. FROM 0.0 FT TO 85.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in.
TOTAL PERFORATED AREA 15.0 FT.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 2-2 FT, 1-5 FT, 6-10F
JOINING METHOD Screw type - flush joint threaded.

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock.

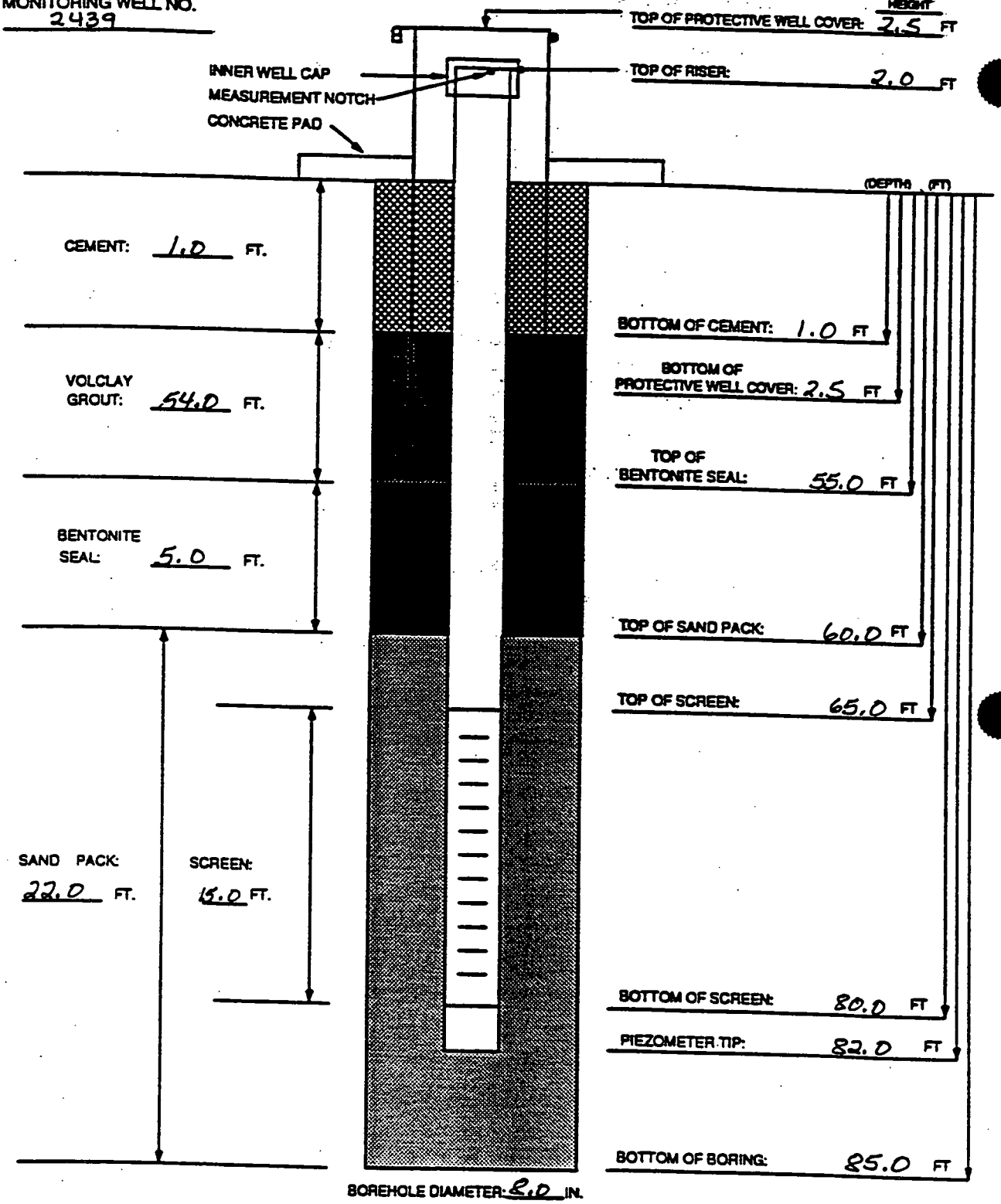
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
VOLCLAY GROUT / ~~SLURRY~~ CEMENT M.W. 3-18-93	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 55.0	TOP	BOTTOM
BENTONITE	TOP 55.0	BOTTOM 60.0	TOP	BOTTOM
SAND	TOP 60.0	BOTTOM 82.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 65.0	BOTTOM 80.0	TOP	BOTTOM
PIEZOMETER TIP	82.0			
BOTTOM OF BOREHOLE	85.0			
GWL AFTER INSTALLATION	70.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement placed 0.0 FT. to 1.0 FT. to hold protective cover in place.

409-11

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2439

INSTALLATION DATE: 3-16-93



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 430, 15 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: 9 - 50 lbs.
AMOUNT OF CEMENT: 1 - 80 lb.
AMOUNT OF WATER USED: 800 gallon
OTHER: 8 - Soil drums
TASK: 602.04.28 (WBA 40)

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 70.3 FT/ 3-1
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Michael Worley

ASI FORM 0157 REV. (0)

mW-2439

5711

Customer Number: 107183

MATERIAL: _____ SAMPLE NUMBER: 930310-034

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 283.1116

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	127.2965	44.96	45.0	78.7
20	48.4525	17.11	62.1	33.5
40	38.5783	13.63	75.7	16.7
60	26.3024	9.28	85.0	9.3
100	14.8429	5.24	90.2	5.9
200	10.5849	3.74	94.0	3.0
Pan	16.2303	5.73	99.7	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

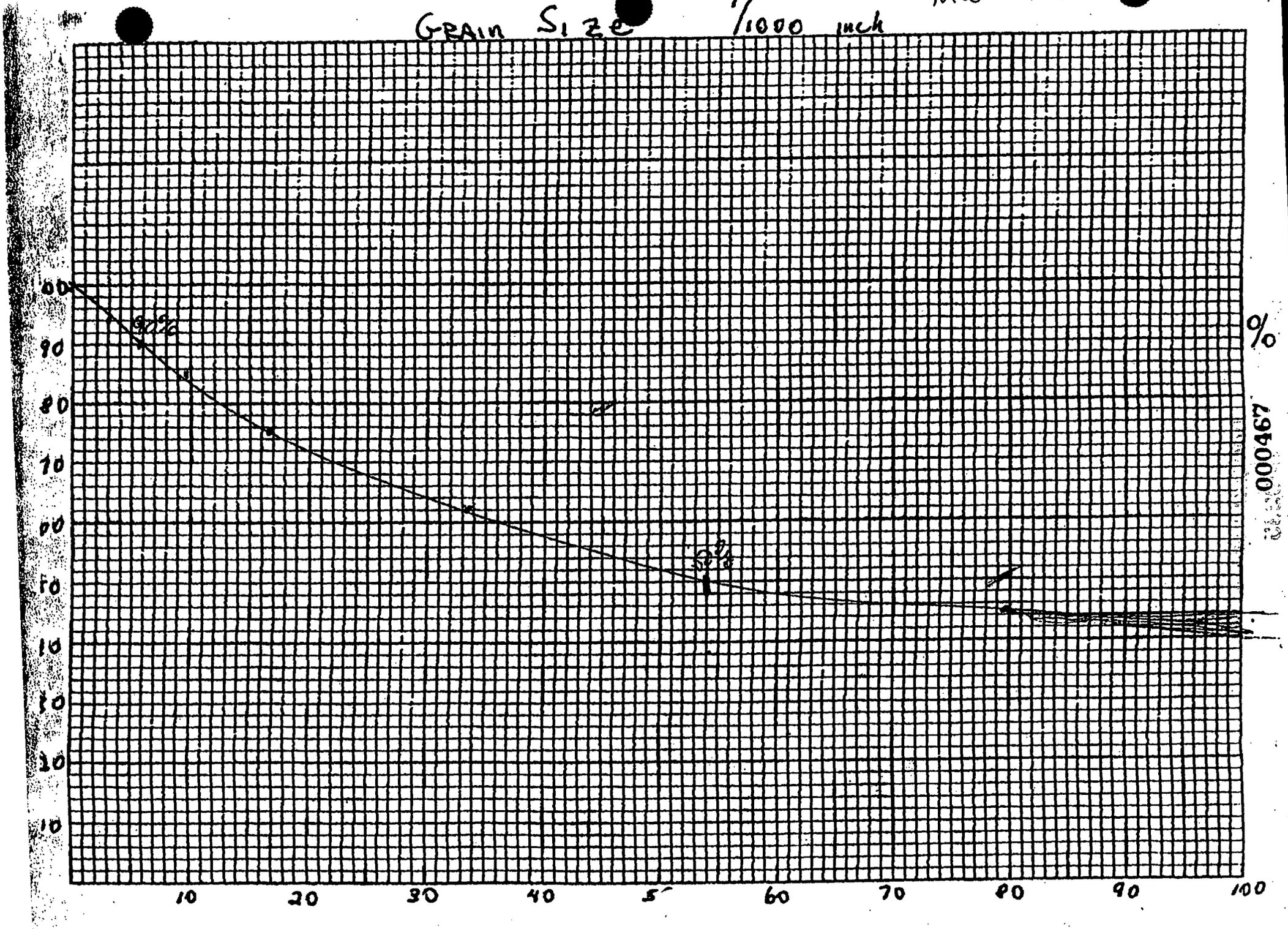
Analyzed by:	Checked by:	Date analyzed:
T McCullough	J Robert	3-12-93

Grain Size Retained

40 %	>100
50 %	54
90 %	6

P.01

MW-2439



000467

well 2439

Sieve Analysis 3/12/93

Sample #107183

5711

Retained values

40% = .100

50% = .054

90% = .006

$\frac{.100}{.006} = 16.6$ 16.6 > 3 use a factor of 4

4 X .054 = .216

.216 most closely fits the coarse grain sand and the .020 screen size

HLFS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 1-29-93
VATION:	GWL: Depth 70.3 FT Date/Time 3-2-93 1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1000 107101 1-29-93	4 5 8	12	Medium stiff (10YR, 4/4) dark yellowish brown silty clay, low plasticity, slightly moist	CL	1.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
2 3	1010 107102 1-29-93	26 9 9	12	medium stiff (2.5Y, 5/4) light olive brown silty clay, trace small gravel, low plasticity, dry	CL	1.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
4	1020 107103 1-29-93	10 15 14	12	Very stiff (2.5Y, 5/6) SAA slightly moist.	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
5 6	1030 107104 1-29-93	8 13 17	18	Very stiff (2.5Y, 5/6) Gray mottled light olive brown clay, trace coarse gravel, medium plasticity slightly moist.	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
	1040 107105 1-29-93	26 37 35	18	Hard SAA, trace large angular limestone cobbles, slightly moist	CL	>4.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
8 9	1315 107106 1-29-93	17 18 31	12	Very stiff (2.5Y, 5/6) Gray mottled light olive brown clay, trace small gravel, medium plasticity, slightly moist.	CL	4.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
0	1325 107107 1-29-93	50/.8	6	Hard (2.5Y, 5/5) SAA	CL	4.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
1 2	1340 107108 1-29-93	7 12 15	14	Hard (2.5Y, 4/4) olivebrown clay, trace small gravel, medium plasticity, slightly moist	CL	4.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
3	1355 107109 1-29-93	7 16 21	12	Hard (2.5Y, 4/2) dark grayish brown clay, trace small gravel, medium plasticity, slightly moist.	CL	4.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
4 5	1405 107110 1-29-93	9 17 21	18	Stiff (2.5Y, N4/) dark gray clay, trace gravel, high plasticity, moist	CL	1.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm

TES:

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

ing Contractor Pennsylvania Drilling

ing Equipment 72 Speedstar

er: Joe Barile
Craig Coulter

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

amples Collected per ASTM Standard Penetration Test
ll colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 1-29-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1415 107111 1-29-93	3 8 7	4	medium stiff (2.5Y, N4/) dark gray clay, trace large cobbles, high plasticity, moist	CL	1.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
17 18	1555 107112 1-29-93	9 5 10	6	SAA, trace small gravel, high plasticity, moist	CL	1.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
19	1615 107113 1-29-93	14 7 13	14	SAA	CL	1.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
20 21	1620 107114 1-29-93	5 9 10	12	MW 2-2-93 ~~SAA,~~ Very stiff, SAA	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
[illegible]	1630 107115 1-29-93	8 10 15	16	SAA	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
23 24	1640 107116 1-29-93	5 8 9	14	Stiff, SAA	CL	2.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
25	1645 107117 1-29-93	8 8 14	16	Medium stiff, SAA	CL	1.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
6 7	1655 107118 1-29-93	3 11 17	14	Very stiff, SAA	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
8	1705 107119 1-29-93	11 13 15	12	SAA	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
9 0	1715 107120 1-29-93	4 17 21	15	SAA, trace medium gravel, medium plasticity, slightly moist	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Logged by Joe Barile

Craig Coulter

Samples Collected per ASTM Standard Penetration Test

All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-2-93
ELEVATION:	GWL: Depth 70.3 FT. Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1000 107121 2-2-93	5 7 11	4	Very stiff (2.5Y, N4/) dark gray clay, trace gravel, trace organics (wood), medium plasticity, slightly moist.	CL	2.5	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
32 33	1005 107122 2-2-93	15 22 22	18	Very stiff (2.5Y, N4/) dark gray silty clay, trace gravel, low plasticity, dry	CL	3.0	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
34	1015 107123 2-2-93	13 30 50	14	Very dense (2.5Y, N5/) gray poorly graded fine sandy dry	SP	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
35 36 37 38 39 40				* Samples will be taken at 5 Foot intervals from 40.0 feet until screened interval for well is encountered.			
41	1115 107124 2-2-93	9 10 40	15	Very dense (2.5Y, 5/6) light olive brown, well graded sand, trace coarse gravel, dry	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
42 43 44 45							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile Kevin Myers Craig Coulter

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-2-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	1400 107125 2-2-93	5 12 19	8	Dense (2.5Y, 4/3) olive brown well graded sand, trace small gravel, dry	SW	N/A	HNU = 0 ppm β γ = 60 cpm α = 0 cpm
47							
48							
49							
50	1420 107126 2-2-93	10 16 30	18	Dense (2.5Y, 4/3) olive brown poorly graded fine sand, dry	SP	N/A	HNU = 0 ppm β γ = 60 cpm α = 0 cpm
51							
53							
54							
55	1455 107127 2-2-93	11 14 23	14	Dense (2.5Y, 4/3) olive brown well graded sand, trace coarse gravel, dry	SW	N/A	HNU = 0 ppm β γ = 50 cpm α = 0 cpm
56							
57							
58							
59							
60							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Logged Joe Barile Craig Coulter Kevin Myers

Samples Collected Per ASTM Standard Penetration Test

All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE.
NA - NOT APPLICABLE

Background { OVM = 0 ppm, β γ = 50 cpm, α = 0 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA40)	PROJECT NAME RCRA Phase II		
BORING NUMBER 4439	COORDINATES	DATE 2-2-93	
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED 1-29-93	
ENGINEER/GEOLOGIST Michael Worley	Depth Date/Time	DATE COMPLETED 3-2-93	
DRILLING METHODS Cable Tool		PAGE 5 OF 17	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	1540 107128 2-2-93	50/.4	2	Very dense (2.5Y, 4/4) olive brown gravelly sand (well graded), slightly moist	SW	N/A	HNU = 0 ppm Bσ = 50cpm α = 0 cpm
62							
63							
64							
65							
66	1635 107129 2-2-93	14 50/.4	8	Very dense (2.5Y, 4/4) olive brown well graded gravel, moist	GW	N/A	HNU = 0 ppm Bσ = 50 cpm α = 0 cpm
67							
68							
69							
70							
71	0900 107130 2-3-93	15 26 31	15	Very dense (2.5Y, 4/4) olive brown well graded sand, trace small gravel, moist	SW	N/A	HNU = 0 ppm Bσ = 50 cpm α = 0 cpm
72				Water table at 72.0 FT. ▽			
73							
74							
75							

NOTES: Drilling Co.: Pennsylvania Drilling
Equipment: Cyclone
Driller: Craig Coulter
Helper: Kevin Myers

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { HNU = 0 ppm, Bσ = 50cpm, α = 0cpm

* Samples collected per ASTM standard Penetration Test
* All colors identified by the Munsell Color Chart

402-11-3F

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-3-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	0940 107131 2-3-93	12 17 22	7	Dense (2.5Y, 5/3) light olive brown poorly graded sand, trace gravel, wet	SP	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
77							
78							
79							
80							
81	1010 107132 2-3-93	9 12 15	9	SAA (MEDIUM DENSE)	SP	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
83				Hydro-punch sample at 82.0 FT. (Sample # 107133)			
84							
85							
86	1420 107134 2-3-93	10 10 15	14	medium dense (2.5Y, 5/3) light olive brown well graded gravel, trace sand, wet.	GW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
87							
88							
89							
90							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Logged Joe Barile / Craig Coulter

Kevin Myers

Samples Collected per ASTM Standard Penetration Test

All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-3-93
VATION:	GWL: Depth 70.3 ft Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 7 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	1440 107135 2-3-93	4 11 13	15	Medium dense (2.5, 5/3) light olive brown well graded coarse sand, trace gravel, wet	SW	N/A	HNU= 0 ppm α = 0 cpm Bγ= 50 cpm
92							
93							
94							
95							
96	1530 107136 2-3-93	7 11 14	15	SAA	SW	N/A	HNU= 0 ppm Bγ = 50 cpm α = 0 cpm
97							
98							
99							
100							
101	1620 107137 2-3-93	9 11 17	16	SAA	SW	N/A	HNU= 0 ppm Bγ= 50 cpm α = 0 cpm
102							
103							
104							
105							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile / Craig Coulter
Kevin Myers

Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 (WBA 40)	PROJECT NAME: RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE: 2-3-93
LOCATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 8 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	1720 107138 2-3-93	50/.4	3	Very dense (2.5Y, 5/3) light olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
107				Hydro-punch sample at 107.0 FT. (sample # 107139)			
108							
109							
110	1330 107140 ~~107139~~ 2-4-93	15 27 39	15	SAA	SW	N/A	HNU = N/A Bγ = 50 cpm α = 0 cpm
111							
113							
114							
115	1445 107141 2-4-93	13 42 50	12	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet.	SW	N/A	Bγ = 50 cpm α = 0 cpm HNU = 0 ppm
116							
117							
118							
119							
120							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Personnel: Joe Barile / Craig Coulter
Kevin Myers

Samples Collected Per ASTM Standard Penetration Test

Soil Colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { ~~HNU = 0 ppm~~ HNU 2-4-93
Bγ = 50 cpm
α = 0 cpm

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-4-93
ELEVATION:	GWL: Depth 70.3 FT. Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 9 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121	1520 107142 2-4-93	20 26 29	10	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	Bγ = 50 cpm α = 0 cpm No HNU Available
122							
123							
124							
125							
126	1630 107143 2-4-93	14 20 25	10	Dense (2.5Y, 4/4) olive brown well graded sand, trace gravel, wet	SW	N/A	Bγ = 50 cpm α = 0 cpm
128							
129							
130							
131	1710 107144 2-4-93	5 16 23	15	SAA	SW	N/A	Bγ = 50 cpm α = 0 cpm
132				Hydro-punch sample at 132.0 FT. (Sample #@132.0 FT = 107145)			
133							
134							
135							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: Joe Barile / Craig Coulter
Kevin Myers

Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background { OVM = 0 ppm, Bγ = 50 cpm, α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 (WBA 40)	PROJECT NAME RCRA PHASE II
BORING NUMBER: 4439	COORDINATES:
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time
DRILLING METHODS: CABLE TOOL	

DATE 2-8-93
DATE STARTED: 1-29-93
DATE COMPLETED: 3-2-93
PAGE 10 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135							
136	0945 107146 2-8-93	12 50/.3	4	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
137							
138							
139							
140							
141	1020 107147 2-8-93	7 50/0	5	SAA	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
142							
143							
144							
145							
146	1035 107148 2-8-93	50/.4	3	Very dense (2.5Y, 5/4) light olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
147							
148							
149							
150							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 72 Speedstar
Driller: Joe Barile / Craig Coulter
Kevin Myers

SAA - SAME AS ABOVE
NA - NOT Applicable

Background { ~~OVM = 0 ppm~~ HNU 28-9, Bγ = 50 cpm, α = 0 cpm, HNA = 0 ppm

* Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 (WBA 40)	PROJECT NAME: RCRA PHASE II	
BORING NUMBER: 4439	COORDINATES:	DATE: 2-8-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 11 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150							
151	1400 107149 2-8-93	20 50/0	6	Very dense (2.5Y, 5/4) light olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm β γ = 50 cpm α = 0 cpm
152							
153							
154							
155							
156	1515 107150 2-8-93	50/.5	3	Very dense (2.5Y, 5/4) light olive brown well graded gravel, trace silt and sand, wet	GW	N/A	HNU = 0 ppm β γ = 50 cpm α = 0 cpm
157				Hydro-punch sample 157.0 FT. (Sample # 107151)			
158							
159							
160							
161	0920 107152 2-9-93	50/.4	3	SAA	GW	N/A	HNU = 0 ppm β γ = 50 cpm α = 0 cpm
162							
163							
164							
165							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 72 Speedstar

Driller: Joe Barile / Craig Coulter / Kevin Myers

* Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: ~~OVM = 0 ppm~~ M.W. 2-8-93
β γ = 50 cpm
α = 0 cpm
HNU = 0 ppm

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.28 (WBB-40)	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-9-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 12 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
165							
166	1000 107153 2-9-93	18 26 30	7	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
167							
168							
169							
170							
2-9-93 MW: 171	1050 107154 ~~107153~~ 2-9-93	50/.4	3	Very dense (2.5Y, 4/4) olive brown well graded coarse sand, trace gravel, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
172							
173							
174							
175							
2-9-93 MW 176	1110 107155 ~~107164~~ 2-9-93	18 50/.5	8	SAA	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
177							
178							
179							
180							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background (M.W. 2-9-93): ~~OVM = 0 ppm~~, Bγ = 50 cpm, α = 0 cpm, HNU = 0 ppm

* Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA40)	PROJECT NAME RCRA Phase II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-9-93
ELEVATION:	GWL: Depth 70.3 ft Date/Time 3-2-93/1100	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 13 OF 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
180							
181	1130 107156 2-9-93	18 50/.6	8	Very dense (2.5Y, 4/4) olive brown well graded sand, trace gravel, wet	SW	N/A	HNU= 0 ppm Bγ= 50 cpm α = 0 cpm
182				Hydro-punch sample at 182.0 ft. (Sample #107157)			
183							
184							
185							
186	1520 107158 2-9-93	16 30 38	15	SAA	SW	N/A	HNU= 0 ppm Bγ= 50 cpm α = 0 cpm
187							
188							
189							
190							
191	1545 107159 2-9-93	5 17 22	15	Dense (2.5Y, 4/4) olive brown poorly graded sand, trace gravel, M.W. 2-9-93, wet	SP	N/A	HNU= 0 ppm Bγ= 50 cpm α = 0 cpm
192							
193							
194							
195							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: ~~OVM = 0 ppm~~ M.W. 2-9-93
Bγ = 50 cpm
α = 0 cpm
HNU = 0 ppm

* Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 (WBA40)	PROJECT NAME RCRA Phase II	
BORING NUMBER: 4439	COORDINATES:	DATE 2-9-93
ELEVATION:	GWL: Depth 70.3 FT Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 14 OF 17

DEPTH (FT) 195	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196	1700 107160 2-9-93	50/.3	3	Very dense (2.5Y, 4/4) olive brown well graded coarse sand, trace gravel, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
197 198 199 200				* Continuous sampling will begin at 200.0 FT. for the composite screen analysis. Ends at 210.0FT. * Hydro-punch at 207.0FT (sample # 107169)			* The continuous sampling from 200.0 FT to 210.0 FT. will be split half for archive & half for sieve analysis. The sieve analysis will be given a separate sample Number. #107168
201	1015 107161 2-10-93	9 18 12	18	Medium dense (2.5Y, 4/4) olive brown poorly graded sand, trace small gravel, wet MW 2-10-93	SP	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
202 203	1330 107162 2-10-93	28 50/.4	8	Very dense, SAA	SP	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
204	1410 107163 2-10-93	25 50/.6	9	Very dense (2.5Y, 4/4) olive brown well graded coarse gravel, trace sand, wet	GW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
205 206	1425 107164 2-10-93	25 27 30	14	SAA	GW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
207	1440 107165 2-10-93	27 30 34	15	Very dense (2.5Y, 4/4) olive brown well graded gravelly sand, wet	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
208 209	1715 107166 2-10-93	30 25 38	14	SAA	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm
MW 2-10-93 210	1725 ~~107166~~ 107167 2-10-93	22 30 40	18	SAA	SW	N/A	HNU = 0 ppm Bγ = 50 cpm α = 0 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone

Driller: Craig Coulter, Kevin Myers

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Background: ~~OVM = 0 ppm~~ MW 2-9-93
Bγ = 50 cpm
α = 0 cpm
HNU = 0 ppm

* Samples Collected per ASTM Standard Penetration Test
All colors identified by the Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 (WBA40)	PROJECT NAME RCRA Phase II	
BORING NUMBER: 44.39	COORDINATES:	DATE 2-16-93
ELEVATION:	GWL: Depth 70.3 ft Date/Time 3-2-93/1700	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: Michael Worley	Depth: Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: CABLE TOOL		PAGE 15 OF 17

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
210				See page 14			
211							
212							
213							
214							
215							
216	1430 107170 2-16-93	8 19 26	16	Dense (2.5Y, 4/4) olive brown well graded sand, trace gravel, wet	SW	N/A	HNU = 0 ppm βγ = 50 cpm α = 0 cpm
217							
218							
219							
220							
221	1800 107171 2-16-93	14 50/.5	8	Very dense (2.5Y, 4/4) olive brown well graded sand, trace gravel, crystalline limestone & shale wet.	SW	N/A	HNU = 0 ppm βγ = 50 cpm α = 0 cpm
222				*Bedrock encountered at 221.0 FT. Bottom of boring and drilling at 221.0 FT.			
223							
224							
225							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 72 Speedstar

Driller: ~~Joe Baile~~ MW 2-16-93 Craig Coulter

~~Rick Pierce~~ MW 2-16-93 Kevin Myers

* Samples Collected per ASTM Standard Penetration Test

All colors identified by the Munsell Color Chart

SAA - SAME AS ABOVE

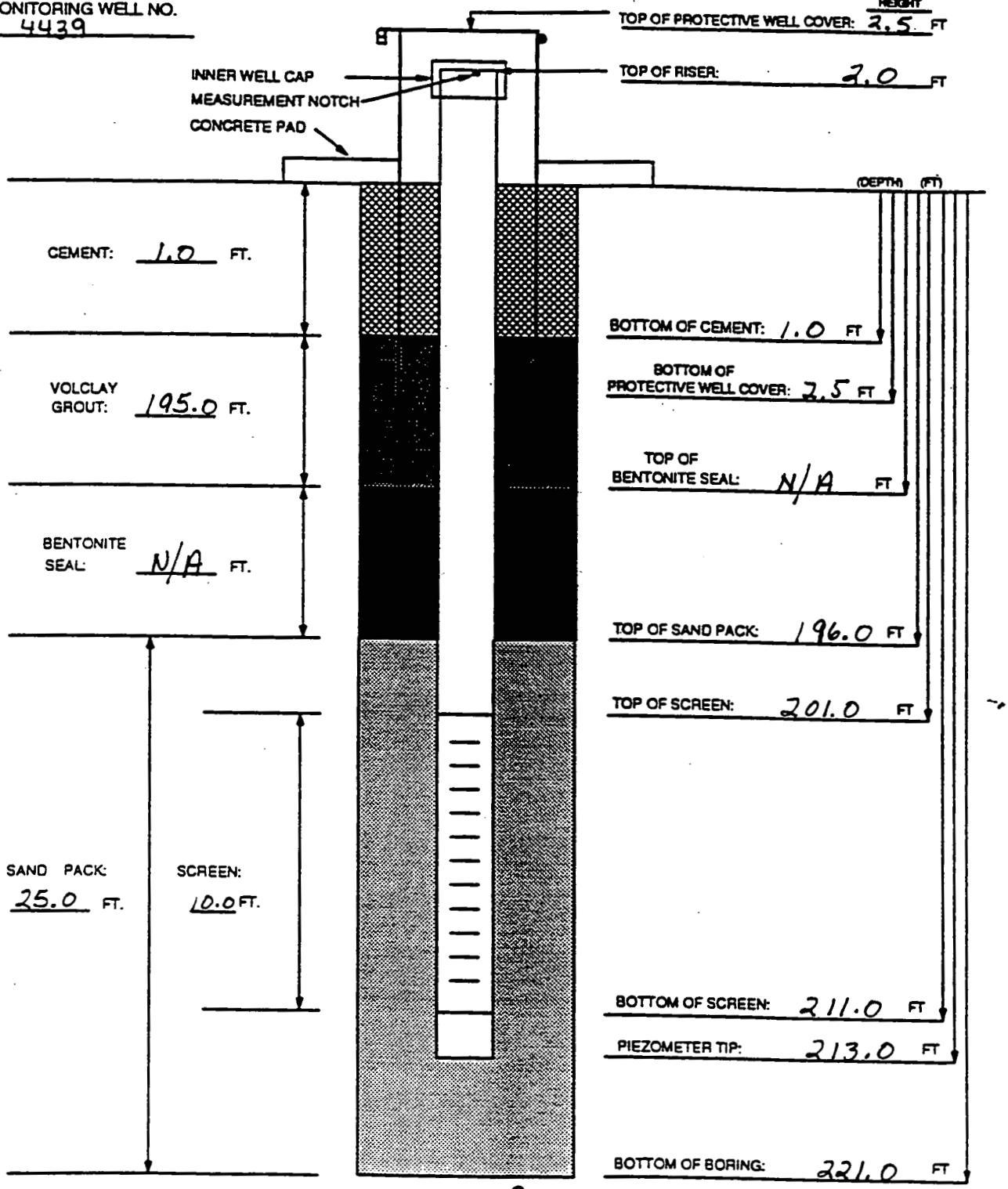
NA - NOT APPLICABLE

M.W. 2-16-93

Background { ~~CVM = 0 ppm~~ βγ = 50 cpm, α = 0 cpm, HNU = 0 ppm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4439

INSTALLATION DATE: 3-2-93



TOP OF PROTECTIVE WELL COVER: HEIGHT 2.5 FT

TOP OF RISER: 2.0 FT

BOTTOM OF CEMENT: 1.0 FT

BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF BENTONITE SEAL: N/A FT

TOP OF SAND PACK: 196.0 FT

TOP OF SCREEN: 201.0 FT

BOTTOM OF SCREEN: 211.0 FT

PIEZOMETER TIP: 213.0 FT

BOTTOM OF BORING: 221.0 FT

BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 13 - 4/30, 3 - 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): none used
BAGS OF VOLCLAY GROUT: 39
AMOUNT OF CEMENT: 1 - 80lb bag
AMOUNT OF WATER USED: 1,100 gallons
OTHER: 1-water drum, 23 soil drums
TASK: 602.04.28, (WBA 40)

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 70.3 FT/ 2-3-
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: M. Worley

ASI FORM 0157 REV. (0)

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II
PROJECT NO. 602.04.28 (WBA 40)
BORING NO. 4439
PIEZOMETER NO. 4439

FIELD ENG./GEO. M. Worley DATE
CHECKED BY DATE
DATE OF INSTALLATION 3-1-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT TO 75.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 8.0 in. I.D. FROM 0.0 TO ~~220~~ 221.0 FT mw
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in.
TOTAL PERFORATED AREA 10.0 FT.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 1-2 FT., 1-3 FT, 20-10
JOINING METHOD Screw-type flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4

OTHER PROTECTION Hinged locking cover with padlock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	mw 2-18-93 ~~2.5~~ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: VOLCLAY CEMENT GROUT ~~/SLURRY~~ m.w. 2-18-93	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 196.0	TOP	BOTTOM
BENTONITE (NONE USED)	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 196.0	BOTTOM 221.0	TOP	BOTTOM
GRAVEL (NONE USED)	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 201.0	BOTTOM 211.0	TOP	BOTTOM
PIEZOMETER TIP	213.0			
BOTTOM OF BOREHOLE	221.0			
GWL AFTER INSTALLATION	70.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS Cement placed 0.0 to 1.0 FT. to hold protective cover in place. Two types of sand were used in the sandpack: From 196.0 Ft to 201.0 ft 10/20 sand; From 201.0 ft to 221.0 ft 4/30 sand.

B-4439

Customer Number: 107168

MATERIAL: Soil

SAMPLE NUMBER: 930211-105

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 167.73

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	89.34	53.26	53.26	78.7
20	18.06	10.77	64.03	33.5
40	30.05	17.92	81.95	16.7
60	15.56	9.28	91.23	9.8
100	6.64	3.96	95.19	5.9
200	3.40	2.03	97.22	3.0
Pan	3.67	2.19	99.41	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:

Grain Size Retained

40 % 7100

50 % 7100

90 % 9

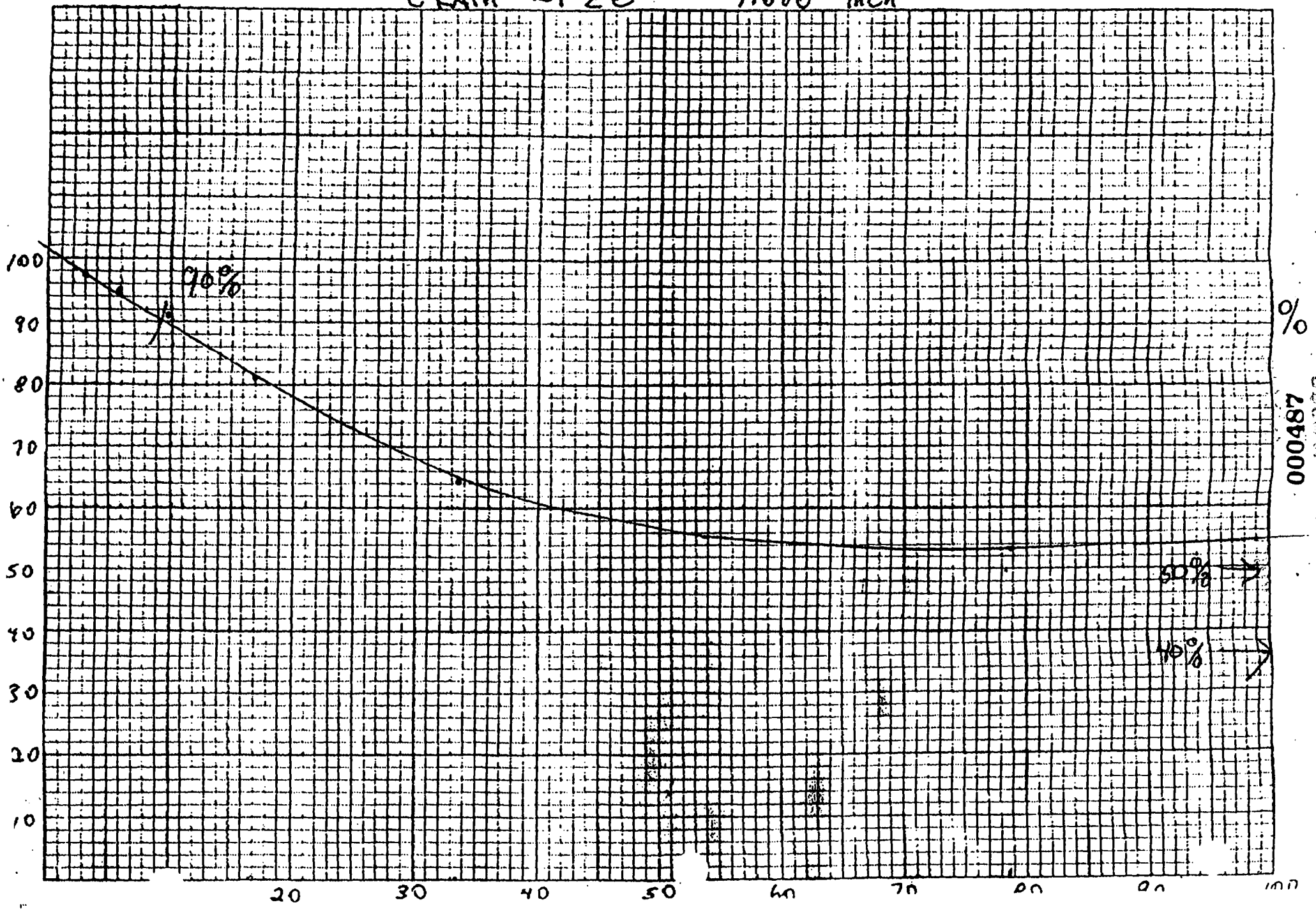
NO 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

2-16-93

930211-105

Grain Size 1/1000 inch



000487

2-17-93

RCRA PHASE II

Boring # 4439

Geologist: Michael L

1. 90% = 9
   50% = > 100
   40% = > 100

   } Retained values

2. ~~.009~~ .100 / .009 = 11.1 11.1 > 3 so Factor of L

   MW. 2-17-93

3. 4 x .100 = 0.4

4. 0.4 most closely fits the coarse grain sand size (4/30) and 0.020 screen size.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1441	COORDINATES:	DATE: 12-1-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-1-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-2-89	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-inches	RECOVERY (Inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	52895 12-1-89 1015	4	6	STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN SILTY CLAY. ROOTLETS. SLIGHTLY MOIST. LOW PLASTICITY.	CL	1.2	Hnu = 0 α = 0
1.0	52896 12-1-89 1015	6	6	STIFF (5Y, 2.5/1) BLACK SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	1.7	γB = 150 cpm
1.5	52897 12-1-89 1015	7	0	NO RECOVERY	NA	NA	
2.0	52898 12-1-89 1020	6	6	VERY STIFF (2.5Y, 4/4) OLIVE BROWN CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5	Hnu = 0 α = 0
2.5	52899 12-1-89 1020	9	6	SAA	CL	2.0	γB = 110 cpm
3.0	52900 12-1-89 1026	12	0	NO RECOVERY	NA	NA	
3.5	52901 12-1-89 1026	3	6	STIFF (2.5Y, 4/4) OLIVE BROWN CLAY. MOTTLED. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5	Hnu = 0 α = 0
4.0	52902 12-1-89 1026	5	4	SAA	CL	1.5	γB = 120 cpm
4.5	52903 12-1-89 1026	13	0	NO RECOVERY	NA	NA	
5.0	52904 12-1-89 1036	6	6	MEDIUM STIFF (5Y, 2.5/1) BLACK SILTY CLAY. ROOTLETS. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	.5	Hnu = 0 α = 0
5.5	52905 12-1-89 1036	3	4	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. SLIGHTLY MOIST. MEDIUM PLASTICITY.	CL	1.5	γB = 150 cpm
6.0	52906 12-1-89 1036	3	0	NO RECOVERY	NA	NA	
6.5	52907 12-1-89 1040	4	6	MEDIUM STIFF (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. TRACE OF FINE PEBBLES. MEDIUM PLASTICITY. MOIST.		0.5	Hnu = 0 α = 0
7.0	52908 12-1-89 1040	6	6	VERY STIFF (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. TRACE OF FINE PEBBLES. LOW PLASTICITY. SLIGHTLY MOIST.		2.0	γB = 120
7.5	52909 12-1-89 1040	10	5	SAA		3.5	

NOTES: Contractor : Pennsylvania Drilling
DRILLER : BOB HOST
DRILLER'S ASSISTANT: BRIAN STRAPAZZON
ALL SAMPLES COLLECTED according to ASTM STANDARDS

000489

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 cpm
GAMMA - BETA = 100 - 120

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1441	COORDINATES:	DATE: 12-1-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-1-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-2-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	52910 12-1-89 1050	12	6	VERY SOFT (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. HIGH PLASTICITY; VERY MOIST.	CL	0.0	Hmm = 0 α = 0 $S\bar{B}$ = 120 cpm
8.5	52911 12-1-89 1050	17	6	HARD (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. TRACE OF FINE TO COARSE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	4.0	
9.0	52912 12-1-89 1050	23	6	SAA	CL	4.0	
9.5	52913 12-1-89 1453	5	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY WITH TRACE OF FINE PEBBLES. LOW PLASTICITY SLIGHTLY MOIST.	CL	2.0	Hmm = 0 α = 0 $S\bar{B}$ = 120 cpm
10.0	52914 12-1-89 1453	12	0	NO RECOVERY	NA	NA	
10.5	52995 12-1-89 1453	12	0	NO RECOVERY	NA	NA	
11.0	52996 12-1-89 1500	21	0				Hmm: NA α : $S\bar{B}$:
11.5	52997 12-1-89 1500	23	0				
12.0	52998 12-1-89 1500	29	0				
12.5	52999 12-1-89 1513	16	0				Hmm: α : $S\bar{B}$: NA
13.0	53000 12-1-89 1513	21	0				
13.5	53001 12-1-89 1513	23	0	NO RECOVERY	NA	NA	
14.0	53002 12-1-89 1528	2	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY WITH TRACE OF FINE PEBBLES. LOW PLASTICITY SLIGHTLY MOIST.	CL	2.5	Hmm = 0 α = 0 $S\bar{B}$ = 100 cpm
14.5	53003 12-1-89 1528	4	6	SAA	CL	2.5	
15.0	53004 12-1-89 1528	6	0	NO RECOVERY	NA	NA	

NOTES: THE MAJORITY OF THE 9.5 - 13.5 FT AUGER CUTTINGS APPEARED TO BE A DARK GRAY (2.5Y, N4/) SILTY CLAY, SLIGHTLY MOIST. SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1441	COORDINATES:	DATE: 12-1-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-1-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-2-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

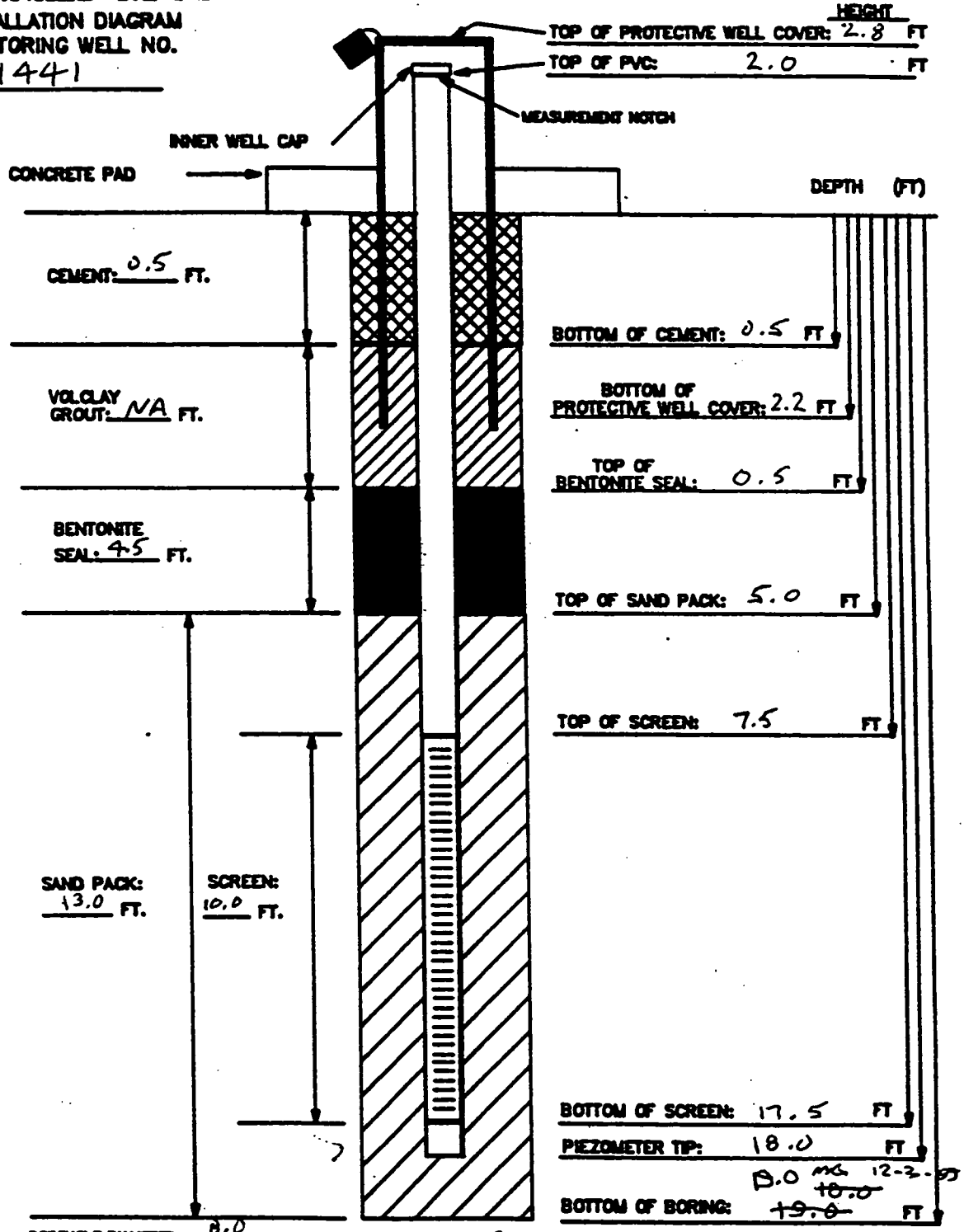
DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	53005 12-1-89 1232	9	6	VERY STIFF (5Y, 4/1) DARK GRAY SILTY CLAY WITH TRACE OF FINE PEBBLES. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5	Hum = 0 α = 0 βB = 100 cpm
16.0	53006 12-1-89 1532	15	6	SAA	CL	2.5	
WATER 16.5	53007 12-1-89 1532	17	3	LOOSE (5Y, 4/1) DARK GRAY SILTY SAND WITH TRACE OF FINE GRAVEL. MOIST.	SM	NA	
17.0	53008 12-1-89 1550	12	6	DENSE (5Y, 4/1) DARK GRAY SILTY SAND WITH TRACE OF FINE GRAVEL. WET.	SM	NA	Hum = 0 α = 0 βB = 120 cpm
17.5	53009 12-1-89 1550	18	6	VERY STIFF (5Y, 4/1) DARK GRAY SILTY CLAY WITH TRACE OF FINE TO COARSE GRAVEL. MOIST.	CL	2.5	
18.0	53010 12-1-89 1550	24	6	SAA	CL	2.5	
18.5	53011			BOTTOM OF BORING PIEZOMETER INSTALLED			Hum = α = βB =
19.0	53012						
19.5	53013						
20	53014						Hum = α = βB =

NOTES: 18.0 FT. HOLE WAS OVERBORED TO APPROX. 19.0 FT. SEE PAGE 1 TO ALLOW BRIDGING SAND (1020) TO FALL FROM AUGER INTO HOLE. PIEZOMETER TIP SET AT 18.0 FT. ALSO, ON 12-1-89 THERE WAS NO WATER IN THE BORING; ON THE MORNING OF 12-2-89, WATER WAS MEASURED AT APPROXIMATELY 2.0 FT.

INSTALLATION DATE: 12-2-89

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1441



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) ~~4.5~~ 4.0 MG 12-2-89 80 lb. bags
BENTONITE PELLETS (5-GALLON BUCKETS): 2.5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: NONE
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07.02

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 12-2-89
PROJECT NO. 602.03.07 CHECKED BY _____ DATE _____
BORING NO. 1441
PIEZOMETER NO. 1441 DATE OF INSTALLATION 12-2-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE FROM ____ TO ____	SIZE NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____	SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 P.V.C.	RISER PIPE MATERIAL SCHEDULE 40 P.V.C.
DIAMETER OF PERFORATED SECTION 2.0 IN. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 IN. I.D. 2.0 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 FT.
AVERAGE SIZE OF PERFORATIONS 0.02 IN.	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 10.0 FT.	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 4.0 FT	OTHER PROTECTION LOCK
PROTECTIVE PIPE O.D. 4 3/8 IN	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.2			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 18.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 7.5	BOTTOM 17.5	TOP	BOTTOM
PIEZOMETER TIP	18.0			
BOTTOM OF BOREHOLE	18.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS DUE TO BRIDGING ON FIRST SETTING ATTEMPT, APPROX. 1.5 FT. OF NO2 SAND WERE LEFT IN AUGER. BOTTOM OF AUGERED AND ADDITIONAL FOOT AND PULLED AUGER, ALLOWING SAND TO SETTLE IN BOTTOM, AND PIEZOMETER TIP TO LIE AS CLOSE TO 18.0 FT AS POSSIBLE.

000493

409-11-88

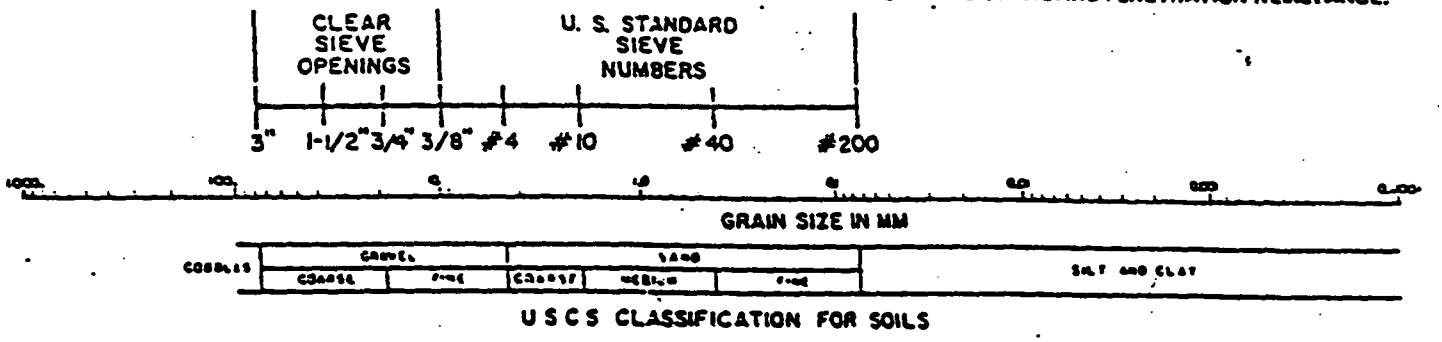
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
MEDIUM STIFF	0.50 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE (1)
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

(1) STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1442	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: M. Garman	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-Inches)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							Start time @1600 11-20-89
0.5	52675 1600 11-20	2	6	Stiff (2.5y, 3/2) very dark grayish brown, silty clay, low plasticity, slightly moist rootlets	CL	1.75	Hnu = 0 ppm, α = 0 cpm, γB = 160 cpm
1.0	52676 1600 11-20	4	6	Stiff (2.5y, 4/4) olive brown, silty clay, trace fine gravel, low plasticity, dry	CL	1.75	
1.5	52677 1600 11-20	6	0	NR	NA	NA	w/screen
2.0	52678 1604 11-20	5	6	Med Dense (5y, 2.5/1) Black clayey silt, Dry	ML	NA	Hnu = 0 ppm, α = 0 cpm, γB = 150 cpm
2.5	52679 1604 11-20	10	6	Very Stiff (5y, 2.5/1) Black silty clay med plastic, dry	CL	2.0	
3.0	52680 1604 11-20	13	0	NR	NA	NA	w/screen
3.5	52681 1614 11-20	8	6	Stiff (10yr, 3/1) very dark gray clay, med plasticity, slightly moist	CL	1.75 ~~NA~~ CAMM 11-20-89	Hnu = 0.5 ppm, α = 1 cpm, γB = 160 cpm
4.0	52682 1614 11-20	10	5	Stiff (10yr, 4/4) dark yellowish brown clay, med plasticity, slightly moist	CL	1.5 ~~NA~~ CAMM 11-20-89	
4.5	52683 1614 11-20	12	0	NR	NA	NA	w/screen
5.0	52684 1621 11-20	2	6	LOOSE (2.5y, 5/4) Lt. olive brown clayey silt, trace fine gravel, dry	~~CL~~ ML CAMM 11-20-89	NA	Hnu = 1 ppm, α = 0 cpm, γB = 120 cpm
5.5	52685 1621 11-20	4	4	Med Stiff (2.5y, 5/4) Lt olive brown silty clay, med plastic, slightly moist	CL	.75	
6.0	52686 1621 11-20	5	0	NR	NA	NA	w/screen
6.5	52687 1624 11-20	3	6	SAA (5.0-5.5FT) In bore #2 5y, 5/4 Lt olive brown, clayey silt, trace fine sand & gravel, moist	CL ML	.75 NA	Hnu = 2 ppm, α = 0 cpm, γB = 120 cpm
7.0	52688 1624 11-20	5	0	NR	NA	NA	
7.5	52689 1624 11-20	12	0	NR	NA	NA	w/screen

NOTES: Contractor: Pennsylvania Drilling
Driller:
Drillers Assistant:
All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

Background Readings/Levels
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma-Beta = 140 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1442	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: M. Garman.	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 Inch)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
H2O zone 8.0	52690 1630 11-20	6	6	Med Dense (2.5y, 5/4) light olive brown clayey sand, wet	SC	NA	Hnu = 0.5 ppm, α = 0 cpm, Sβ = 120 cpm
8.5	52691 1630 11-20	8	6	Med Dense SAA	SC	NA	
				Stiff (2.5y 5/4) light olive brown mottled silty clay, trace fine sand, med plastic, wet	CL	1.25	
9.0	52692 1630 11-20	14	6	Stiff (2.5y, 4/4) olive brown silty clay, trace fine gravel, med plastic, moist	CL	1.5	W/ screen
	52693			Bottom of Boring & Sampling, Piezometer installed			Hnu = ppm, α = cpm, Sβ = cpm
9.5	52694						
10.0	52255						
10.5	52256						Hnu = ppm, α = cpm, Sβ = cpm
11.0	52257						
11.5	52258						
12.0	52259						Hnu = ppm, α = cpm, Sβ = cpm
12.5	52260						
13.0	52261						
13.5	52262						Hnu = ppm, α = cpm, Sβ = cpm
14.0	52263						
14.5	52264						
15.0							

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1442	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: M. Coffman	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	52265						
15.5	52266						Hum = ppm α = cpm βB = cpm
16.0	52267						
16.5	52268						
17.0	52269						Hum = ppm α = cpm βB = cpm
17.5	52270						
18.0	52271						
18.5	52272						Hum = ppm α = cpm βB = cpm
19.0	52273						
19.5	52274						
20							Hum = ppm α = cpm βB = cpm

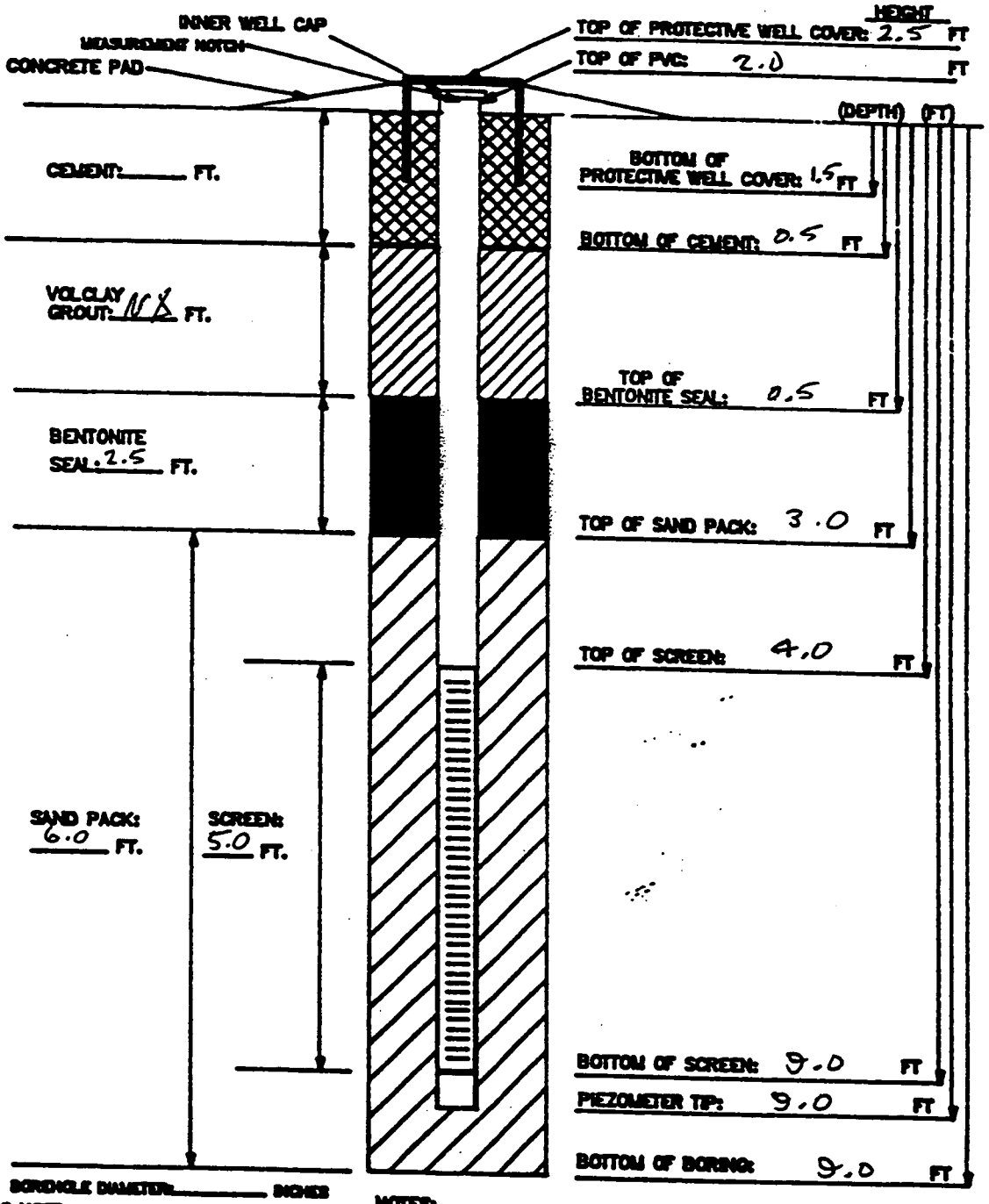
NOTES:

SEE PAGE 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1442

INSTALLATION DATE: 11-20-89



MATERIALS USED:

SAND TYPE AND QUANTITY: (1020) 2 80 lb/bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1.0
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: ~1 gal.
AMOUNT OF WATER USED: 2.5 gal.
OTHER:

NOTES:

1) INNER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES DENOTE DEPTH BELOW GROUND LEVEL.

TASK: 03.07

GEOLOGIST/ENGINEER: Mark [illegible]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 11-20-89
PROJECT NO. 602.03.07 CHECKED BY _____ DATE _____
BORING NO. 1442
PIEZOMETER NO. 1442 DATE OF INSTALLATION 11-20-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE ~~FROM~~ _____ TO _____	SIZE NONE ~~FROM~~ _____ TO _____
FLUID NONE ~~FROM~~ _____ TO _____	SIZE NONE ~~FROM~~ _____ TO _____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC.	RISER PIPE MATERIAL SCHEDULE 40 PVC.
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 IN. I.D. 2.0 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 FT.
AVERAGE SIZE OF PERFORATIONS 0.02 IN.	JOINING METHOD FLUSH JOINT THREADED
TOTAL PERFORATED AREA 10.0 FT.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 4.0 FT.	OTHER PROTECTION LOCK
PROTECTIVE PIPE O.D. 4 3/8 IN.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (CEMENT)	TOP 0.5	BOTTOM 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 3.0	TOP	BOTTOM
SAND	TOP 3.0	BOTTOM 9.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 4.0	BOTTOM 9.0	TOP	BOTTOM
PIEZOMETER TIP	9.0			
BOTTOM OF BOREHOLE	9.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.01	PROJECT NAME: FMPC RI/FS (Facility Testing)		
BORING NUMBER: 1443	COORDINATES:	DATE: 11-18-89	
ELEVATION: Mark Garman	GWL: Depth Date/Time	DATE STARTED: 11-18-89	
ENGINEER/GEOLOGIST: ~~Brad~~ Dunning	Depth Date/Time	DATE COMPLETED: 11-19-89	
DRILLING METHODS: Auger / Hollow Stem - Split Spoon Sampling		PAGE 1 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-Inches	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	51175 11-18 1530	2	6	SOFT VERY DARK GRAYISH BROWN (2.5Y, 3/2) CLAY. DRY	CL	.5	Hnu = 0 α = 0 βγ = 100 cpm
1.0	51176 11-18 1530	4	0	NO RECOVERY	NR	NR	
1.5	51177 11-18 1530	8	0	NO RECOVERY			
2.0	51178 11-18 1533	7	6	MEDIUM DENSE VERY DARK GRAYISH BROWN (2.5Y, 3/2) MOTTLED CLAYEY SILT. DRY.	ML	NA	Hnu = 0 α = 0 βγ = 100 cpm
2.5	51179 11-18 1533	9	0	NO RECOVERY	NR	NR	
3.0	51180 11-18 1533	6	0	NO RECOVERY			
3.5	51181 11-18 1538	7	6	VERY STIFF VERY DARK GRAYISH BROWN (2.5Y, 3/2) CLAY (MOTTLED). DRY.	CL	2	Hnu = 0 α = 0 βγ = 100 cpm
4.0	51182 11-18 1538	9	6	SAA		2	
4.5	51183 11-18 1538	11	6	SAA			
5.0	51184 11-18 1600	5	6	STIFF VERY DARK GRAY (2.5, 3/1) SILTY CLAY. ROOTLETS. DRY.	CL	1.5	Hnu = 0 α = 0 βγ = 100 cpm
5.5	51185 11-18 1600	7	5	STIFF DARK GRAYISH BROWN (10YR, 4/2) SILTY CLAY. TRACE OF FINE PEBBLES. DRY.	CL	1	
6.0	51186 11-18 1600	13	0	NO RECOVERY	NR	NR	
6.5	51187 11-18 1605	5	6	HARD LIGHT OLIVE BROWN (2.5Y, 5/4) SILTY CLAY. TRACE OF FINE GRAVEL. DRY.	CL	>4	Hnu = 0 α = 0 βγ = 100 cpm
7.0	51188 11-18 1605	11	6	SAA		>4	
7.5	51189 11-18 1605	15	6	VERY STIFF LIGHT OLIVE BROWN (2.5Y, 5/4) SILTY CLAY. TRACE OF FINE TO COARSE GRAVEL. DRY		3.5	

NOTES: Contractor : Pennsylvania Drilling
Driller : Craig Coulter
Drillers Assistant: Larry Booth

All Samples collected according to ASTM Standards. Soil Colors Described by Munsell Soil Color Charts.

Background Readings/Levels
Hnu = 0 ppm
Alpha (α) = 0 dpm
Gamma - Beta = 100 dpm

NR = No Recovery

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS (Facility Testing)		
BORING NUMBER: 1443	COORDINATES:	DATE: 11-18-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-18-89	
ENGINEER/GEOLOGIST: MARK GARMAN	Depth Date/Time	DATE COMPLETED: 11-17-89	
DRILLING METHODS: Hollow Stem Auger - Split Spoon Sampling		PAGE 2 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 Inches	RECOVERY (Inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	51190 11-18 1612	16	6	DENSE LIGHT OLIVE BROWN (2.5Y, 5/4) CLAYEY SILT. TRACE OF FINE TO COARSE PEBBLES. DRY.	ML	NA	Hnu = 0 α = 0 γβ = 80
8.5	51191 11-18 1612	20	6	SAA			
9.0	51192 11-18 1612	16	0	NO RECOVERY	NR	NR	
9.5	51193 11-18 1620	2	6	MEDIUM DENSE VERY DARK GRAYISH BROWN (2.5Y, 3/2) CLAYEY SILT. DRY.	ML	NA	Hnu = 0 α = 0 γβ = 120
10.0	51194 11-18 1620	6	6	SAA			
10.5	51435 11-18 1620	12	0	NO RECOVERY	NR	NR	NR
11.0	51436 11-18 1625	11	4	DENSE VERY DARK GRAYISH BROWN (2.5Y, 3/2) CLAYEY SILT. DRY.	ML	NA	Hnu = 0 α = 0 γβ = 100
11.5	51437 11-18 1625	20	0	NO RECOVERY	NR	NR	
12.0	51438 11-18 1625	27	0	NO RECOVERY			
12.5	51439 11-18 1658	27	6	VERY DENSE OLIVE BROWN (2.5Y, 4/4) CLAYEY SILT. TRACE OF FINE TO COARSE GRAVEL. MOIST.	ML	NA	Hnu = 0 α = 0 γβ = 100
13.0	51440 11-18 1658	23	6	SAA			
13.5	51441 11-18 1658	30	6	VERY DENSE OLIVE BROWN (2.5Y, 4/4) SILTY SAND. SOME FINE TO COARSE GRAVEL. MOIST.	SM	NA	
14.0	51442 11-18 1704	34	6	VERY DENSE OLIVE BROWN (2.5Y 4/4) SILTY SAND. SOME FINE TO COARSE GRAVEL. MOIST	SM	NA	Hnu = 0 α = 0 γβ = 100 cpm
14.5	51443 11-18 1704	33	5	SAA			
15.0	51444 11-18 1704	23	0				

NOTES:

Borehole was dry after drilling/Augering down to 15 feet. Shut down for the day. Came back the next day. Drove a split spoon and observed water approximately 8-10 feet up the sample rod.

SEE Page 1

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS (Facility Testing)		
BORING NUMBER: ~~1225~~ 1443	COORDINATES:	DATE: 11-19-89	
ELEVATION: A.G.	GWL: Depth Date/Time	DATE STARTED: 11-18-89	
ENGINEER/GEOLOGIST: M. Garman	Depth Date/Time	DATE COMPLETED: 11-19-89	
DRILLING METHODS: Hollow Stem Auger - Split Spoon Sampling		PAGE 3 OF 5	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	51445 11-19 1100	6	0	No Recovery	NR	N/A	Hum = NR α = γB =
16.0	51446 11-19 1100	15	0				
16.5	51447 11-19 1100	8	0				Note: upon Pulling split Spoon from inside Augers, approx. 8+ feet of Water observed in boring.
17.0	51448 11-19 1104	9	6	Stiff very Dark gray (5Y, 3/1) clay, slightly silty, tr fine sand and gravel moderate to poor plasticity, WET.		2.0	Hum = 0 α = 0 γB = 80 d.p.m.
17.5	51449 11-19 1104	17	6				
18.0	51450 11-19 1104	17	NR				
18.5	51451			Piezometer installed			Hum = α = γB =
19.0	51452						
19.5	51453						
20	51454						Hum = α = γB =

NOTES: Upon return to boring 1443, water was encountered at depth of 8-10' ft. Some natural sand probably mixed with sand pack during piezometer installation.

See Page 1

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/~~FS~~ FS MG. FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 11-19-89
PROJECT NO. 602.03.07 CHECKED BY _____ DATE _____
BORING NO. 1443
PIEZOMETER NO. 1443 DATE OF INSTALLATION 11-19-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE ~~FROM~~ ____ ~~TO~~ ____	SIZE NONE ~~FROM~~ ____ ~~TO~~ ____
FLUID NONE ~~FROM~~ ____ ~~TO~~ ____	SIZE NONE ~~FROM~~ ____ ~~TO~~ ____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC	RISER PIPE MATERIAL SCHEDULE 40 PVC.
DIAMETER OF PERFORATED SECTION 2 IN. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 IN. I.D. 2 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10 FT.
AVERAGE SIZE OF PERFORATIONS 0.02 IN.	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 10 FT.	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.	OTHER PROTECTION ____
PROTECTIVE PIPE O.D. 4 3/8 IN.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.8			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (CEMENT)	TOP ~~NONE~~ 0.5 MG	BOTTOM ~~NONE~~ 0.5 MG	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP 6.0	BOTTOM 18.0	TOP	BOTTOM
GRAVEL- NA	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 18.0	TOP	BOTTOM
PIEZOMETER TIP	18.0			
BOTTOM OF BOREHOLE	18.0			
GWL AFTER INSTALLATION	TO BE TAKEN AT A LATER DATE			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS THERE WAS SOME MIXING OF NATURAL SANDS WITHIN THE SAND PACK

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1444	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: MARK GARMAN	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-inches	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	51555 0852 11-20	5	6	Stiff (2.5y 4/2) Dark grayish brown clay, med plastic, rootlets, dry	CL	1.5	Hnu = 0 ppm, α = 0 cpm, γB = 120 cpm
1.0	51556 0852 11-20	4	0	NR	NA	NA	
1.5	51557 0852 11-20	5	0	NR	NA	NA	
2.0	51558 0856 11-20	2	6	Med Dense (2.5y, 3/2) very dark grayish brown clayey silt, dry	ML	NA	Hnu = 0 ppm, α = 2 cpm, γB = 260 cpm
2.5	51559 0856 11-20	5	4	Med Dense (2.5y, 3/2) very dark grayish brown silty sand, fine to coarse grains, dry	SM	NA	
3.0	51560 0856 11-20	6	0	NR	NA	NA	
3.5	51561 0858 11-20	5	6	Loose (2.5y 4/4) olive brown sandy gravel (fine to coarse) trace silt, dry.	GM	NA	Hnu = 0 ppm, α = 2 cpm, γB = 125 cpm
4.0	51562 0858 11-20	3	3	Stiff (5y, 2.5/1) black, clay, trace fine gravel, high plasticity, dry	CL	1.0	
4.5	51563 0858 11-20	3	0	NR	NA	NA	
5.0	51564 0909 11-20	3	6	Stiff (2.5y, 3/2) very dark grayish brown, clay (silty), low plasticity dry	CL	1.5	Hnu = 0.5 ppm, α = 1 cpm, γB = 140 cpm
5.5	51565 0909 11-20	7	6	SAA	CL	1.5	
6.0	51566 0909 11-20	5	6	~~Med Dense~~ Stiff (5y, 3/2) clay, trace fine gravel, high plasticity, dry	CL	1.5	
6.5	51567 0911 11-20-89	4	6	Very Stiff (2.5y, 3/2) Dark grayish brown mottled clay, low plasticity, dry	CL	2.5	Hnu = 0.5 ppm, α = 140 cpm, γB = 0 cpm
7.0	51568 0911 11-20-89	7	6	Stiff (2.5y, 5/2) brown mottled clay, plasticity, moist	CL	1.5	
7.5	51569 0911 11-20-89	9	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : CRAIG COULTER
Driller's Assistant: LARRY BOOTH
All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

Background Readings/Levels
Hnu = 0 ppm
Alpha (α) = 0 dpm
Gamma - Beta = 100-140 dpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1444	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: MARK GARMAN	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	51570 0918 11-20	5	6	SOFT (2.5Y, 5/4) light olive brown mottled clay, mod plastic, moist	CL	.5	Hnu = 0.5 ppm α = 0 cpm SB = 120 cpm
8.5	51571 0918 11-20	6	6	SAA	CL	.5	
9.0	51572 0918 11-20	8	6	Very Stiff (SAA)	CL	2.5	
9.5	51573 1003 11-20	3	6	Stiff (2.5Y, 3/2) very dark grayish brown silty clay, low plasticity, trace fine gravel, dry.	CL	1.0	Hnu = 0 ppm α = 1 cpm SB = 120 cpm
10.0	51574 1003 11-20	4	3	Stiff (2.5Y, 5/6) light olive brown silty clay, mod plasticity, dry	CL	1.5 cpm 11-20-89	
10.5	51695 1003 11-20	6	0	NR	NA	NA	
11.0	51696 1007 11-20	9	6	HARD (2.5Y, 5/4) light olive brown, silty clay, low plasticity, dry	CL	>4	Hnu = 0 ppm α = 0 cpm SB = 160 cpm
11.5	51697 1007 11-20	14	6	HARD (2.5Y, 5/4) light olive brown silty clay, trace fine to coarse gravel, low plasticity, moist	CL	3.5	
12.0	51698 1007 11-20	15	0	NR	NA	NA	
12.5	51699 1010 11-20	19	6	HARD (2.5Y, 4/4) olive brown silty clay, low plasticity, trace fine to coarse gravel, slightly moist	CL	4.0	Hnu = 0 ppm α = 2 cpm SB = 120 cpm
13.0	51700 ms ~~51700~~ 1010 11-20	20	6	HARD SAA	CL	4.0	
13.5	51701 1010 11-20	23	6	HARD (2.5Y, 4/4) olive brown, silty clay. SAA	CL	4.0	
14.0	51702 1017 11-20	27	6	HARD (2.5Y 4/4) OLIVE BROWN SILTY CLAY - TRACE OF FINE GRAVEL. DRY	CL	3.5	Hnu = 0 ppm α = 1 cpm SB = 140 cpm
14.5	51703 1017 11-20	30	6	SAA	CL	3.5	
15.0	51704 1017 11-20	32	3	SAA BOTTOM OF BORING	CL	3.5	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1444	COORDINATES:	DATE: 11-20-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11-20-89	
ENGINEER/GEOLOGIST: MARK GARMAN	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	51705			PIEZOMETER INSTALLED AT 15 FT.			Hum: α: γB:
15.5	51706						
16.0	51707						
16.5	51708						Hum: α: γB:
17.0	51709						
17.5	51710						
18.0	51711						Hum: α: γB:
18.5	51712						
19.0	51713						
19.5	51714						Hum: α: γB:
20							

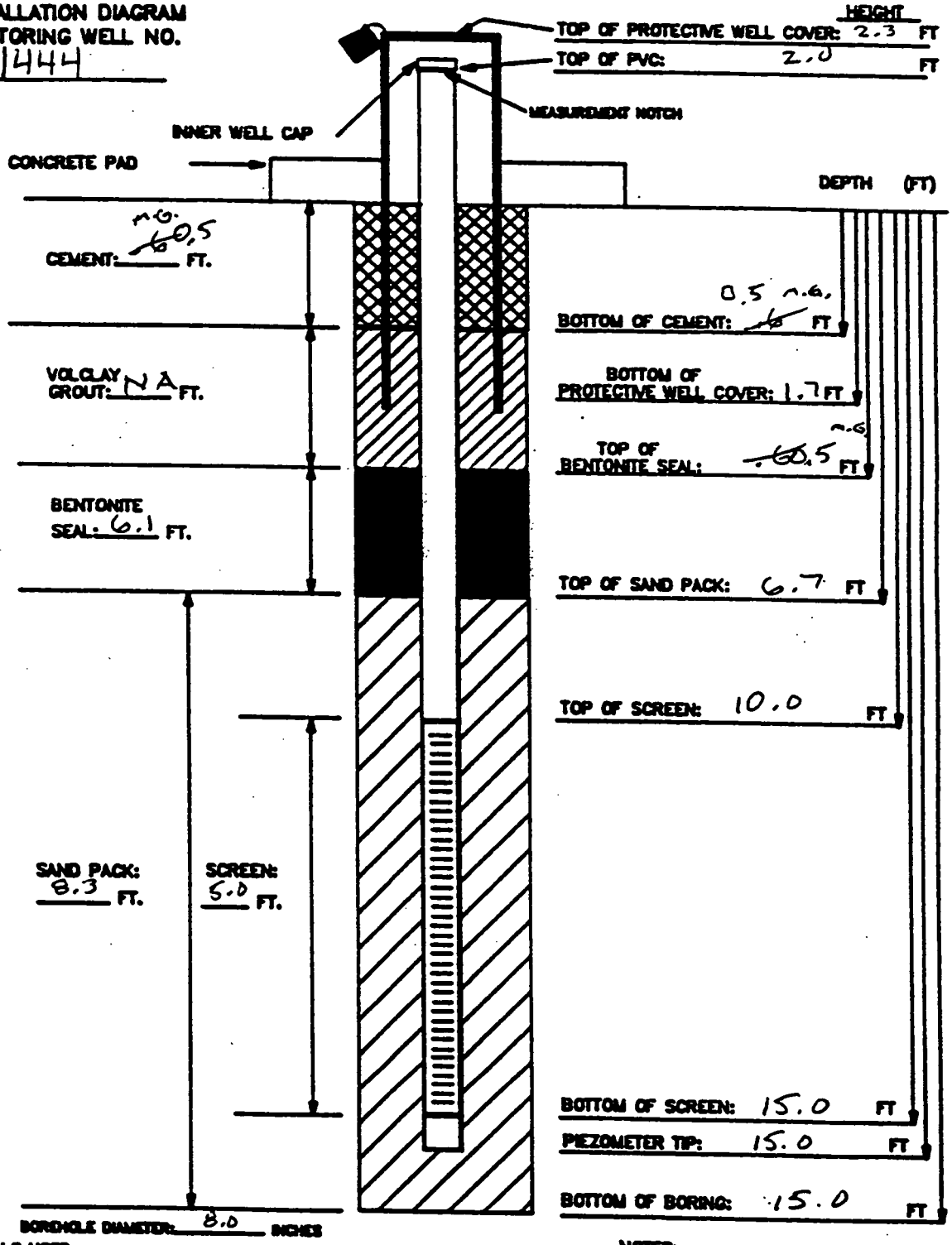
NOTES:

SEE PAGE 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1444

INSTALLATION DATE: 11-20-89



MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 3.0201b. 5 KS.
BENTONITE PELLETS (5-GALLON BUCKETS): 3.0
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ~1 gal.
AMOUNT OF WATER USED: 3 gal.
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: n.a. ~~R.0~~ 03.07 ~~07.03~~ - n.a.

GEOLOGIST/ENGINEER: Mark Hamm

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 11-20-89
PROJECT NO. 602.03.07 CHECKED BY _____ DATE _____
BORING NO. 1444
PIEZOMETER NO. 1444 DATE OF INSTALLATION 11-20-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ _____ TO _____
FLUID NONE ~~FROM~~ _____ TO _____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ _____ TO _____
SIZE NONE ~~FROM~~ _____ TO _____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC.
DIAMETER OF PERFORATED SECTION 2 IN. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN.
TOTAL PERFORATED AREA 10.0 FT.

RISER PIPE MATERIAL SCHEDULE 40 PVC.
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN. I.D. 2.0 IN.
LENGTH OF PIPE SECTIONS 10.0 FT.
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 4.0 FT.
PROTECTIVE PIPE O.D. 4 3/8 IN.

OTHER PROTECTION LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.3			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.7			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (CEMENT)	TOP 0.5	BOTTOM 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 6.7	TOP	BOTTOM
SAND	TOP 6.7	BOTTOM 15.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 15.0	TOP	BOTTOM
PIEZOMETER TIP	15.0			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

000508

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04-28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 2446	COORDINATES.	DATE 3-3-93
ELEVATION:	GWL: Depth 6.3 FT Date/Time 3-18-93/1400	DATE STARTED 3-3-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 3-17-93
DRILLING METHODS Cable Tool		PAGE 1 OF 8

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				* For Soil Classification from 0.0 to 56.0 FT, see Boring Log from Monitoring well 4446			
				* Continuous Sampling will begin at ~~58.6~~ 56.0 FT and continue to 71.0 FT			
56.0							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGlocklin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetr[illegible]

Colors identified using Munsell Color [illegible]

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04-28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 2446	COORDINATES.	DATE 3-9-93
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED 3-3-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 3-17-93
DRILLING METHODS Cable Tool		PAGE 3 OF 8

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
72							Composite sieve sample from 56.0 – 71.0 FT Sample# 107281
73							
74							
75							
76							
77				Bottom of Boring 77.0'			
78							
79							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Leonie McGlokin

SAA - Same as above

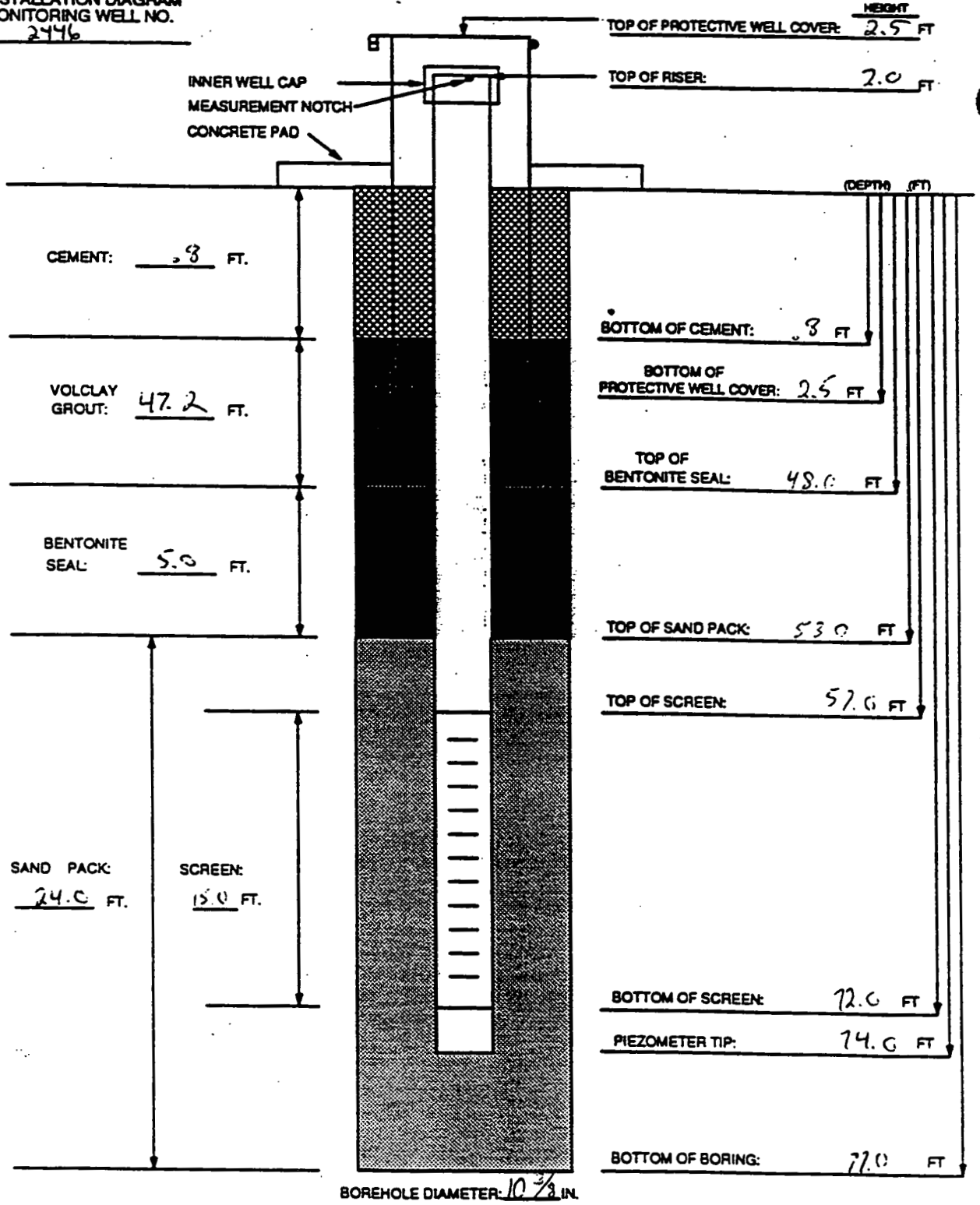
NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2446

INSTALLATION DATE: 3-17-93



BOREHOLE DIAMETER: 10 3/8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 26 - 50lb bags 4/30
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 17-50lb bags
AMOUNT OF CEMENT: 1 - 94lb bag
AMOUNT OF WATER USED: 1900 gallons
OTHER: 12 Drums Soil; 1 Drum Alconox/Water
TASK: 602.04.25 WBA 40

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 61.3 FT/3/19/93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

ASI FORM 0157 REV. (0)

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II
PROJECT NO. 602.04.28 WBA 40
BORING NO. 2446
PIEZOMETER NO. 2446

FIELD ENG./GEO. K. Payne DATE 3-1
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 3-17-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 60.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 FT TO 77.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 5-10FT, 1-5FT, 2-2F
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0 Ft ~~2.5 FT~~ CA 7/25/93			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM .8 FT		
Cement GROUT/SLURRY	TOP .8 FT	BOTTOM 48.0 FT	TOP	BOTTOM
BENTONITE	TOP 48.0 FT	BOTTOM 53.0 FT	TOP	BOTTOM
SAND	TOP 53.0 FT	BOTTOM 77.0 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 57.0 FT	BOTTOM 72.0 FT	TOP	BOTTOM
PIEZOMETER TIP	74.0 FT			
BOTTOM OF BOREHOLE	77.0 FT			
GWL AFTER INSTALLATION	~~63.5 FT~~ 63.3 FT (Top of Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS Cement was placed from 0.0 to .8 ft to hold the protective cover in place.

B 2446

Customer Number: 107281

MATERIAL: RCRA PHASE II SIEVE SAMPLE NUMBER: 930310-033

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 235.8785

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	84.1175	35.66	35.7	78.7
20	48.7101	20.65	56.3	33.5
40	51.5577	21.86	78.2	16.7
60	24.9493	10.58	88.8	9.8
100	9.3217	3.91	92.7	5.9
200	6.5099	2.76	95.4	3.0
Pan	10.6245	4.50	99.9	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
[illegible]	J Kohart	

Grain Size Retained

40 %	JUL ~~62.6~~ 63.0
50 %	~~43.5~~ 43
90 %	7.0

Well #2446

5711

Retained Values
90% = .007
50% = .043
40% = .063

$$\frac{40\%}{90\%} = \frac{.063}{.007} = 9.0$$

9.0 > 3 ∴ use factor

(50%) .043 × 4 = .172

Since .172 is closer to the ~~medium~~ KP 3-12-93 coarse (4/30 sand curve than the medium (10/20) sand curve. Coarse (4/30) sand was choosen as a result.

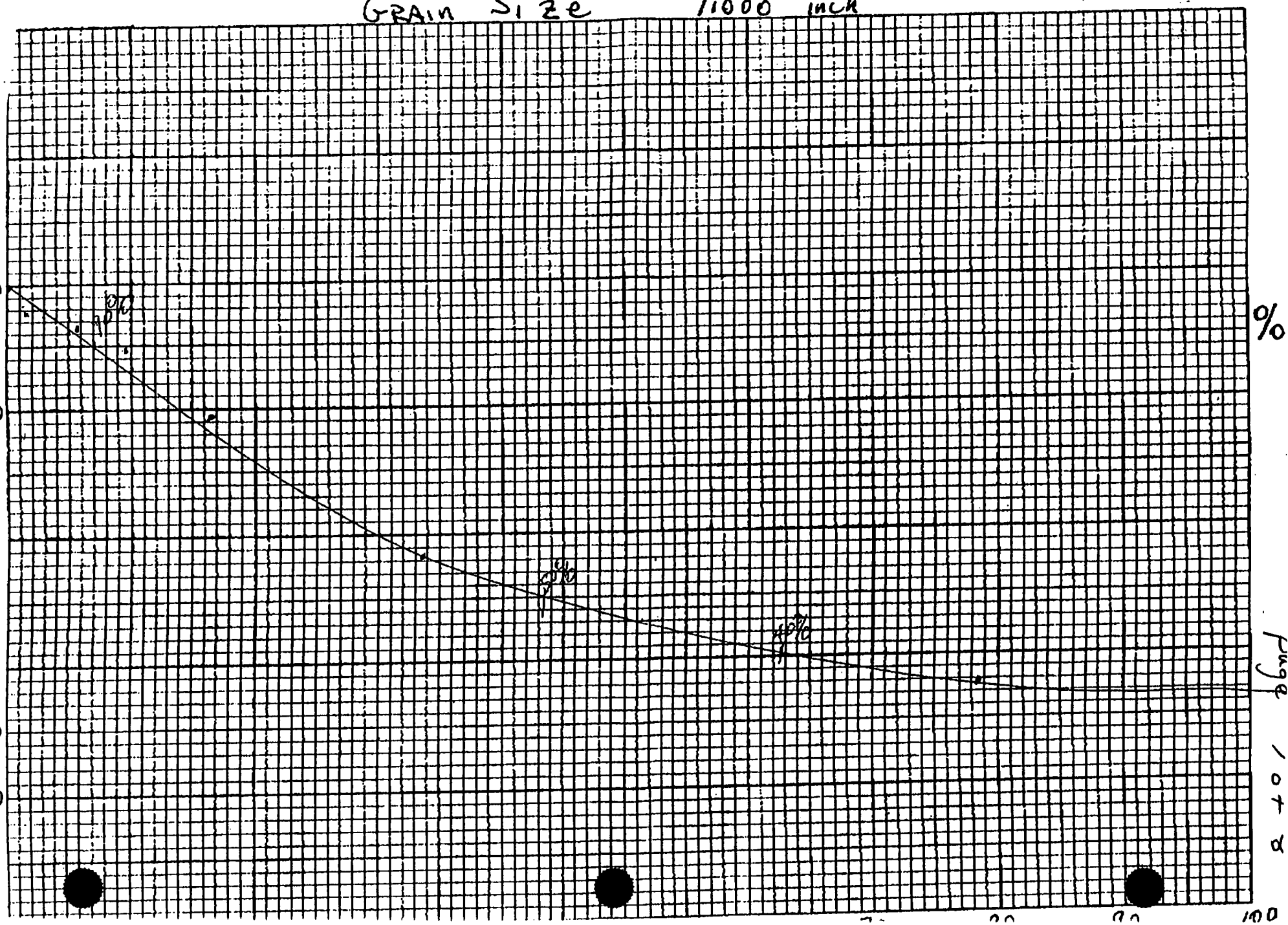
NO. 340/ -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

MADE IN U. S. A.

BZ.16

Cust. # 107281

GRAIN SIZE 1/1000 inch



Page 1 of 2

000515

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME RCRA Phase II	
BORING NUMBER 4446	COORDINATES.	DATE 1-29-93
ELEVATION:	GWL: Depth 63.2 Date/Time 2-10-93/0940	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth 63.3 Date/Time 3-2-93/1325	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 1 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	107201 1505 1-27-93	2 5 5	10	Stiff (10YR, 5/3) Brown, Back Fill Material, Silty Clay, mottling, low plasticity, slightly moist	CL	1.5	HNU = 0 ppm; Bγ = 40-60 cpm
2 3	107202 1510 1-29-93	2 3 6	10	Very Stiff (10YR, 5/3) Brown, Back Fill Material, Silty Clay, mottling, low plasticity, slightly moist	CL	2.0	HNU = 0 ppm; Bγ = 40-60 cpm
4	107203 1520 1-29-93	3 8 9	14	Stiff (10YR, 5/6) Yellowish Brown, Back Fill Material, Silty Clay, mottling, low plasticity, slightly moist	CL	1.5	HNU = 0 ppm; Bγ = 40-60 cpm
5 6	107204 1525 1-27-93	6 9 9	13	Stiff (10YR, 5/4) Yellowish Brown, Back Fill Material, Silty Clay, mottling, low plasticity, slightly moist	CL	1.5	HNU = 0 ppm; Bγ = 60-80 cpm
7	107205 1530 1-27-93	7 8 9	15	Stiff (10YR, 6/6) Brownish Yellow, Back Fill material, Silty Clay, mottling, low plasticity, slightly moist	CL	1.5	HNU = 0 ppm; Bγ = 40-60 cpm
8 9	107206 1535 1-29-93	8 16 21	16	Hard (10YR, 5/4) Yellowish Brown, Back Fill material, Silty Clay, mottling, low plasticity, slightly moist	CL	4.0	HNU = 0 ppm; Bγ = 40-60 cpm
10	107207 0850 2-1-93	7 14 41	10	Very Dense (10YR, 6/4) light yellowish Brown, Back Fill material, Clayey Silt with pockets of sand, low plasticity, slightly moist, Back Fill Material	ML	N/A	HNU = 0 ppm; Bγ = 60-80 cpm
11 12	107208 0905 2-1-93	45 20 26	8	Dense (10YR, 5/6) Yellowish Brown, Back Fill material, Clayey Silt with pockets of sand, low plasticity, slightly moist	ML	N/A	HNU = 0 ppm; Bγ = 40-60 cpm
13	107209 0930 2-1-93	6 12 14	8	Medium Dense (10YR, 5/1) Gray with mottling, Clayey Silt with trace sand, low plasticity, slightly moist	ML	N/A	HNU = 0 ppm; Bγ = 40-60 cpm
14 15	107210 0950 2-1-93	4 5 9	5	Medium Dense (7.5YR, N4/1) Dark Gray, Clayey Silt with trace Gravel, low plasticity, slightly moist	ML	N/A	HNU = 0 ppm; Bγ = 80-100 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Lonnie McGlocklin

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Char-

Background Readings 1-29-93 { HNU = 0 ppm; Bγ = 40-60 cpm } 2-1-93 { HNU = 0 ppm; cpm - 40-60 cpm }

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 002-0-1.28 W3A 40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 7446	COORDINATES:	DATE 2-1-93
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: Cable Tool		PAGE 2 OF 20

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1005 2-1-93	5 3 7	N/A	No Recovery	N/A	N/A	2 Samples Taken. No Recovery on Each Sample.
17 18	107211 1300 2-1-93	9 16 16	10	Dense (2.5Y, N5/) gray, Clayey Silt with Trace Gravel, low plasticity, slightly moist	ML	N/A	HNU = 0 ppm Bg = 60-80 cpm
19	107212 KP 2-1-93 ~~1300~~ 1030 2-1-93	11 11 10	5	Medium Dense (2.5Y, N5/) gray, Clayey Silt with Trace Gravel and wood fragments, slight plasticity, slightly moist	ML	N/A	HNU = 0 ppm Bg = 60-80 cpm
20 21	107213 1310 2-1-93	7 11 12	11	Medium Dense (2.5Y, N5/) gray, Silt with trace gravel, ~~sandy~~ KP 2-1-93 slight plasticity, slightly moist	ML	N/A	HNU = 0 ppm Bg = ~~[illegible]~~ KP 2-1-93 60-80 cpm
22	107214 1315 2-1-93	14 16 19	8	Dense (2.5YR, N4/) Dark Gray, sandy silt, slight plasticity, slightly moist	ML	N/A	HNU = 0 ppm Bg = 80-100 cpm
23 24	107215 1400 2-1-93	5 7 9	5	Medium Dense (2.5YR, N5/) Gray, Clayey Silt, low plasticity, slightly moist	ML	N/A	HNU = 0 ppm Bg = 40-60 cpm Base of till at 24
25	107216 1405 2-1-93	4 25 50	5	Very Dense (10YR, 4/6) Dark Yellowish Brown, poorly graded fine sand, dry	SP	N/A	HNU = 0 ppm Bg = 80-100 cpm
26 27	107217 1415 2-1-93	7 23 20	7	Dense (10YR, 4/6) Dark Yellowish Brown poorly graded ~~sand~~ KP 2-1-93 fine sand with trace gravel, Dry	SP	N/A	HNU = 0 ppm Bg = 40-60 cpm
28 29				Begin Sampling at 5 foot intervals			

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cable Tool

Driller [illegible]

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

KI/PS

VISUAL CLASSIFICATION OF SOILS 5711

PROJECT NUMBER: 602.09.28 W3A 40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 4446	COORDINATES:	DATE 2-1-93
ELEVATION:	GWL: Depth See page 1 Date/Time	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: K. Ryne	Depth See page 1 Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: Cable Tool		PAGE 3 OF 20

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	107219 1425 2-1-93	15 18 20	10	Dense (10 YR, 5/6) Yellowish Brown, poorly graded fine Sand with trace gravel, Dry	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
32							
33							
34							
35							
36	107219 1540 2-1-93	29 50/4	5	Dense (10 YR, 6/4) light Yellowish Brown poorly graded fine sand, Dry	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
37							
38							
39							
40	107220 1605 2-1-93	11 15 18	5	Dense (10 YR, 5/6) Yellowish Brown poorly graded fine sand, Dry	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
41							
42							
43							
44							
45							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment [illegible]

Driller [illegible]

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Char-

Background Readings: HNU = 0 ppm, βγ = 40-60 cpm

2-1-93

000518

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04 22 (WBA 40)	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 4446	COORDINATES:	DATE 2-1-93
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED: 1-29-93
ENGINEER/GEOLOGIST: K Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS: Cable Tool		PAGE 4 OF 20

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	107221 1700 2-1-93	50 50/.4	8	Very Dense (10 YR, 5/4) Yellowish Brown poorly graded fine sand with trace gravel, Dry	SP	N/A	HNU = 0 ppm BZ = 40-60 cpm
47							
48							
49							
51	107222 0900 2-2-93	9 32 37	14	Very Dense (10 YR, 6/3) pale Brown well graded gravelly sand, Dry	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
52							
53							
54							
55	107223 1020 2-2-93	1 0/5	9	Very Dense (2.5Y, 6/3) light Yellowish Brown well graded gravelly medium sand, Dry	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
57							
58							
59							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment [illegible]

Driller [illegible]

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

KI/PS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04-28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES:	DATE 2-2-93
ELEVATION:	GWL: Depth See page Date/Time	DATE STARTED 1-27-93
ENGINEER/GEOLOGIST K. Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 5 OF 20

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	107224 1040 2-2-93	30 30 24	12	Very Dense (10YR, 5/4) Yellowish Brown Well Graded Gravelley Sand, Dry	SW	N/A	HNU = 0 ppm BG = 60-80 cpm
62							
63							
64							
65	107225 1315 2-2-93	29 27 54/.4	15	Very Dense (2.5 Y, 5/2) Grayish Brown Well Graded Sandy Gravel, Wet	GW	N/A	HNU = 0 ppm BG = 60-80 cpm
66							
67							
68							
69							
70	107226 1340 2-2-93	30 35 27	11	Very Dense (2.5 Y, 4/2) Dark Grayish Brown, Poorly Graded ~~KP 3-2-93~~ Fine Sand with Trace Gravel, wet	SP	N/A	HNU = 0 ppm BG = 60-80 cpm
71							
72							
73				HYDRO PUNCH 73.0 FT (No Recovery)			KP 2-2-93 ~~Sample # 107227~~
74							
75				HYDROPUNCH 75.0 FT			Sample # 107227

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson, Lonnie McCloskin

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Char-

Background Readings
2-2-93 { HNU = 0 ppm
BG = 60-80 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES.	DATE 2-3-93
ELEVATION:	GWL: Depth 60-7 ft Date/Time 2-3-93/0815	DATE STARTED 1-29-9
ENGINEER/GEOLOGIST K. Payne	Depth see page 1 Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 6 OF 20

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	107228 0805 2-3-93	17 16 16	11	Medium Dense (2.5Y, 5/3) light olive Brown ~~KP 2-3-93~~ well Graded ~~KP 2-3-93~~ Sand with trace gravel, wet	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
77							
78							
79							
80							
81	107229 1045 2-3-93	5 16 17	19	Medium Dense (2.5Y, 4/3) olive Brown well Graded ~~KP 2-3-93~~ Sand with trace gravel, wet	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
82							
83							
84							
85	107230 1105 2-3-93	30 35 50/.4	14	Very Dense (2.5Y, 5/2) Grayish Brown, well Graded Sand, wet	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
87							
88							
89							
90							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller B-6 Johnson
Bonnie McGlocklin

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penet
Colors identified using Munsell Color Char

Background Readings
2-3-93 HNU = 0 ppm
BZ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 7446	COORDINATES:	DATE 2-3-93
ELEVATION:	GWL: Depth See page 1 Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth See page 1 Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 7 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	107231 1320 2-3-93	3 10 11	17	Medium Dense (2.5Y, 4/2) Dark Grayish Brown, Poorly Graded Fine Sand, wet, Trace Gravel	SP	N/A	HNU = 0 ppm Bγ = 80-100 cpm
92							
93							
94							
95	107232 1435 2-3-93	10 21 25	12	Dense (2.5Y, 5/2) Grayish Brown Well Graded Sand, wet	SW ~~SP~~ CA 7/25/93	N/A	HNU = 0 ppm Bγ = 60-80 cpm
96							
97							
98							
99				HYDROPUNCH 100.0 FT			Sample # 107234
100	107233 1515 2-3-93	16 17 10	15	Medium Dense (2.5Y, 3/3) Dark olive Brown, Well Graded Sand with Trace Gravel, wet	SW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
101							
102							
103							
104							
105							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGriff

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Char

Background Readings - 2-3-93 HNU = 0 ppm, Bγ = 40-60 cpm

KI/PS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28 WBA	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES:	DATE ~~1-29-93~~ 2-4-93
ELEVATION:	GWL: Depth See page 1 Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth See page 1 Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 8 OF 20

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	107235 0930 2-4-93	39 35 35	14	Very Dense (2.5Y, 4/3) Olive Brown Well Graded Sand with Trace Gravel, wet	SW	N/A	HNU = 0 ppm βγ = 40-60 cpm
107							
108							
109							
110	107236 0955 2-4-93	29 32 35	14	Very Dense (2.5Y, 4/2) Dark Grayish Brown, Well Graded Sand, wet	SW	N/A	HNU = 0 ppm βγ = 30-100 cpm
111							
112							
113							
114							
115	107237 1350 2-4-93	6 16 29	10	Dense (5Y, 4/2) Olive Gray, Poorly Graded Medium Sand, ~~wet~~ Trace Gravel, wet	SP	N/A	HNU = 0 ppm βγ = 40-60 cpm
116							
117							
118							
119							
120							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGlaflin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetr

Colors identified using Munsell Color Char-

Background Readings
2-4-93 { HNU = 0 ppm
βγ = 40-100 cpm

000523

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME RCRA Phase II	
BORING NUMBER: 4446	COORDINATES:	DATE 2-4-93
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-9
DRILLING METHODS cable Tool		PAGE 9 OF 26

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121	107233 1425 2-4-93	3 9 11	15	Medium Dense (5Y, 5/3) Olive Well Graded Sand, wet	SW	N/A	HNU = 0 ppm BY = 40-60 cpm
122							
123							
124							
125				HYDRO PUNCH 1250 FT			Sample # 107239
126	107290 0940 2-5-93	44 44 50/.5	16	Very Dense (2.5Y, 4/2) Dark Grayish Brown, Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm BY = 60-80 cpm
127							
128							
129							
130	107241 0915 2-5-93	8 14 22		Dense (2.5Y, 4/3) Olive Brown Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm BY = 80-100 cpm
131							
132							
133							
134							
135							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Ben Johnson

Lennie Malicki

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Char-

Background Readings -

2-4-93 { HNU = 0 ppm, BY = 40-60 cpm

2-5-93 { HNU = 0, BY = 40-60

000524

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME RCRA Phase II		
BORING NUMBER 4446	COORDINATES.	DATE 2-5-93	
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED 1-29-93	
ENGINEER/GEOLOGIST K. Payne	Depth See page Date/Time	DATE COMPLETED: 3-2-9	
DRILLING METHODS Cable Tool		PAGE 10 OF 20	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136	107240 1045 2-5-93	25 47 50/.5	15	Very Dense (2.5Y, 5/2) Grayish Brown, well Graded Sand, wet	SW	N/A	HNU = 0 ppm βγ = 60-80 cpm
137							
138							
139							Drillers feel 3/4 clay layer is approx. from 138.0 to 143.0 ft
140							
141	107243 1125 2-5-93	8 9 10	17	Very Stiff (5Y, 4/2) olive Gray, ~~well Graded silty clay~~ KP 2-5-93, low plasticity moist	CL	2.5	HNU = 0 ppm βγ = 40-60 c
142							
143							
144							
145							
146	107244 1320 2-5-93	10 17 26	6	Dense (5Y, 5/3) Olive, well Graded Sandy Gravel, wet	GW	N/A	HNU = 0 ppm βγ = 40-60 cpm
147							
148							
149							
150				HYDROPUNCH 150.0 FT			Sample #107240

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Connie McGlocklin

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetr
Colors identified using Munsell Color Char

Background Readings
2-5-93 { HNU = 0 ppm
βγ = 40-60 cpm

HI/PS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES.	DATE 2-5-93
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-9
DRILLING METHODS Cable Tool		PAGE 11 OF 2c

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	107245 1420 2-5-93	29 31 32	6	Very Dense (5Y, 5/2) Olive Gray, well Graded Sandy Gravel wet	GW	N/A	HNU = 0 ppm BY = 60-80 cpm
152							
153							
154							
155							
156	107247 1030 2-5-93	45 20 20	8	Dense (2.5Y, 6/3) light Yellowish Brown, well Graded Sandy Gravel, wet	GW	N/A	HNU = 0 ppm BY = 40-60 cpm
157							
158							
159							
160							
161	107245 1420 2-5-93	3 4 17	15	Loose (2.5Y, 5/2) Grayish Brown, Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm BY = 40-60 cpm
162							
163							
164							

NOTES

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable 42

Driller: Bob Johnson

Lance Mitchell

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Char

Background Readings

2-5-93. { HNU = 0 ppm, BY = 40-60 cpm

2-8-93 { HNU = 0 ppm, BY = 40-60 cpm

000526

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES.	DATE 2-8-93
ELEVATION:	GWL: Depth 62.1FT Date/Time 2-8-93 / 0800	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth See page Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 12 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166	107249 1505 2-8-93	6 6 12	13	Medium Dense (2.5Y, 5/3) light Olive Brown, Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm BZ = 40-60 cpm
167							
168							
169							
170	107250 1530 2-8-93	9 11 21	15	Dense (2.5Y, 4/4) Olive Brown well Graded Sand with Trace Gravel, wet	SW	N/A	HNU = 0 ppm BZ = 40-60 cpm
171							
172							
173							
174							
175				[illegible] 175 FT			Sample #107251
176	107252 0920 2-9-93	5 20 50/.4	17	Very Dense (2.5Y, 4/3) Olive Brown Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
177							
178							
179							
180							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Lonnie McGlothlin

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetr[illegible]
Colors identified using Munsell Color [illegible]

Background Readings
2-8-93 { HNU = 0 ppm, BZ = 40-60 cpm
2-9-93 { HNU = 0 ppm, BZ = 40-60 cpm

000527

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.27 WBA 40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES.	DATE 2-9-93
ELEVATION:	GWL: Depth See page 1 Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth See page 1 Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 13 OF 20

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
181	107253 0945 2-9-93	7 10 19	18	Medium Dense (2.5Y, N4/) Dark Gray, Well Graded Sand, wet	SW	N/A	HNU = 0 ppm Bγ = 60-80 cpm
182							
183							
184							
185	107254 1400 2-9-93	16 40 45	13	Very Dense (5Y, 4/4) Olive, Well Graded Sand, wet	SW	N/A	HNU = 0 ppm Bγ = 40-60 cpm
186							
187							
188							
189							
190				Samples taken from 190.0 - 193.5 were used for sieve			
191	107268 1445 2-9-93	6 9 13	18	Medium Dense (5Y, 4/2) Olive Gray, Poorly Graded Fine Sand, wet	SP	N/A	HNU = 0 ppm Bγ = 60-80 cpm Sample used for sieve
192							
193							
194							
195				~~Begin Sampling for Sieve Analysis~~ KP 2-24-93			

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lennie McGlocklin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Char-

Background Readings

2-9-93 { HNU = 0 ppm, Bγ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA 40	PROJECT NAME RCRA Phase II		
BORING NUMBER: 4446	COORDINATES.	DATE 2-9-93	
ELEVATION:	GWL: Depth 63.2 Date/Time 2-10-93/0840	DATE STARTED 1-29-93	
ENGINEER/GEOLOGIST K. Payne	Depth See page 1 Date/Time	DATE COMPLETED: 3-2-93	
DRILLING METHODS Cable Tool		PAGE 14 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196	107268 1610 2-9-93	11 14 11	14	Medium Dense (5Y, 4/3) Olive, Well Graded Sand, Wet	SW	N/A	HNU = 0 ppm BZ = 60-80 cpm
197 198	107268 1710 2-9-93	48 50/.4	8	Very Dense (5Y, 4/2) Olive, ~~Gray~~ KA 2-9-93 Poorly Graded Fine Sand, Wet	SP	N/A	HNU = 4 ppm BZ = 60-80 cpm
KP 2-10-93 199	~~107261~~ ~~107269~~ 0855 2-10-93	10 20 20	14	Dense (5Y, 4/2) Olive Gray, Poorly Graded Medium Sand, Wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
200 201	107261 0920 2-10-93	12 15 23	13	Dense (5Y, 5/4) Olive, Poorly Graded Fine Sand, Wet HYDROPUNCH 200.0 FT SAMPLE # 107262	SP	N/A	HNU = 0 ppm BZ = 40-60 cpm
202	107263 1350 2-10-93	42 50/.5	8	Very Dense (5Y, 4/3) Olive, Poorly Graded Fine Sand, Wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
203 204	107264 1400 2-10-93	42 50/.4	7	Very Dense (5Y, 4/3) Olive, Poorly Graded Fine Sand with Trace Gravel, Wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
205	107265 1440 2-10-93	50 75 40	18	Very Dense (5Y, 4/3) Olive, Poorly Graded Fine Sand with Trace Gravel, Wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
206 207	107266 1550 2-10-93	42 80	11	Very Dense (5Y, 4/3) Olive, Poorly Graded Fine Sand with Trace Gravel, Wet	SP	N/A	HNU = 0 ppm BZ = 60-80 cpm
208 KP 2-10-93 209							
210	107267 1700 2-10-93	85/.5	2	Bedrock - Shale	SH	N/A	HNU = 0 ppm BZ = 60-80 cpm

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Rob Johnson

Lonnie McGlothlin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

Background Readings

2-9-93 { HNU = 0 ppm, BZ = 40-60 cpm

2-10-93 { HNU = 0 ppm, BZ = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 60204.28 WBA40	PROJECT NAME. RCRA Phase II	
BORING NUMBER: 4446	COORDINATES.	DATE 2-10-93
ELEVATION:	GWL: Depth see page Date/Time	DATE STARTED 1-29-93
ENGINEER/GEOLOGIST K. Payne	Depth see page Date/Time	DATE COMPLETED: 3-2-93
DRILLING METHODS Cable Tool		PAGE 15 OF 20

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 In.	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211				Bottom of Boring 210.0 FT			
212							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Lonnie McGlocklin

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration t

Colors identified using Munsell Color Char

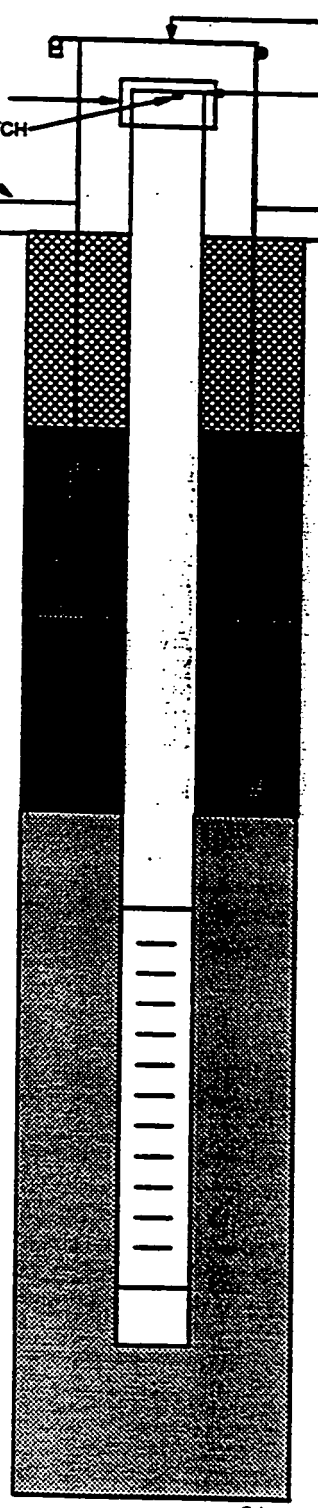
Background Readings

2-10-93 { HNU = 0 ppm
BG - 40-60 cpm

000530

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4446

INSTALLATION DATE: 3-2-93



TOP OF PROTECTIVE WELL COVER: HEIGHT 2.5 FT

TOP OF RISER: 2.0 FT

CEMENT: 1.3 FT.

VOLCLAY GROUT: ~~N/A~~ ~~178.3~~ 178.7 KP 3-2-93 FT.

BENTONITE SEAL: N/A FT.

SAND PACK: 30.0 FT.

SCREEN: 10.0 FT.

(DEPTH) (FT)

BOTTOM OF CEMENT: 1.3 FT

BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF BENTONITE SEAL: N/A FT

TOP OF 10/20 SAND PACK: 180.0 FT

Top of 4/30 Sand 185.5 FT

TOP OF SCREEN: 188.7 FT

BOTTOM OF SCREEN: 198.7 FT

PIEZOMETER TIP: 200.7 FT

BOTTOM OF BORING: 210.0 FT

BOREHOLE DIAMETER: 10 3/8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30 32-50 lb ; 10/20 3-80 lb
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 36 - 50 lb bags
AMOUNT OF CEMENT: 1 - 94 lb bags
AMOUNT OF WATER USED: 2400 gallons
OTHER: 33 Drums Soil ; 2 Drums Akonox/Water
TASK: 602 04.28 WBA 410

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 63.3 FT; 3-2
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K Payne

ASI FORM 0157 REV (0)

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II
PROJECT NO. 602.04.28 WBA 40
BORING NO. 4446
PIEZOMETER NO. 4446

FIELD ENG./GEO. K. Payne DATE 3-2-9
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 3-2-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 130.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 FT TO 210.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.020 in.
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 19-10 FT, 1-.7 FT
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM 1.3 FT		
GROUT / ~~SLURRY~~ Cement KP 2-16-93	TOP 1.3 FT	BOTTOM 180.0 FT	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND (see remarks Below)	TOP 180.0 FT	BOTTOM 210.0 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 188.7 FT	BOTTOM 198.7 FT	TOP	BOTTOM
PIEZOMETER TIP	200.7 FT			
BOTTOM OF BOREHOLE	210.0 FT			
GWL AFTER INSTALLATION	63.3 FT (TOP OF RISER)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS The Sand Pack consists of 4/30 sand from 210.0 to 185.5 FT, 10/20 sand from 185.5 to. Cement was placed from 0.0 to 1.3 FT to hold the protective cover in place.

B-4446

Customer Number: 107268

MATERIAL: Soil

SAMPLE NUMBER: 930211-104

DETERMINATION: Particle Size

METHOD: Sieve Analysis

Sample weight: 170.95~~04~~

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	30.99	18.13	18.13	78.7
20	34.15	19.98	38.11	33.5
40	59.14	34.59	72.70	16.7
60	21.50	12.58	85.28	9.8
100	12.42	7.27	92.55	5.9
200	6.80	3.98	96.53	3.0
Pan	4.56	2.67	99.20	

$$\frac{W_2 \times 100\%}{W_1} = R$$

$$\left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by: H Volk

Checked by: J Fabant

Date analyzed: 2-16-93

Grain Size Retained

40 %	33
50 %	~~37~~ 27
90 %	7

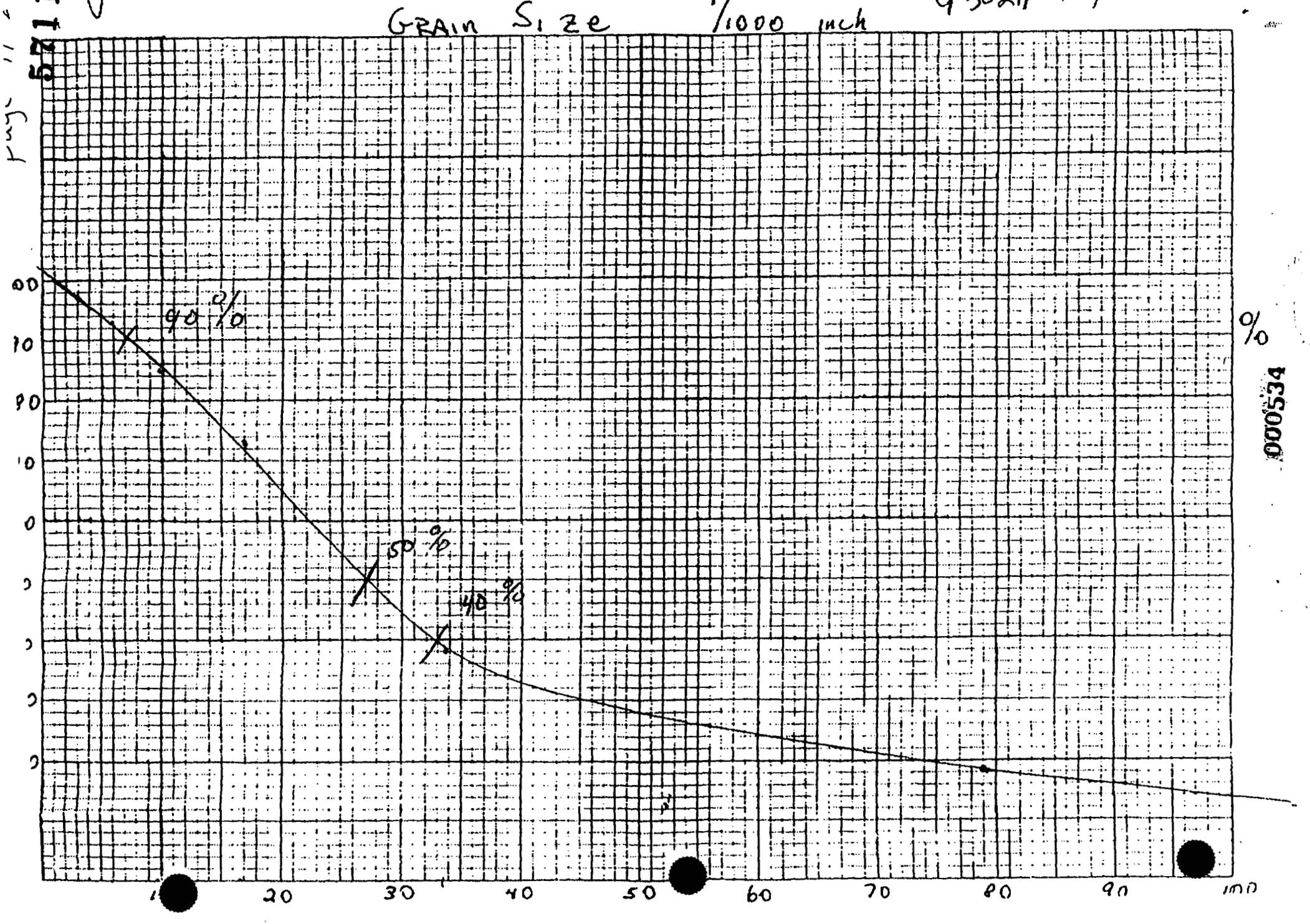
NO. 3407 HD DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

930211-104

Page 11 of 1

57711



000534

well #4446

Retained Values

90% = .007

50% = .027

40% = .033

$\frac{.033}{.007} = 4.71$ 4.71 > 3 use factor of 4

$4 \times .027 = .108$

The 50% Retained Value more closely fits the 4/30 Coarse Sand and .020 slot screen

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1447	COORDINATES:	DATE: 12-3-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-3-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-3-89	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-Inches	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	54375 1418 12-3-89	4	6	Med Dense (2.5y, 3/2) very dark grayish brown clayey silt, rootlets, slightly moist	ML	NA	Hnu = 0 ppm, α = 0 cpm, βB = 30 cpm
1.0	54376 1418 12-3-89	11	6	Med Dense SAA	ML	NA	
1.5	54377 1418 12-3-89	7	3	Med Dense SAA + trace sand	ML	NA	
2.0	54378 1424 12-3-89	5	6	Med Dense (2.5y, 4/4) olive brown coarse silty sand, wet, some thin clay layers (1-2 inches), wet	SM	NA	Hnu = 0 ppm, α = 0 cpm, βB = 30 cpm
2.5	54379 1424 12-3-89	5	0	NR	NA	NA	
3.0	54380 1424 12-3-89	4	0	NR	NA	NA	
3.5	54381 1428 12-3-89	8	6	SAA (1.5-2.0 ft) + some gravel, no clay	SM	NA	Hnu = 0 ppm, α = 0 cpm, βB = 80 cpm
4.0	54382 1428 12-3-89	12	4	Very Stiff (2.5y, 4/4) olive brown silty clay, low plasticity, trace sand & fine gravel, wet	CL	2.5	
4.5	54383 1428 12-3-89	12	0	NR	NA	NA	
5.0	54384 1435 12-3-89	5	5	Very Stiff (2.5y 5/4) light olive brown silty clay, trace fine gravel, low plasticity, slightly moist	CL	2.0	Hnu = 0 ppm, α = 0 cpm, βB = 50 cpm
5.5	54385 1435	8	0	NR			
6.0	54386 1435	9	0	NR			
6.5	54387 1445	7	6	Very Stiff (2.5y, 5/4) Lt. olive brown silty clay, mottled trace fine gravel, slightly moist	CL	2.5	Hnu = 0, α = 0, βB = 100
7.0	54388 1445	7	6	HARD SAA	CL	4.5	
7.5	54389 1445	13	0	NR	NA	NA	

H_2O ZONE

NOTES: Contractor : Pennsylvania Drilling
Driller : BOB YOST
Drillers Assistant: BRIAN STRAZZON
All Samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Charts.

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 60-80 cpm

000536

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1447	COORDINATES:	DATE: 12-3-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-3-89	
ENGINEER/GEOLOGIST: M. GAZMAN	Depth Date/Time	DATE COMPLETED: 12-3-89	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	54390 1455 12-3-89	22	6	HARD SAA 6.5-7.0FT	CL	4.5	Hnu = 0 ppm
8.0	54391			BOTTOM OF BORING PIEZOMETER INSTALLED			α = 0 cpm
8.5	54392						β = 80 cpm
9.0	54393						
9.5	54394						Hnu = α = β =
10.0	54435						
10.5	54436						
11.0	54437						Hnu = α = β =
11.5	54438						
12.0	54439						
12.5	54440						Hnu = α = β =
13.0	54441						
13.5	54442						
14.0	54443						Hnu = α = β =
14.5	54444						
15.0							

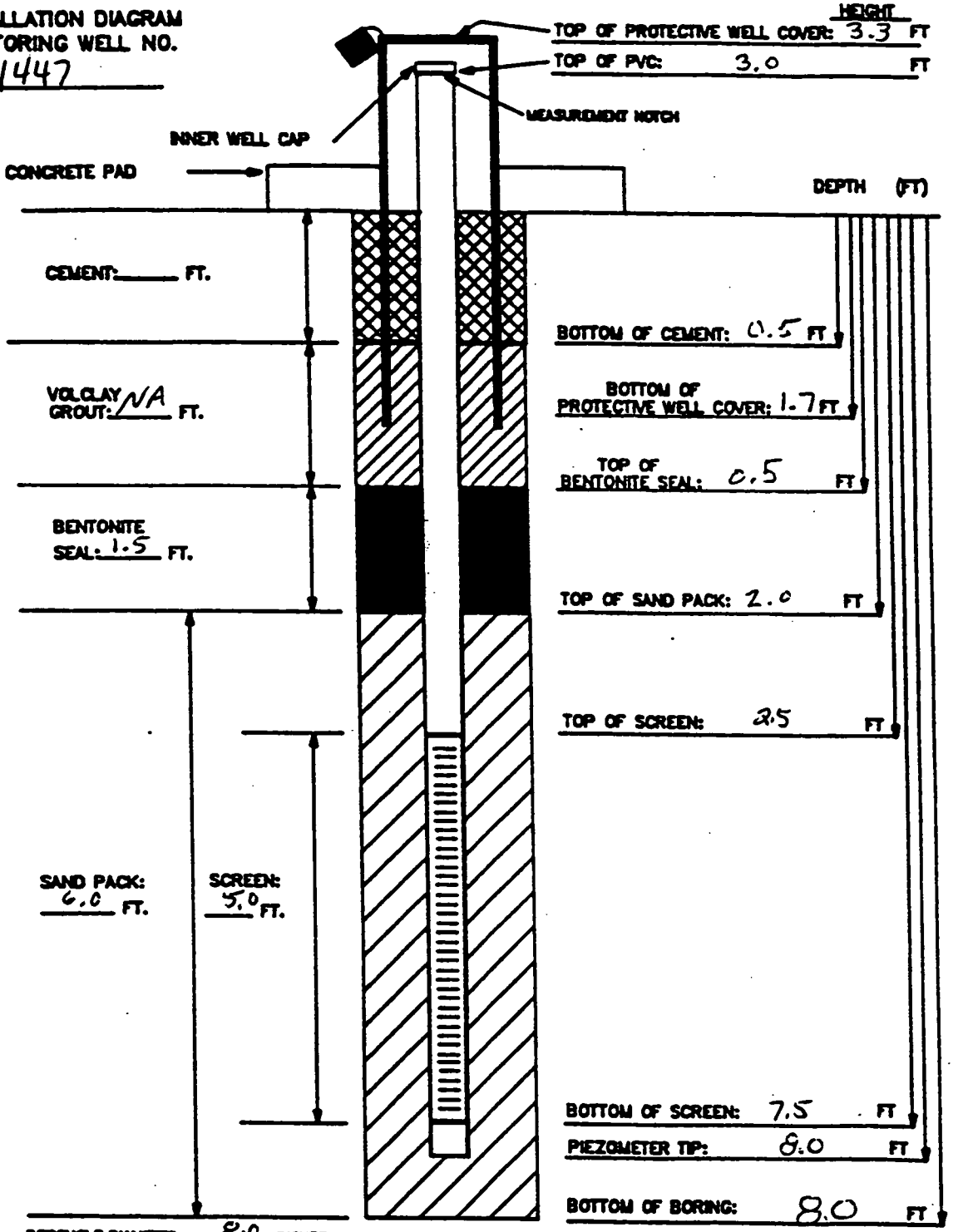
NOTES:

SEE PAGE 1

INSTALLATION DATE: 12-3-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1447



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 2.5 80 lb. bags
BENTONITE PELLETS (5-GALLON BUCKETS): ~~1.5~~ 1.0 M.G. 12-3-91
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 5 gal.
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.7.1

GEOLOGIST/ENGINEER: M. Gnerman

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITY ES TESTING FIELD ENG./GEO. M. GREENHAN DATE 12-3-89
PROJECT NO. 602.03.07 CHECKED BY _____ DATE _____
BORING NO. 1447
PIEZOMETER NO. 1447 DATE OF INSTALLATION 12-3-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ _____ ~~TO~~ _____
FLUID NONE ~~FROM~~ _____ ~~TO~~ _____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ _____ ~~TO~~ _____
SIZE NONE ~~FROM~~ _____ ~~TO~~ _____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC.
DIAMETER OF PERFORATED SECTION 2.0 IN. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN.
TOTAL PERFORATED AREA 10.0 FT.

RISER PIPE MATERIAL SCHEDULE 40 PVC.
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN. I.D. 2.0 IN.
LENGTH OF PIPE SECTIONS 10.0 FT.
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN.

OTHER PROTECTION LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	3.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.7			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 2.0	TOP	BOTTOM
SAND	TOP 2.0	BOTTOM 8.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 2.5	BOTTOM 7.5	TOP	BOTTOM
PIEZOMETER TIP	8.0			
BOTTOM OF BOREHOLE	8.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS A 1.0 FT. EXTENSION WAS ADDED TO THE TOP OF THE RISER PIPE. THE PROTECTIVE CASE STANDS AT 3.3 TO AVOID PENETRATING THE BOTTOM OF THE BENTONITE INTO THE SAND PACK.

000539

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1448	COORDINATES:	DATE: 12-2-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-2-89	
ENGINEER/GEOLOGIST: M Gorman	Depth Date/Time	DATE COMPLETED: 12-2-89 MG.	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF ~~5~~ 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-inches	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	S4455 1513 12-2-89	3	6	Medium dense (10yr, 3/2) very dark gray sh brown, clayey silt, rootlets, slightly moist.	ML	NA	Hnu = 0 ppm; α = 0 cpm; γB = 100-120 cpm
1.0	S4456 1513 12-2-89	7	5	Medium Dense SAA.	ML	NA	
1.5	S4457 1513 12-2-89	10	0	NR	NA	NA	
2.0	S4458 1515 12-2-89	6	6	SAA (0.5 to 1.0 FT)	ML	NA	Hnu = 0 ppm; α = 0-5 cpm; γB = 60-80 cpm
2.5	S4459 1515 12-2-89	9	2	STIFF (2.5y 4/4) olive brown clay, med plasticity, slightly moist	CL	1.5	
3.0	S4460 1515 12-2-89	12	0	NR	NA	NA	
3.5	S4461 1521 12-2-89	10	6	Medium stiff (2.5y 5/4) light olive brown clay, high plasticity, moist	CL	.75	Hnu = 0 ppm; α = 0 cpm; γB = 100-120 cpm
4.0	S4462 1521 12-2-89	12	6	Stiff (2.5y 5/4) light olive brown, silty clay, trace fine gravel, med plasticity, slightly moist	CL	2.0	
4.5	S4463 1521 12-2-89	12	0	NR	NA	NA	
5.0	S4464 1530 12-2-89	5	0	NR	~~CL~~ CLAY NA	~~12-2-89~~ 3.5 NA	Hnu = NA ppm; α = NA cpm; γB = NA cpm; w/Trap
5.5	S4465 1530 12-2-89	8	0	NR	NA	NA	
6.0	S4466 1530 12-2-89	8	0	NR.	NA	NA	
6.5	S4467 1535 12-2-89	7	6	Very Stiff (2.5y 5/4) light olive brown silty clay, (mottled) trace fine to coarse gravel low plasticity, very slightly moist	CL	3.5	Hnu = 0 ppm; α = 0 cpm; γB = 100 cpm
7.0	S4468 1535 12-2-89	14	6	HARD SAA	CL	4.0	
7.5	S4469 1535 12-2-89	19	2	HARD SAA	CL	4.2	

NOTES: Contractor : Pennsylvania Drilling
Driller : ROBERT YOST
Driller's Assistant: LARRY BOOTH
All Samples collected according to ASTM Standards Soil Colors described

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 60-100 cpm

000540

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS Facility Testing)		
BORING NUMBER: 1448	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-2-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-2-89 M.G.	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	54470 1539 12-2-89	19	0	NR	NA	NA	Hum = NA ppm; α = NA cpm; SB = NA cpm
8.5	54471 1539 12-2-89	23	0	NR	NA	NA	
9.0	54472 1539 12-2-89	24	0	NR	NA	NA	
9.5	54473 1550 12-2-89	5	6	Med Dense 2.5y 3/2 very dark grayish brown clayey silt, slightly moist	ML	NA	Hum = 0 ppm; α = 0 cpm; SB = 120 cpm
10.0	54474 1550 12-2-89	12	3	M. Dense (2.5y, 4/4) olive brown, clayey silt. Some Coarse gravel slightly moist	ML	NA	
10.5	54475 1550 12-2-89	12	0	NR	NA	NA	
11.0	54476 1600 12-2-89	16	6	Very Stiff (5y, 4/1) dark gray silty clay, trace fine to coarse gravel, low plasticity, slightly moist	CL	3.5	Hum = 0 ppm; α = 0 cpm; SB = 100-120 cpm
11.5	54477 1600 12-2-89	30	6	Very Dense (5y, 4/1) dark gray clayey silt, trace sand, some fine to codrse gravel, moist	ML	NA	
12.0	54478 1600 12-2-89	23	4	Very Dense (2.5y, 4/2) dark grayish brown clayey silt trace sand, some fine to codrse gravel, moist	ML	NA	
12.5	54479 1615 12-2-89	25	6	Dense SAA	ML	NA	Hum = 0 ppm; α = 0-5 cpm; SB = 120 cpm
13.0	54480 1615 12-2-89	30	6	Dense (2.5y, 4/2) dark grayish brown silty gravel, trace sand, moist	GM	NA	
13.5	54481 1615 12-2-89	17	3	Dense (5y 4/1) dark gray, clayey gravel, moist	GC	NA	
14.0	54482 1625 12-2-89	16	6	Dense (5y, 5/3) olive clayey sand, trace fine to coarse gravel very moist	SC	NA	Hum = 0 ppm; α = 0 cpm; SB = 120 cpm
14.5	54483 1625 12-2-89	23	6	HARD (5y 5/1) gray silty clay, trace fine to coarse gravel. low plasticity, slightly moist	CL	4.0	
15.0	54484 1625 12-2-89	18	6	HARD SAA + trace sand	CL	4.0	

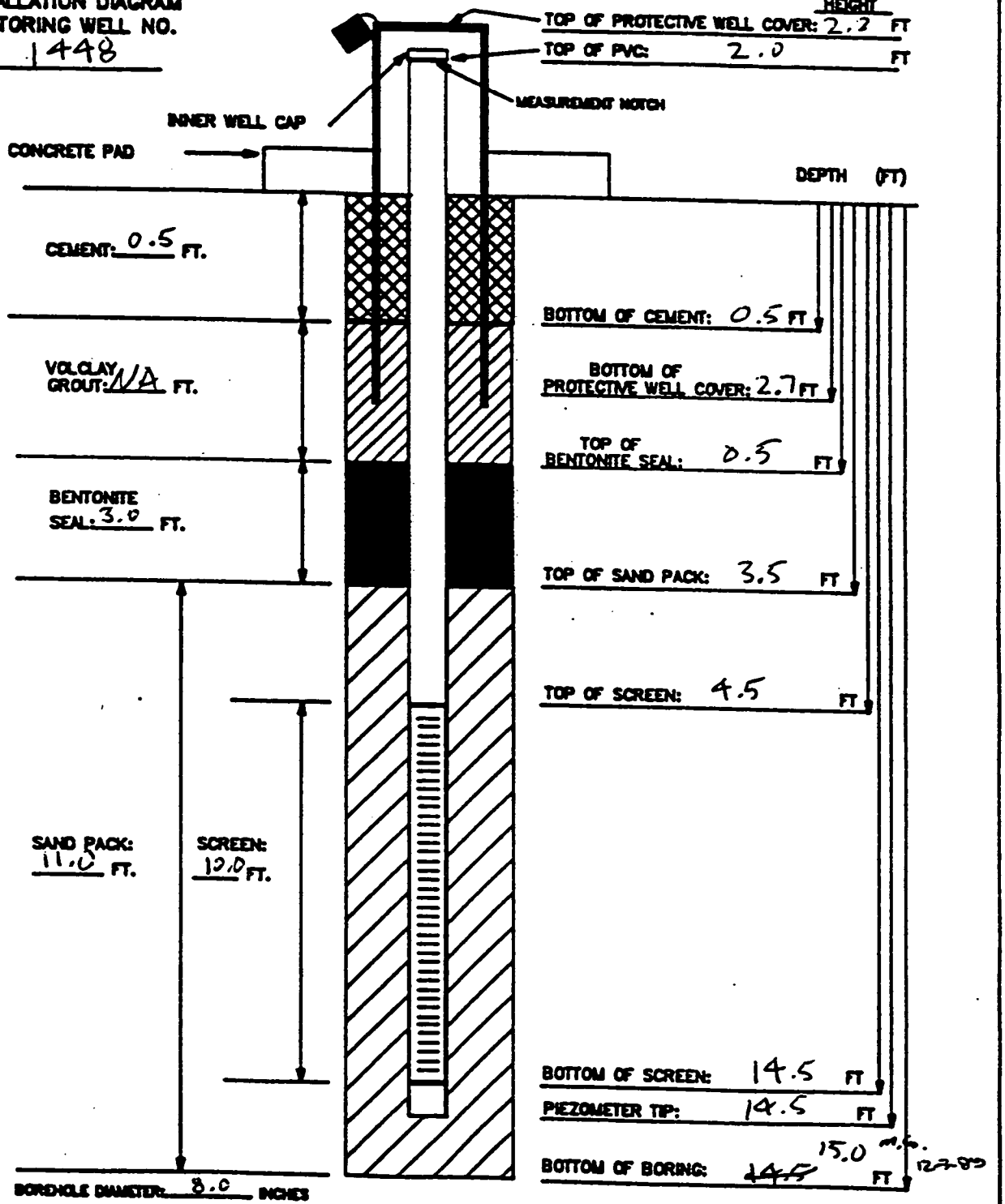
NOTES:

Bottom of sampling SEE PAGE 1
Bottom of Boring at 14.5 FT
Piezometer installed at 14.5 FT.

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1448

INSTALLATION DATE: 12-2-89



MATERIALS USED:

SAND TYPE AND QUANTITY: (1020) 4 80 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 2.0
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 2 gallons
OTHER:

m.6. 12-2-89

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07.01

GEOLOGIST/ENGINEER: Mark Hamm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Gastman DATE 12-2-89
PROJECT NO. 602.03.07.01 CHECKED BY _____ DATE _____
BORING NO. 1448
PIEZOMETER NO. 1448 DATE OF INSTALLATION 12-2-89

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID None FROM ____ TO ____
FLUID None FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Schedule 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN. I.D. 2.0 IN.
LENGTH OF PIPE SECTIONS 10.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____
PROTECTIVE PIPE O.D. 4 3/8 IN.

OTHER PROTECTION LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.7			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 3.5	TOP	BOTTOM
SAND	TOP 3.5	BOTTOM 14.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 4.5	BOTTOM 14.5	TOP	BOTTOM
PIEZOMETER TIP	14.5			
BOTTOM OF BOREHOLE	14.5			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

000543

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1448	COORDINATES:	DATE: 12-2-89	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-2-89	
ENGINEER/GEOLOGIST: W. German	Depth Date/Time	DATE COMPLETED: 12-2-89	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (Inc.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	54455 1513 12-2-89	3	6	Medium dense (10yr, 3/2) very dark grayish brown, clayey silt, rootlets, slightly moist.	ML	NA	Hnu = 0 ppm; α = 0 cpm; γB = 100-120 cpm
1.0	54456 1513 12-2-89	7	5	Medium Dense SAA.	ML	NA	
1.5	54457 1513 12-2-89	10	0	NR	NA	NA	
2.0	54458 1515 12-2-89	6	6	SAA (0.5 to 1.0 FT)	ML	NA	Hnu = 0 ppm; α = 0-5 cpm; γB = 60-80 cpm
2.5	54459 1515 12-2-89	9	2	STIFF (2.5y 4/4) olive brown clay, med plasticity, slightly moist	CL	1.5	
3.0	54460 1515 12-2-89	12	0	NR	NA	NA	
3.5	54461 1521 12-2-89	10	6	Medium stiff (2.5y 5/4) light olive brown clay, high plasticity, moist	CL	0.75	Hnu = 0 ppm; α = 0 cpm; γB = 100-120 cpm
4.0	54462 1521 12-2-89	12	6	Stiff (2.5y 5/4) light olive brown silty clay, trace fine gravel, med plasticity, slightly moist	CL	2.0	
4.5	54463 1521 12-2-89	12	0	NR	NA	NA	
5.0	54464 1530 12-2-89	5	0	NR	~~CL~~ CH NA	~~12-2-89~~ 3.5 NA	Hnu = NA ppm; α = NA cpm; γB = NA cpm; w/Trap
5.5	54465 1530 12-2-89	8	0	NR	NA	NA	
6.0	54466 1530 12-2-89	8	0	NR.	NA	NA	
6.5	54467 1535 12-2-89	7	6	Very Stiff (2.5y 5/4) light olive brown silty clay, (mottled) trace fine to coarse gravel low plasticity, very slightly moist	CL	3.5	Hnu = 0 ppm; α = 0 cpm; γB = 100 cpm
7.0	54468 1535 12-2-89	14	6	HARD SAA	CL	4.0	
7.5	54469 1535 12-2-89	19	2	HARD SAA	CL	4.2	

NOTES: Contractor : Pennsylvania Drilling
Driller : ROBERT YOST
Driller's Assistant: LARRY BOOTH
All Samples collected according to ASTM Standards Soil Colors described

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - BETA = 60-100

000544

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1448	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-2-89	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 12-2-89 A.G.	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	54470 1539 12-2-89	19	0	NR	NA	NA	Hum = ppm; α = NA cpm; β = cpm
8.5	54471 1539 12-2-89	23	0	NR	NA	NA	
9.0	54472 1539 12-2-89	24	0	NR	NA	NA	
9.5	54473 1550 12-2-89	5	6	Med Dense 2.5y 3/2 very dark grayish brown clayey silt, slightly moist	ML	NA	Hum = 0 ppm; α = 0 cpm; β = 120 cpm
10.0	54474 1550 12-2-89	12	3	Med. Dense (2.5y, 4/4) olive brown clayey silt. Some coarse gravel slightly moist	ML	NA	
10.5	54475 1550 12-2-89	12	0	NR	NA	NA	
11.0	54476 1600 12-2-89	16	6	Very Stiff (5y, 4/1) dark gray silty clay, trace fine to coarse gravel, low plasticity, slightly moist	CL	3.5	Hum = 0 ppm; α = 0 cpm; β = 100-120 cpm
11.5	54477 1600 12-2-89	30	6	Very Dense (5y, 4/1) dark gray clayey silt, trace sand some fine to coarse gravel, moist	ML	NA	
12.0	54478 1600 12-2-89	23	4	Very Dense (2.5y, 4/2) dark grayish brown clayey silt, trace sand, some fine to coarse gravel, moist	ML	NA	
12.5	54479 1615 12-2-89	25	6	Dense SAA	ML	NA	Hum = 0 ppm; α = 0-5 cpm; β = 120 cpm
13.0	54480 1615 12-2-89	30	6	Dense (2.5y, 4/2) dark grayish brown silty gravel, trace sand, moist	GM	NA	
13.5	54481 1615 12-2-89	17	3	Dense (5y 4/1) dark gray, clayey gravel, moist	SC	NA	
14.0	54482 1625 12-2-89	16	6	Dense (5y, 5/3) olive clayey sand, trace fine to coarse gravel very moist	SC	NA	Hum = 0 ppm; α = 0 cpm; β = 120 cpm
14.5	54483 1625 12-2-89	23	6	HARD (5y 5/1) gray silty clay, trace fine to coarse gravel, low plasticity, slightly moist	CL	4.0	
15.0	54484 1625 12-2-89	18	6	HARD SAA + trace sand	CL	4.0	

NOTES:

Bottom of sampling

Bottom of Boring at 14.5 FT

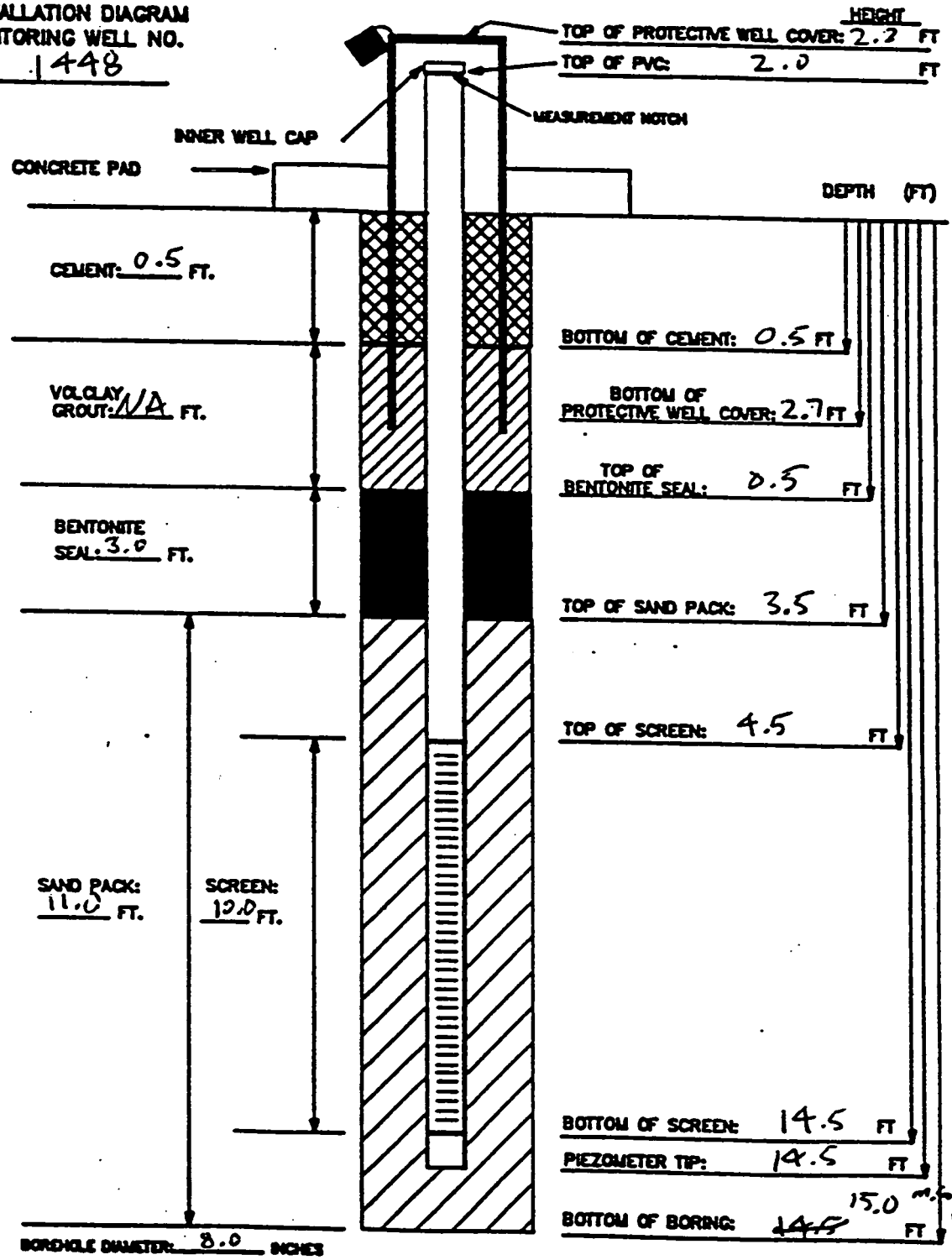
Piezometer installed at 14.5 FT.

SEE PAGE 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1448

INSTALLATION DATE: 12-2-89



MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 4 80 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 2.0
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 2 gallons
OTHER:

m.b. 12-2-89

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07.01

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Gastman DATE 12-2-89
PROJECT NO. 6602.03.07.01 CHECKED BY _____ DATE _____
BORING NO. 1448
PIEZOMETER NO. 1448 DATE OF INSTALLATION 12-2-89

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID None FROM ——— TO ——→	SIZE NONE FROM ——— TO ——→
FLUID None FROM ——— TO ——→	SIZE NONE FROM ——— TO ——→

PIEZOMETER DESCRIPTION

TYPE Schedule 40 PVC	RISER PIPE MATERIAL Schedule 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 IN. I.D. 2.0 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 FT
AVERAGE SIZE OF PERFORATIONS 0.02 IN	JOINING METHOD FLUSH JOINT THREADED
TOTAL PERFORATED AREA 10.0 FT	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____	OTHER PROTECTION LOCK
PROTECTIVE PIPE O.D. 4 3/8 IN.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.7			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 3.5	TOP	BOTTOM
SAND	TOP 3.5	BOTTOM 14.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 4.5	BOTTOM 14.5	TOP	BOTTOM
PIEZOMETER TIP	14.5			
BOTTOM OF BOREHOLE	14.5			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

000547

RI/FS

VISUAL CLASSIFICATION OF SOILS 1

Page of

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:	DATE: 2/23/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time: 12/25/93	DATE STARTED: 2/23/93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time: 3/10/93 0800	DATE COMPLETED: 4-2-93	
DRILLING METHODS Cable Tool	Depth 53.7 Ft Date/Time: 4/08/93	PAGE 1 OF 17	

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0950 107346 2/23/93	27 34 42	12	Hard, 10YR(5/4) yellowish brown silty clay, low plasticity, dry	CL	Top 2' frozen >4, FROZEN	Bγ = 60-80 cpm HNU = 0 ppm
2 3	1000 By 3/23/93 ~~107347~~ 2/23/93	14 13 16	0	No Recovery	NA	NA	Bγ = - cpm HNU = - ppm
4 5	1010 107348 2/23/93	25 34 25	3	Stiff 2.5Y(4/3) olive brown (5/4) lt olive brown mottled, silty clay, med plasticity, moist	CL	1.5	Bγ = 40-60 cpm HNU = 0 ppm
5 6	1015 107348 2/23/93	14 16 21	6	SAA	CL	1.25	Bγ = 40-60 cpm HNU = 0 ppm
7	1020 107349 2/23/93	24 34 35	8	V. stiff 2.5Y(5/3) lt olive brown, silty clay, med plasticity, moist	CL	2.25	Bγ = 50-60 cpm HNU = 0 ppm
8 9	1025 107350 2/23/93	11 [illegible]	18	Stiff 2.5Y(5/3) lt olive brown silty clay, med plasticity wet	CL	1.25	Bγ = 50-60 cpm HNU = 0 ppm
10 By 3/23/93	1030 107352 2/23/93	5 [illegible] 9	17	Stiff 10YR(5/3) brown silty clay, high plast (wet) Med. dense 10YR(5/3) brown silty sand, f-c (wet) Med. Dense (5/4) yellowish brown silt, trace clay (wet)	CL SC SM	1.00 NA	Bγ = 50-60 cpm HNU = 0 ppm
11 12 By 3/23/93	1515 107352 2/23/93	13 17 19	14	2.5Y(5/4) lt olive brown silt, wkly plastic, wet	ML	NA	Bγ = 40-60 cpm HNU = 0 ppm
13	1525 107353 By 3/23/93 2/23/93	9 11 13	13	2.5Y(5/4) lt olive brown silt, wkly plastic, wet. Last 3" stiff 2.5Y(4/2) dk grayish brown, med plasticity wet	ML CL	NA 1.00	Bγ = 40-60 cpm HNU = 0 ppm
14	1550 107354 2/23/93	12 10 [illegible] 8	14	5Y(5/1) Gray gravel from silty clay, high plasticity to silt, wet	ML CL ML	NA 2.10 NA	Bγ = 60-80 cpm HNU = 0 ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
Background = 40-50 cpm 3/23/93
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:	DATE: 2/23/93	
ELEVATION:	GWL: Depth 66.8 Ft Date/Time: 12/25/93	DATE STARTED: 2/23/93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time: 3/10/93 0800	DATE COMPLETED: 4/2/93	
DRILLING METHODS Cable Tool	Depth 53.7 Ft Date/Time: 4/05/93	PAGE 2 OF 17	

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1605 10735~~85~~ 2/23/93	12 7 6	11	M. Dense, 5Y (5/1) Gray, silt w/ some clay, weak plasticity, wet	ML	NA	BG = 40-60 cpm HNU = 0 ppm
17 18	1640 10735~~86~~ 2/23/93	6 8 10	9	M. Dense, 5Y (4/1) Dk Gray, grades from silt to silty sand, poorly graded to stiff gravelly clay, wet.	ML SP CL	NA 1.25	BG = 40-60 cpm HNU = 0 ppm
19	1650 10735~~87~~ 2/23/93	5 12 13	10	Stiff 5Y (5/2) Olive, silty clay w/ minor coarse gravel (silica), med. plasticity, moist	CL	1.25	BG = 40-60 cpm HNU = 0 ppm
20 21	1705 107358 2/23/93	34 50/.5	14	V. Stiff 5Y (4/3) Olive silty clay w/ some (most coarse gravel), medium plasticity, moist	CL	3.00	BG = 40-60 cpm HNU = 0 ppm
22	1105 107360 2/24/93	9 16 17	3	Stiff, 5Y (5/2) Gray sandy gravelly (LMST) clay, med. plasticity, wet	CL	2.25	BG = 40-60 cpm HNU = 0 ppm
23 24	1115 10736D 2/24/93	42 50 50/.5	17	Vy stiff 5Y (5/1) Gray gravelly clay, med plasticity, moist	CL	3.75	BG = 40-60 cpm HNU = 0 ppm
				V. Dense 10YR (5/6) yellowish brown sand, poorly graded, dry to silt, dry	SP ML	NA NA	
25				note: go to page 3			BG = cpm HNU = ppm
26				Note: Sampling will be at 5 ft intervals			BG = cpm HNU = ppm
27							BG = cpm HNU = ppm
28							BG = cpm HNU = ppm
29							BG = cpm HNU = ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
Background = 60 cpm 2/23/93 & 2/24/93
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 2/24/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time 12/25/93	DATE STARTED: 2/23/93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time 3/10/93	DATE COMPLETED: 4/2/93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/Time 4/08/93	PAGE 3 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS
30	1350 107361 2/24/93	17 25 31	8	V. Dense 10YR(5/4) yellowish brown sand, poorly graded, moist to gravelly sand, poorly graded, moist*	SP	NA	BY = 40-60 cpm HNU = 0 ppm
31.5							* moist = due to added water
35	1410 107362 2/24/93	36 50/5	7	V. Dense 10YR(5/4) yellowish brown, sand, poorly graded, moist*	SP	NA	BY = 40-60 cpm HNU = 0 ppm
36.5							
40.	1510 107363 2/24/93	34 50/5	12	V. Dense 10YR(5/4) yel. brown sandy gravel, poorly graded, moist ..... SAA Sand, poorly graded, moist*	GP ..... SP	NA	BY = 60-80 cpm HNU = 0 ppm
41.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Chris Coulter
Helper : David Holmes

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 2/24/93	
ELEVATION:	GWL: Depth 60.8 ft Date/Time 2/25/93	DATE STARTED: 2/23/93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 ft Date/Time 3/10/93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 ft Date/Time 4/08/93	PAGE 4 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS
45 46.5	1515 107364 2/24/93	32 50/5	11	V. Dense 10YR (5/4) yellowish brown, gravelly sand, poorly graded, dry	SP	NA	βγ = 60-80 cpm HNU = 0 ppm
50 51.5	1030 107365 2/24/93	50/3	8	V. Dense 10YR (5/4) yellowish brown, gravel, well graded, wet	GW ~~SP~~ CB 5/2/93	GW ~~SP~~	NA ~~Bm~~ 7/12/93 βγ = 60-80 cpm HNU = 0 ppm
55 56.5	0950 107366 2/25/93	50/2	6	V. Dense 10YR (5/4) yellowish brown, gravel, poorly graded, moist to V. Dense, 10YR (5/4) sand, poorly graded, moist	GP ↓ SP	NA	βγ = 60-80 cpm HNU = 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 38 Cyclone
Driller: Chris Coulter
Helper: David Holmes

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 2-25-93.	
ELEVATION:	GWL: Depth 60.8 ft Date/Time 12/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 ft Date/Time 3/10/93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 ft Depth/Time 4/08/93	PAGE 5 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	1110	10		M. Dense 10YR(5/4) Yellowish Brown			
	107367	15	14	medium grained sandy gravel, well-graded	GW	NA	βγ = 40-60 cpm
61.5	12/25/92	10		wet			HNU = 0 ppm
				Water Table at 60.8 ft. - M-scope			
65							
	1334	37		Dense 25Y(5/4) Lt. Olive brown			
	107368	50/3	5	gravel - sand mixture, well graded,	GW	NA	βγ = 60-80 cpm
66.5	12/25/93			wet			HNU = 0 ppm
70							
	1430	13		Dense 25Y(5/4) Lt. Olive brown			
	107369	14	5	sandy gravel, well graded, wet	GW	NA	βγ = 40-60 cpm
71.5	12/25/93	20		to a sand, poorly graded, wet	SP		HNU = 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Chris Coulter
Helper : David Holmes

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time: 12/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time: 3/10/93	DATE COMPLETED: 4-2-93	
DRILLING METHODS Cable Tool	Depth 53.7 Ft Date/Time 4/09/93	PAGE 6 OF 17	

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	1110	14					
76.5	12/26/93	32 34	0	No Recovery (Sorry)	NA	NA	BZ = NA ppm HNU = NA ppm
80.0							
81.5	1330 107370 12/26/93	28 28 16	12	Dense, 2.5Y(5/4) Lt. Olive Brown, gravelly sand, well graded, wet	Bkg 2/26/93 ~~SP~~ SW	NA	BZ = 40-60 ppm HNU = 0 ppm
85.0							
86.5	1445 ~~107372~~ 12/26/93	10 13 16	0	No Recovery	NA	NA	BZ = NA ppm HNU = NA ppm

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 38 Cyclone

Driller Chris Coulter

David Holmes

SAA - Same as above

NA - Not Applicable

Background =

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 5711 Page of

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:		DATE: 3-1-93
ELEVATION:	GWL: Depth 60.8 Ft Date/Time: 12/25/93		DATE STARTED: 2-23-93
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time: 3/10/93		DATE COMPLETED: 4-2-93
DRILLING METHODS Cable Tool	Depth 53.7 Ft Date/Time 4/05/93		PAGE 7 OF 17

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90.0	1505 107372 12/28/93	10 24 16	18	Dense 2.5Y (5/4) lt. olive brown sand, poorly graded, wet to sandy gravel, well graded to	SP ↓ GW	NA	BG = 40-60 ppm HNU = 0 ppm
95	1000 107373 3/1/93	30 50/6"	12"	very Dense, grayish brown (2.5Y, 5/2), poorly graded, saturated sand ~~trace~~ some gravel	SP	NA	BG = 40-60 ppm HNU: ø ppm
				-Hydropunch sample collected at 95.0 ft. sample number - 107374			
100	1345 107375 3-1-93	5 10 17	18"	medium dense, very dark gray (2.5Y, 3/1). medium sand trace gravel, poorly graded wet	SP	NA	BG = 40-60 ppm HNU: ø ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
Background =
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:		DATE: 3-1-93
ELEVATION:	GWL: Depth 60.8 Ft	Date/Time: 12/25/93	DATE STARTED: 2-23-93
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft	Date/Time: 3/10/93	DATE COMPLETED: 4-2-93
DRILLING METHODS Cable Tool	Depth 53.7 Ft	Date/Time 4/08/93	PAGE 8 OF 17

DEPTH (ft)	SAMPLE TYPE AND No.	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	1445 107376 3-1-93	7 7 7	12 in	medium dense, dark gray (2.5Y, 4/1) medium sand some gravel, poorly graded, wet	SP	NA	βγ = 40-60 ppm HNU = Ø ppm
106.5							
110	1515 107377 3-1-93	5 10 12	15 in	medium dense, dark gray (2.5Y, 4/1), medium to coarse sand some gravel, poorly graded wet	SP	NA	βγ = 40-60 ppm HNU = Ø ppm
111.5							
115	1710 107378 3-2-93 to 3-1-93	39 50/5	5	Vy Dense SY (SL) Gray, medium to coarse grain sand w/ gravel, well graded, wet	SW ~~SP~~ CB 5/4/93	NA	βγ = 40-60 ppm HNU : 0 ppm
116.5							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable
Background =
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3/5/93, 3/8/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time 12/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time 3/10/93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/Time 4/08/93.	PAGE 9 OF 17	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS
120.0	1650 10737K 3/5/93	50/4	4	V. Dense 5Y(4/1) Dk. Gray gravelly coarse sand, poorly graded, wet	SP	NA	BY = 40-60 cpm HNU = 0 ppm
125	BY 3/8/93 ~~0955~~ 1030 3/8/93	13 15 19	0	(Dense) BY 3/9/93 No Sample recovery	NA	NA	BY = NA HNU = NA
126.5				Driller displays sample from interval			
130	1110 10738I 3/9/93	22 50/5	12	V. Dense 5Y(4/1) Dk Grey fine ~~medium~~ grained sand, poorly graded, wet. Last 2 in. a coarse gravel w/ 2.5Y (7/4) very pale brown clay (minor), wet BY 3/9/93	SP	NA	BY = 40-60 cpm HNU = 0 ppm
131.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 38 Cyclone
Driller: Chris Coulter
Helper: David Holmes

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3/8/93, 3/10/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time 2/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time 3/10/93, 0800	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/Time 4/05/93	PAGE 10 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135	1530 10892 3/4/93	50/5 50/2	7	V. Dense 5Y(4/1) Dk Gray fine grain sand, poorly graded, wet to crse grained sand, poorly graded, wet - last 2 in crse gravel w/ clay, ~~[illegible]~~ wet CB 5/12/93	SP /60	NA	BG = 60-80 cpm HNU = 0 ppm
136.5							
140	1015 107383 3/4/93	14 17 29	2	Dense 5Y(4/1) Dk Gray, fine sand w/ fine to coarse gravels, poorly graded, wet Also layer of med. gravel, poorly graded wet	SP GP SP	NA	BG = 4000 cpm HNU = 0 ppm
141.5							
145	1415 107384 3/4/93	9 11 10	5	Med. Dense 5Y(4/1) Dk Gray, fine sand, poorly graded, wet to fine gravel, poorly graded, wet	SP CP	NA	BG = 40-60 cpm HNU = 0 ppm
146.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 38 Cyclone
Driller: Chris Coulter
Helper: David Holmes

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 cpm 3/8/93
40-60 cpm 3/10/93

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3/10/93, 3/11/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time 4/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time 3/10/93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/Time 4/05/93	PAGE 11 OF 17	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150	3/10/93 1630	50/4	3	V. Dense 5Y(4/1) Dk. Grey, sandy ~~coarse~~ gravel, well graded, wet	GW ~~NA~~ By	NA	BS = 40-60 cpm HNU = 0 ppm
151	107386						
155	174S 107387 3/10/93	15 50/5	4	V. Dense 5Y(4/1) Dk Grey, medium gravel w/ minor coarse gravel, well graded, wet	GW	NA	BS = 60-80 cpm HNU = 0 ppm
156.5							
160	101S 107388 3/11/93	5 5 6	8	M. Dense 5Y(4/2) Olive grey, medium sand, poorly graded, wet. to medium gravel w/ minor coarse, well graded wet	SP GW	NA	BS = 40-60 cpm HNU = 0 ppm
161.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Chris Coulter
Helper : David Holmes

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 cpm 3/10/93
= 40-60 cpm 3/11/93

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3-11-93 3/12/93	
ELEVATION:	GWL: Depth 60.8 ft Date/Time 12/25/93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 ft Date/Time 3-10-93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 ft Date/Time 4/08/93	PAGE 12 OF 17	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
165 / 166.5	1400 107391 3/11/93	10 15 25	14	Dense 2.5Y(4/2) Dk gray brown fine sand w/ some gravel, poorly graded, wet	SP	NA	Bq = 60 cpm HNU 0 ppm
170							
171.5	1430 3-11-93	5 5 10	0	No Recovery	NA	NA	Bq = NA cpm HNU = NA ppm
				Sample being pulled through 120 feet of water & flushed out			
175 / 176.5	1030 107391 3/12/93	18 18 15	14	Dense 2.5Y(4/2) Dk. Grey brown fine sand w/ some gravel, poorly graded, wet	SP	NA	Bq = 40 cpm HNU = 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Chris Coulter
Helper : David Holmes

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 cpm 3/11/93
= 40-60 cpm 3/12/93

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-88

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3/12/93	
ELEVATION:	GWL: Depth 60.9 Ft Date/Time 2-25-93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Ft Date/Time 3-10-93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/time 4/08/93	PAGE 13 OF 17	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
180	~~1110~~ 1320 107392 3/12/93	13 25 26	10	V Dense 2.5Y(4/2) Dk. Gray Brown fine sand, poorly graded grading to crs sand, poorly graded trace gravel wet CBS 4/9/93	SP	NA	BZ = 40-60 cpm HNU = 0 ppm
181.5							
185	1500 107393 3/12/93	12 10 9	8	Dense 2.5Y(4/2) Dk Gray Brown fine sand w/ gravel, poorly graded, wet	SP	NA	BZ = 40-60 cpm HNU = 0 ppm
186.5							
190	0930 107394 3/16/93	15 15 30	5	Dense, 2.5Y(4/2) Dk Gray Brown Fine sand w/ gravel, poorly graded, wet	SP	NA	BZ = 40-60 cpm HNU = 0 ppm
191.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Chris Coulter
Helper : David Holmes

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 ppm 3/12/93
= 40-60 cpm 3/16/93

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: LWBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW 4451	COORDINATES:	DATE: 3/22/93	
ELEVATION:	GWL: Depth 60.8 Date/Time 2-25-93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 52.1 Date/Time 4-2-93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Date/Time 3-10-93	PAGE 14 OF 17	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
191	*	*	*	*See previous page	*	*	βγ: * HNU: *
192	0900 ~~107396~~ 3/22/93	50/5 50/1	5	Vy. Dense 2.5Y (4/2) Dk Gray Brown fine to coarse grain sand w/ minor gravel poorly graded, wet	SP	NA	βγ: 40-60cpm HNU: 0ppm
193 194	0920 ~~107397~~ 3/22/93	50/6 45	14	Very Dense 2.5Y (4/2) Dk. Gray Brown fine to coarse grain sand w/ some gravel, well graded, wet	SW	NA	βγ: 40-60 cpm HNU: 0 ppm
195 196	0940 107398 3/22/93	35 42 50/5	12	SAA	SW	NA	βγ: 40-60cpm HNU: 0ppm
197	0955 107399 3/22/93	40 50/6	6	SAA	SW	NA	βγ: 40-60cpm HNU: 0ppm
198 199	1020 ~~107400~~ 3/22/93	50/5 45 50/6	17	SAA	SW	NA	βγ: 40-60cpm HNU: 0ppm
200	1535 ~~107401~~ 3/22/93	50/5 50/5	10	Very Dense 2.5Y (4/2) Dk Gray Brown fine sand, poorly graded, wet	SP	NA	βγ: 40-60cpm HNU: 0ppm
	107500	3/23/93					
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
205							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 38 Cyclone
Driller: Chris Coulter
Helper: David Holmes

SAA = Same As Above
N/A = Not Applicable
Background = 40-60cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBA-40	PROJECT NAME: RCRA Phase II		
BORING NUMBER: MW4451	COORDINATES:	DATE: 3/22/93, 3/23/93	
ELEVATION:	GWL: Depth 60.8 Ft Date/Time 2-25-93	DATE STARTED: 2-23-93	
ENGINEER/GEOLOGIST: R. Yeardley	Depth 52.1 Ft Date/Time 3-10-93	DATE COMPLETED: 4-2-93	
DRILLING METHODS: Cable Tool	Depth 53.7 Ft Date/Time 4/08/93	PAGE 15 OF 17	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
205	1115 107503 3/23/93	300/10	10	Very Dense 2.5 Y(4/2) Dk Gray Brown fine to coarse gravel, well graded, wet fr. cable	GW	NA	Y/B = 40-60 cpm HNU = 0ppm
206.5				Shale, wet to moist.	SH		
				Bottom of Boring + Sampling at 206.5 Ft			Sieve Analysis 107500 # ~~107503~~ 1100 CA 7/25/93

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Louis Carter
Helper : Dennis Holmes

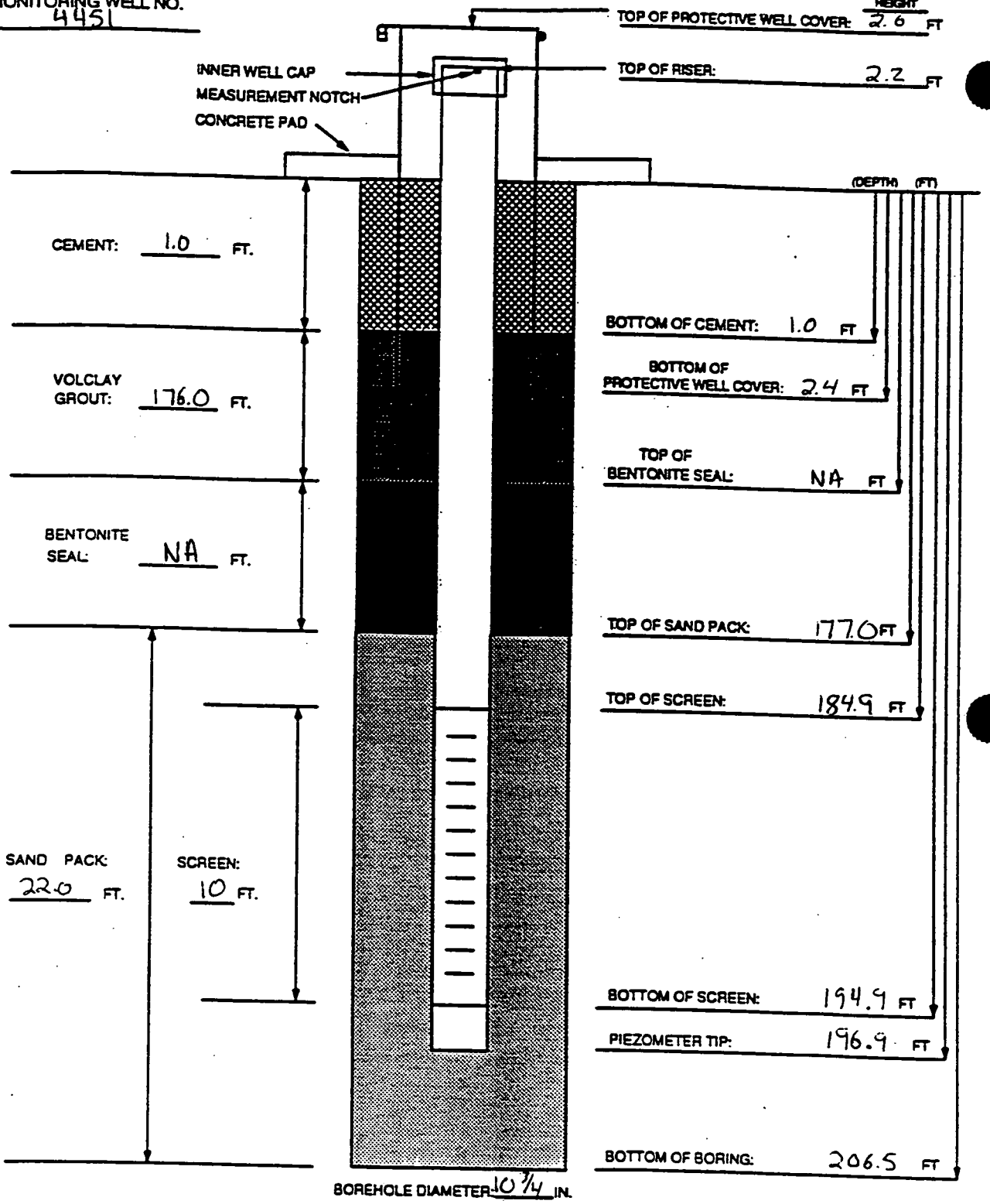
SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm 3/23/93

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4451

INSTALLATION DATE: 2-23-93 to 4-2-93



MATERIALS USED

SAND TYPE AND QUANTITY: 12 bags of 4/30, 4 bags 9/20
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 43 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 2000 gal
OTHER: 42 drums soil, 3 drums water
TASK: WBIA-40 (04.25)

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 53.7 FT/ 4-
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTEC COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeardley

ASI FORM 0157 REV 0

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II
PROJECT NO. WBA-40 (04.28)
BORING NO. 4451
PIEZOMETER NO. 4451

FIELD ENG./GEO. B. Yeardley DATE 4-7-
CHECKED BY C. Brier DATE 5/21
DATE OF INSTALLATION 2-23-93 - 4-2-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 Ft TO 52.0 Ft
FLUID NA FROM NA TO NA

TYPE OF BIT Hammer Percussion
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 Ft TO 205.0
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4.0 in I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.020 in.
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 19 - 10 ft, 1 - 5 ft, 2 -
JOINING METHOD Screw Type - flush joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ( )	
TOP OF RISER PIPE	2.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.4			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT / ~~SLURRY~~ VOLCLAY (CB 5/20/93)	TOP 1.0	BOTTOM 177.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND 10/20	TOP 177.0	BOTTOM 183.0	TOP	BOTTOM
(CB 5/20/93) ~~GRAVEL~~ Sand 4/30	TOP 183.0	BOTTOM 198.0	TOP	BOTTOM
PERFORATED SECTION	TOP 185.0	BOTTOM 195.0	TOP	BOTTOM
PIEZOMETER TIP	197.0			
BOTTOM OF BOREHOLE	206.5			
GWL AFTER INSTALLATION	53.7			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS

mw-4451

Customer Number: ~~930323-060~~ 107500

MATERIAL: _____ SAMPLE NUMBER: 930323-060

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 250.10

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	41.94	16.77	16.77	78.7
20	73.51	29.39	46.16	33.5
40	93.70	37.46	83.62	16.7
60	23.61	9.44	93.06	9.8
100	4.77	1.91	94.97	5.9
200	3.54	1.42	96.39	3.0
Pan	5.73	2.29	98.68	

$\frac{W_2 \times 100\%}{W_1} = R$

$\left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = RPD$

Analyzed by: [signature] Checked by: [signature] Date analyzed: 3-24-93

Grain Size Retained

40 %	38
50 %	32
90 %	12

995000

1125

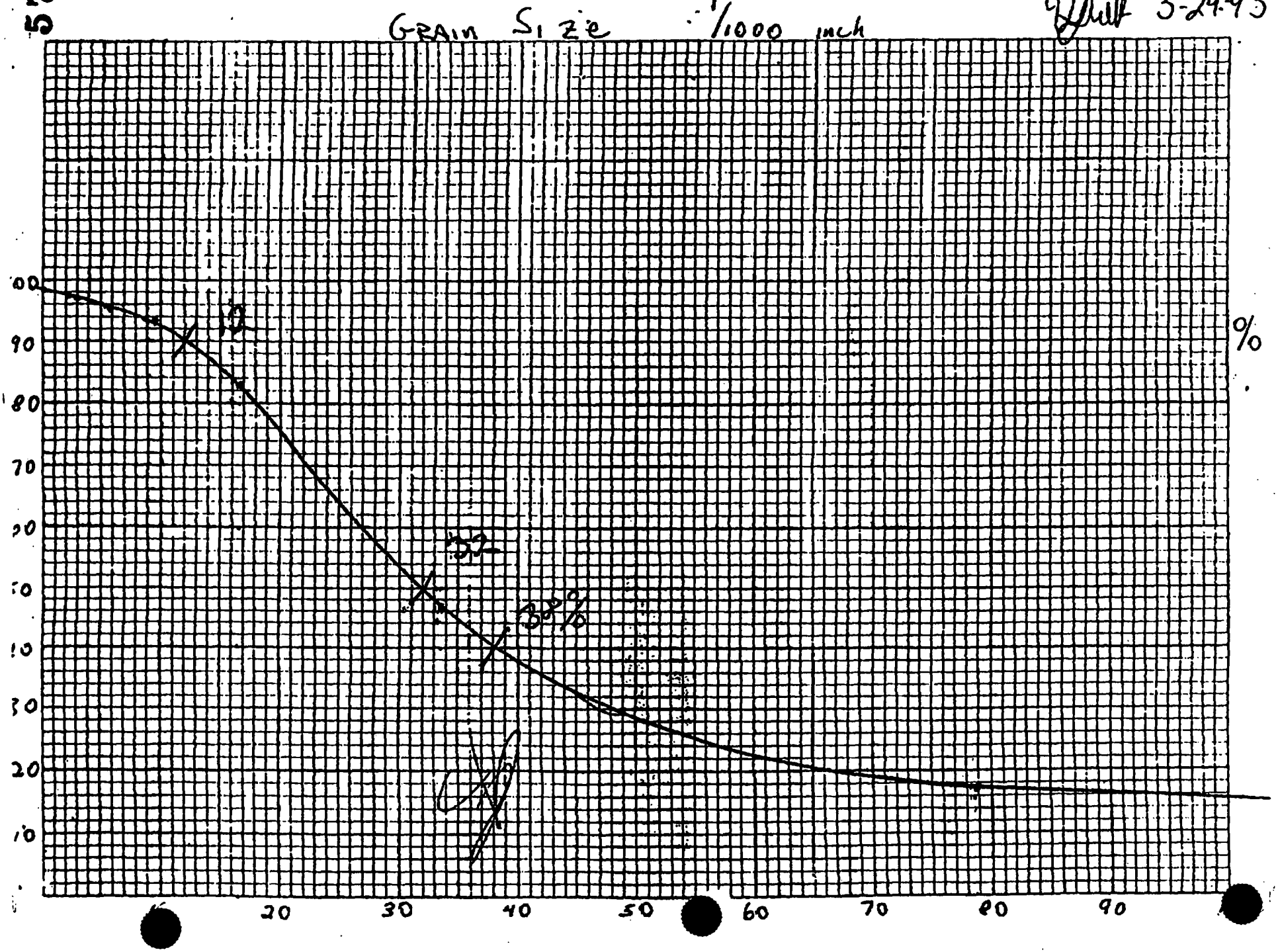
MW-4451

NO 340, .10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

930323-060

3-24-93



MW 4451

Methodology for sand pack and sieve determination
(from R. Scheper paper)

① WEMCO grain size
40% = .038 in
50% = .032 in
90% = .012 in

② 40% 90% Ratio (uniformity coefficient)
= 3.16 > 3 ∴ use 4 factor

③ 50% value × 4
.032 × 4 = 0.128

④ Look at distrabution curves. G. falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in). screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 2452	COORDINATES:	DATE 2/24/93
ELEVATION:	GWL: Depth 61.2 ft Date/Time 3/8/93/930	DATE STARTED: 2/24/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 ft Date/Time 3/11/93/800	DATE COMPLETED: 3/10/93
DRILLING METHODS: Cable Tool		PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For Visual classification of Soils (0.0'-57.0') see Log for well 3452			
45.0							

NOTES:

Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Jeff Bentley

Samples Collected Per ASTM Standard Penetration Test. Colors Identified using Munsell Color Chart.

Background Levels
HNu = 0 ppm
BZ = 40-60 cpm
Σ = 0 cpm

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 2452	COORDINATES:	DATE 3/2/92
ELEVATION:	GWL: Depth 61.2 ft Date/Time 3/8/93 / 930	DATE STARTED 2/24/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7 ft Date/Time 3/11/93 / 800	DATE COMPLETED: 3/10/93
DRILLING METHODS Cable Tool		PAGE 2 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0							
57.0	107053 1500 3/2/92	50/4	4	Very Dense, Yellowish Brown, (10YR, 5/4) well Graded medium Sand, with a Trace of Gravel, Dry	SW	N/A	HNU = 1ppm Br = 40cpm α = 0cpm
55.5 60.0	107054 1640 3/2/93	50 50/4	8	Very Dense, Yellowish Brown, (10YR, 5/4) well Graded medium Sand, with a Trace of Gravel, Dry	SW	N/A	HNU = 1ppm Br = 40cpm α = 0cpm

NOTES:

See page 1

Background levels
HNU = .1ppm
Br = 40-60 cpm
α = 0 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 60204.28 WBA40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 2452	COORDINATES:	DATE 3/3/93
ELEVATION:	GWL: Depth 61.2 ft Date/Time 3/8/93/930	DATE STARTED 2/24/93
ENGINEER/GEOLOGIST. Ken Geiger	Depth 61.7 ft Date/Time 3/11/93/800	DATE COMPLETED: 3/10/93
DRILLING METHODS: Cable Tool		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0	107055 85: 3/3/93	50/3	3	Very Dense, Yellowish Brown (10YR, 5/4) Poorly Graded medium Sand, with Some Gravel, ~~moist~~ wet RG 3/3/93	SP	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
GWL 61.7ft ▽ 61.5	107056 905 3/3/93	16 30 50/4 ~~3/4~~ RG 3/3/93	9	Very Dense, Dark Gray (10YR, 4/1) Poorly Graded, medium Sand, with Some Gravel, wet	SP	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
63.0	107057 920 3/3/93	8 12 30	8	Dense, Dark Gray (10YR, 4/1) Poorly Graded Sand with Some Gravel, wet	SP	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
64.5	107058 935 3/3/93	29 30 30	10	Very Dense, Dark Gray (10YR, 4/1) Poorly Graded Sand with Some Gravel, wet	SP	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
66.0	107059 1055 3/3/93	30 50/4	9	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand, with Some Gravel, wet	SW	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
67.5	107060 1340 3/3/93	17 24 35	15	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand with a Trace of Gravel, wet	SW	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
69.0	107061 1355 3/3/93	16 21 35	8	Very Dense, Dark Gray (10YR, 4/1) well Graded sand with a Trace of Gravel, wet	SW	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
70.5	107062 1505 3/3/93	17 28 36	14	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand with a Trace of Gravel, wet	SW	N/A	Hnu = .1 ppm Br = 40cpm α = 0cpm
72.0				Split Spoon Sampled To 72.0' Bottom of Boring at 77.0'			Composite Sieve Sample # 107063 from 57 - 72 ft
77.0							

NOTES:

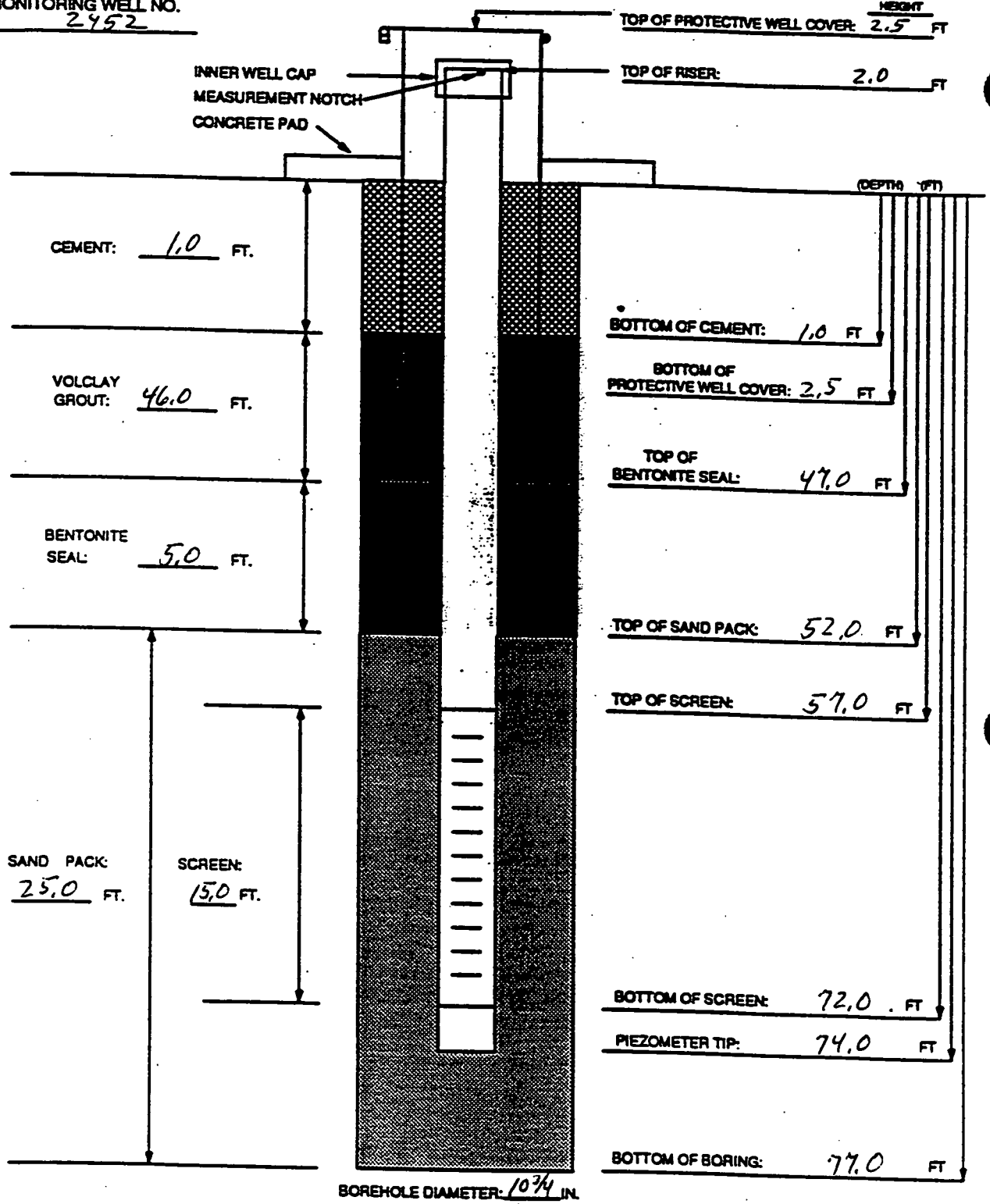
See Page 1

Background levels
Hnu = .1 ppm
Br = 40-60 cpm
α = 0 cpm

402-11-86

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2452

INSTALLATION DATE: 3/10/93



MATERIALS USED

SAND TYPE AND QUANTITY: 430 / 26 Bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6 Buckets
BAGS OF VOLCLAY GROUT: 9 Bags
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 500 Gallons
OTHER: Riser Pipe Sections 1-15' Screen w/ 1' Sump, 5-10' 1-5' 2-2'
TASK: 6020428 WBA-40

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 41.7 FT/ 3/1
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: KEN GEIGER

ASI FORM 0157 REV. (0)

PIEZOMETER INSTALLATION SHEET

PROJECT NAME KCRA Phase II
FIELD ENG./GEO. Ken Geiger
DATE 3/10/93
PROJECT NO. 60204.28 WBA-40
CHECKED BY
DATE
BORING NO. 2452
~~PIEZOMETER~~ monitoring well NO. 2452 (6/31/93)
DATE OF INSTALLATION 3/10/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 ft TO 62.0 ft
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 80.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring well
DIAMETER OF PERFORATED SECTION 4.0 in I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS .020
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 5'-10', 1'-5', 2'-2', 1'-18 Screw with 2' Sump
JOINING METHOD Screw Type - Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CONCRETE GROUT / SLURRY	TOP 1.0	BOTTOM 47.0	TOP	BOTTOM
BENTONITE	TOP 47.0	BOTTOM 52.0	TOP	BOTTOM
SAND	TOP 52.0	BOTTOM 77.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 57.0	BOTTOM 72.0	TOP	BOTTOM
PIEZOMETER TIP	74.0			
BOTTOM OF BOREHOLE	77.0			
GWL AFTER INSTALLATION	61.7			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS

Ken Geiger

MW -2452

B-2452

Customer Number: 107063

MATERIAL: 930304-042 SAMPLE NUMBER:

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 233.1237

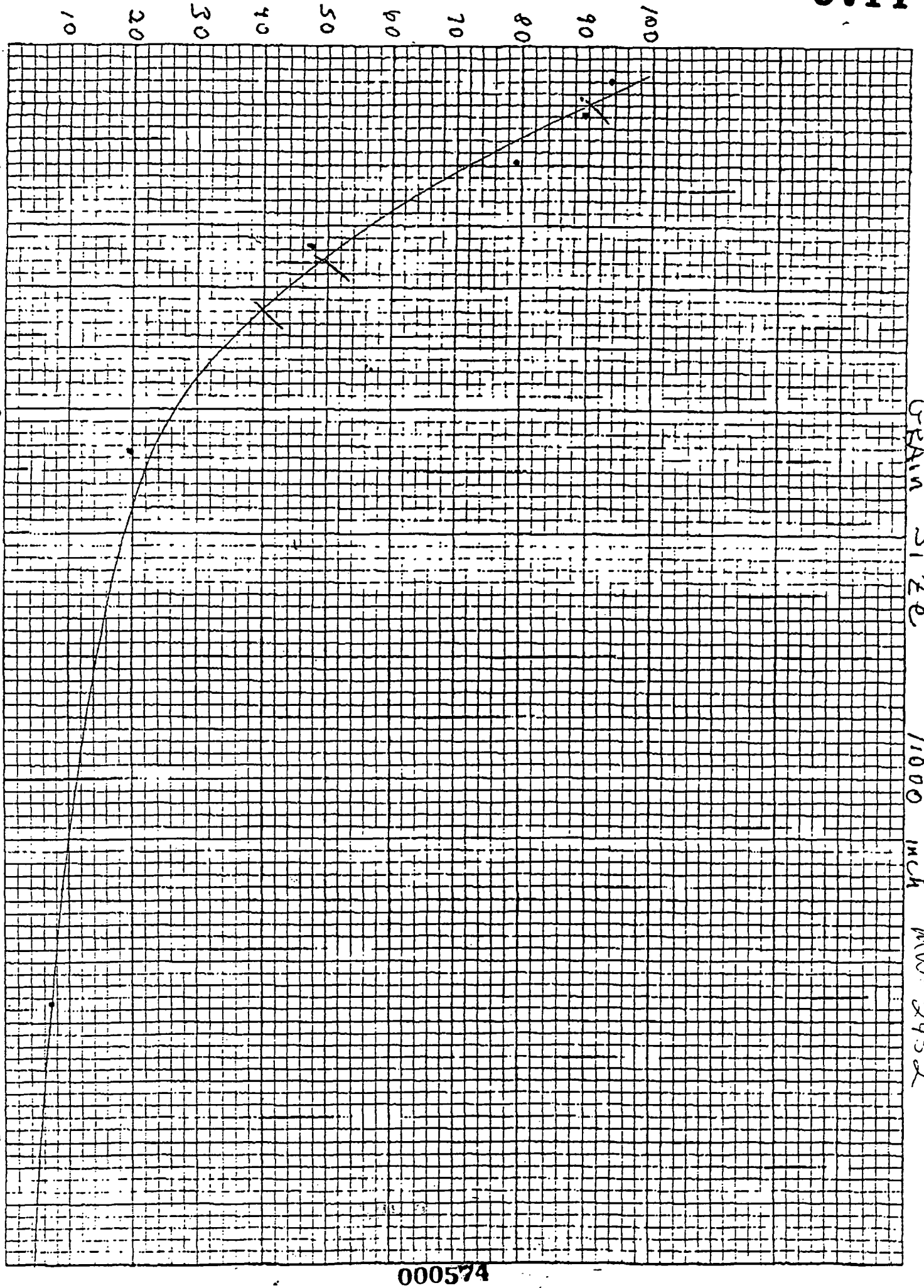
Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	15.9058	6.8	6.8	78.7
20	30.0711	12.9	19.7	33.5
40	64.3299	27.6	47.3	16.7
60	73.0138	31.3	78.6	9.8
100	24.5890	10.6	89.2	5.9
200	10.6738	4.6	93.8	3.0
Pan	13.7282	5.9	99.7	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = RPD$$

Analyzed by:	Checked by:	Date analyzed:
Tom McCullough	J. Robert	3-5-93

Grain Size Retained

40 %	22
50 %	18
90 %	5


10
20
30
40
50
60
70
80
90
100
GRAIN SIZE
1000 INCH
MW-3452

well # 2452 Sieve Analysis 3/5/93.

Ken Geiger

Sample # 107063

Retained Values

40% = .022

50% = .018

90% = .005

$\frac{.022}{.005} = 4.5$ 4.5 > 3 use a factor of 4

4 x .018 = .072

.072 most closely fits the coarse grain sand and the .020 screen size.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 04.28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 1/27/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 1 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	107000	1		Soft, Dark Yellowish Brown (10YR 4/4) Silty Clay with a Trace of ~~Silt~~ sand, med Plasticity, Moist	AG 1/27/93 CL	.5	HNU = 0ppm Bg = 40cpm α = 0cpm Some Grass + Roots in sample
	1330	2	18				
	1/27/93	3					
1.5	107001	1		Stiff Yellowish Brown (10YR 5/6) Silty Sandy Clay with Some Gravel, Low Plasticity, moist	CL	1.5	HNU = 0ppm Bg = 40cpm α = 0cpm
	1340	1	13				
	1/27/93	1					
3.0	107002	2		Stiff, Yellowish Brown (10YR 5/6) Silty Clay with Some Sand and Gravel, Low Plasticity moist	CL	1.5	HNU = 0ppm Bg = 40cpm α = 0cpm
	1350	3	19				
	1/27/93	5					
4.5	107003	19		Same As Above	CL	1.5	HNU = 0ppm Bg = 40cpm α = 0cpm
	1400	23	18				
		28					
	1/27/93			S.SE: Stiff Gray (2.5Y 5/1) Silty Sandy Clay with Some Gravel Low Plasticity, moist	CL	1.5	
6.0	107004	19		Very Soft Gray (2.5Y 5/1) Silty Sandy Clay with Some Gravel Low Plasticity, moist	CL	.25	HNU = 0ppm Bg = 40cpm α = 0cpm
	1410	25	12				
		32					
7.5	1/27/93						

NOTES:

Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller

Samples collected per ASTM Standard Penetration Test. Colors identified using Munsell Color Chart.
Background Levels
HNU = 0 PPM
Bg = 40 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 1/27/93
ELEVATION:	GWL: Depth 63.5 FT Date/Time 2/5/93/950	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 FT Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 2 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	107005 1420 1/27/93	14 23 45	12	Very Soft Gray (2.5Y, 5/1) Silty Sandy Clay with Some Gravel Low Plasticity, Moist	CL	.25	Hnu = 0 ppm Bp = 40 cpm α = 0 cpm
9.0	107006 1430 1/27/93	33 45 49	18	Very Soft Gray (2.5Y, 5/1) Silty Sandy Clay with Some Gravel medium Plasticity, Moist	CL	.25	Hnu = 0 ppm Bp = 40 cpm α = 0 cpm
10.5	107007 1600 1/27/93	2 4 4	13	Very Soft Gray (2.5Y, 5/1) Silty Sandy Clay with a Trace of Gravel, medium Plasticity, Moist	CL	.25	Hnu = 0 ppm Bp = 40 cpm α = 0 cpm
12.0	107008 830 1/28/93	4 6 9	14	Stiff Dark Gray (2.5Y, 4/1) Silty Sandy Clay with Some Gravel, medium Plastic ity, Moist	CL	1.0	Hnu = 0 ppm Bp = 60 cpm α = 0 cpm
13.5	107009 840 1/28/93	4 6 5	7	Same As Above	CL	1.0	Hnu = 3.0 ppm Bp = 60 cpm α = 0 cpm

NOTES:

See Page 1

Background Levels 1/24/93
Hnu = 0 ppm
Bp = 20-40 cpm
α = 0 cpm

Background Levels 1/28/93
Hnu = 0 ppm
Bp = 40-60
α = 0 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME RCRA Phase II	
BORING NUMBER 3452	COORDINATES:	DATE 1/28/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/ 750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7 ft Date/Time 2/17/93/ 1550	DATE COMPLETED: 2/16/93
DRILLING METHODS Cable Tool		PAGE 3 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	107010 850 1/28/93	7 8 7	6	Very Soft Dark Gray (2.5Y, 4/1) Silty clay with some Sand and Gravel, medium Plasticity, Moist	CL	.25	HNU = 1ppm βγ = 40 cpm α = 0 cpm
16.5	107011 905 1/28/93	5 5 7	14	Very Soft, Dark Gray (2.5Y, 4/1) Silty clay with some Sand and Gravel, medium Plasticity, moist	CL	.25	HNU = 1ppm βγ = 40cpm α = 0 cpm
18.0	107012 920 1/28/93	6 9 12	18	Same As Above	CL	.25	HNU = 1ppm βγ = 40cpm α = 0 cpm
19.5	107013 1030 1/28/93	7 12 14	14	Very Soft Dark Gray (2.5Y, 4/1) Silty Clay with a Trace of sand and Gravel, medium Plasticity, Moist	CL	.25	HNU = 1ppm βγ = 40cpm α = 0 cpm
21.0	107014 1050 1/28/93	7 13 14	13	Same As Above	CL	.25	HNU = 0ppm βγ = 40 cpm α = 0 cpm
22.5							

NOTES:

See Page 1

Background Levels
HNU = 0ppm
βγ = 40-60 cpm
α = 0 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.28 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 345-2	COORDINATES:	DATE 1/28/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.4 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 4 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	107015 1340 1/28/93	1 1 50	6	Hard Dark Gray (2.5Y, 4/1) Gravelly, Sandy, Clay Low plasticity, slightly moist	CL	4.5	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
24.0	107016 1430 1/28/93	32 50/4	8	Same As Above	CL	4.5	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
25.5	107017 1510 1/28/93	19 25 35	12	Very Stiff Dark Gray (2.5Y, 4/1) Gravelly Clay with Some Sand, medium plasticity, slightly moist	CL	3.5	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
27.0	107018 1540 1/28/93	13 17 21	17	Very Stiff Dark Gray (2.5Y, 4/1) Sandy Clay with Some Gravel, medium plasticity, slightly moist	CL	3.5	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
28.5	107019 1600 1/28/93	10 12 12	18	Stiff, Dark Gray (2.5Y, 4/1) Sandy Clay with Some Gravel and a Trace of organic material (wood), medium plasticity, slightly moist	CL	2.0	Hnu = 0 ppm Bg = 40 cpm α = 0 cpm
30.0							

NOTES:

See Page 2

Background Levels

Hnu = 0 ppm
Bg = 40-50 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 60204.28 UBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 1/24/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/750	DATE STARTED: 1/24/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 5 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	107020	8		Stiff Dark Gray (2.5Y,4/1)			HNu = 0 ppm
	1450	11	6	Sandy clay with some	CL	2.0	Bz = 40 cpm
		13		Gravel, medium plasticity			α = 0 cpm
	1/24/93			moist			
31.5	107021	8		Very Stiff Dark Gray (2.5Y,4/1)			HNu = 0 ppm
	1520	10	18	Sandy clay with some Gravel	CL	3.5	Bz = 40 cpm
		12		medium plasticity, moist			α = 0 cpm
	1/24/93						
33.0	107022	10		Stiff. Dark Gray (2.5Y,4/1)			HNu = 0 ppm
	1050	14	18	Sandy Clay with some	CL	1.5	Bz = 40 cpm
		17		Gravel, medium plasticity,			α = 0 cpm
	1/24/93			moist			
34.5	107023	9					HNu = 0 ppm
	1330	13	17	Same as above	CL	1.5	Bz = 40 cpm
		11					α = 0 cpm
	1/24/93						
36.0	107024	5		Stiff Dark Gray (2.5Y,4/1)			HNu = 0 ppm
	1350	7	15	Sandy Clay with some	CL	1.0	Bz = 40 cpm
				Gravel, medium plasticity,			α = 0 cpm
37.5	1/24/93			moist			

NOTES:

See page 1

Background Levels
HNu = 0 ppm
Bz = 40-60 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.04.28 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 3452	COORDINATES:	DATE 1/29/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST Ken Gerger	Depth 61.7 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 6 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	107025 1410 1/24/93	29 32 45	13	Very Dense Dark Yellowish Brown (10YR,4/4) well Graded medium Sand with a Trace of Gravel, Dry	SW	N/A	HNU = 0 ppm Br = 40 cpm α = 0 cpm
39.0	107026 1530 1/29/93	41 50/.5	8	Same As Above	SW	N/A	HNU = 0 ppm Br = 40 cpm α = 0 cpm
40.5				No Samples Taken. Samples To Be Taken Every 5' Starting at 45'			
45.0	107027 1645 1/29/93	50/.5	5	Very Dense, Dark Yellowish Brown, (10YR,4/4) well Graded Medium Sand with a Trace of Gravel, Dry	SW	N/A	HNU = 0 ppm Br = 40 cpm α = 0 cpm
46.5							
50.0	107028 930 2/1/93	41 49 50/.5	14	Very Dense, Dark Yellowish Brown (10YR,4/4) well Graded Medium Sand with Some Gravel, Dry	SW	N/A	HNU = 0 ppm Br = 65 cpm α = 0 cpm
37.5							
52.5							

NOTES:

See Page 1

Background Levels 1/29/93
HNU = 0 ppm
Br = 40-60 cpm
α = 0 cpm

Background Levels 2/1/93
HNU = 0 ppm
Br = 40-60 cpm
α = 0 cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602042 8 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 3452	COORDINATES:	DATE 2/3/93
ELEVATION:	GWL: Depth 63.5 Ft Date/Time 2/5/93/ 750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7 Ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS Cable Tool		PAGE 7 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
52.5							
55.0	107029 890 2/3/93	32 50 50/5	4	Very Dense Dark Yellowish Brown (10YR 4/4) well Graded medium Sand with a Trace of Gravel and clay, Dry	SW	N/A	Hnu = 0 ppm Bz = 46 cpm α = 0 cpm Some moisture. Appears to be from Drilling fluid.
56.5							
60.0	107030 950 2/3/93	32 50/5	8	Very Dense Dark yellowish Brown (10YR, 4/4) Poorly Graded medium Sand, with Some Gravel, Dry	SP	N/A	Hnu = 0 ppm Bz = 46 cpm α = 0 cpm Some moisture Appears to be from Drilling fluid.
61.5				∇ WATER TABLE 61.7'			
65.0	107031 1335 2/3/93	35 50/3	8	Very Dense, Dark Gray (10YR, 4/1) well Graded medium Sand, with Some Gravel, wet	SW	N/A	Hnu = 0 ppm Bz = 40 cpm α = 0 cpm
66.5							
67.5							

NOTES

See page 1

Background Levels

Hnu = [illegible]
Bz = 40-60 cpm
α = [illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6020428 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 2/3/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93 / 750	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 61.7 ft Date/Time 2/17/93 / 550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 8 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0	107032 1355 2/3/93	12 10 12	14	Medium Dense Dark Gray (10YR, 4/1) well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	HNu = 0ppm Br = 40cpm α = 0cpm
71.5							
				Hydropunch Taken at 75.0 ft sample # 107034			
75.0	107033 1500 2/3/93	32 50/3	6	Very Dense Dark Gray (10YR, 4/1) well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	HNu = 0ppm Br = 40-60cpm α = 0cpm
76.5							
80.0	107035 1410 2/4/93	6 10 17	12	Medium Dense Dark Gray (10YR, 4/1) Poorly Graded Sand with Some Gravel, wet	SP	N/A	HNu = 0ppm Br = 40-60cpm α = 0cpm
81.5							
82.5							

NOTES:

See Page 1

Background Levels 2/3/93
HNu = 0ppm
Br = 40-60 cpm
α = 0 cpm

Background Levels 2/4/93
HNu = 0ppm
Br = 40-60 cpm
α = 0 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

571

PROJECT NUMBER 602.04.29 WBA-40	PROJECT NAME: RCRA Phase II	
BORING NUMBER: 3452	COORDINATES:	DATE 2/4/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/950	DATE STARTED: 1/27/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 9 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
85.5							
85.0	107036 1505 2/4/93	9 17 21	13	Dense Dark Gray (10YR, 4/1) Poorly Graded Gravelly Sand, wet	SP	N/A	Hnu = 0ppm βγ = 40-60 cpm α = 0 cpm
86.5							
90.0	107057 1625 2/4/93	9 12 15	18	Medium Dense Dark Gray (10YR, 4/1) Poorly Graded Gravelly Sand, wet	SP	N/A	Hnu = 0ppm βγ = 40-60 cpm α = 0 cpm
91.5							
95.0	107038 940 2/5/93	25 25 25	18	Dense Dark Gray (10YR, 4/1) Poorly Graded Gravelly Sand, wet	SP	N/A	Hnu = 0ppm βγ = 40 cpm α = 0 cpm
96.5							
97.5							

NOTES:

See page 1

Background Levels 2/4/93
Hnu = 0ppm
βγ = 40-60 cpm
α = 0 cpm

Background Levels 2/5/93
Hnu = 0ppm
βγ = 40-60 cpm
α = 0 cpm

000584

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 3452	COORDINATES:	DATE 2/5/93
ELEVATION:	GWL: Depth 63.5 ft Date/Time 2/5/93/750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST. Ken Geiger	Depth 61.7 ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS: Cable Tool		PAGE 10 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
97.5							
				Hydropunch Taken at 100.0 Ft sample #107040			
100.0	107039 1020 2/5/93	5 7 10	17	Medium Dense, Dark Gray (10YR, 4/1) Poorly Graded Sand with Some Gravel, wet	SP	N/A	Hnu = 0ppm Bγ = 40-60cpm α = 0cpm
101.5							
105.0	107041 1425 2/5/93	20 25 31	18	V. Dense, Dark Gray (10YR, 4/1) Poorly Graded Gravelly Sand with Some Clay, wet	SP	N/A	Hnu = 0ppm Bγ = 40-60cpm α = 0cpm
				V. Dense, Dark Gray (5Y, 4/1) Clayey Silt with a Trace of Gravel, wet	ML	N/A	
106.5	107042 1520 2/5/93	17 24 32	10	Very Dense, Dark Gray (5Y, 4/1) Well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	Hnu = 0ppm Bγ = 40-60cpm α = 0cpm
108.0	107043 1535 2/5/93	12 16 21	12	Dense, Dark Gray (5Y, 4/1) Well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	Hnu = 0ppm Bγ = 60cpm α = 0cpm
109.5	107044 1600 2/5/93	9 12 17	14	Medium Dense, Dark Gray (5Y, 4/1) Well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	Hnu = 0ppm Bγ = 40-60cpm α = 0cpm
111.0	107045 935 2/5/93	10 32 50	14	Very Dense, Dark Gray (5Y, 4/1) Well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	Hnu = 0ppm Bγ = 60cpm α = 0cpm
112.5				Very Dense, Brown (10YR, 4/3) Well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	

NOTES:

See Page 1

Background Levels 2/5/93
Hnu = 0ppm
Bγ = 40-60cpm
α = 0cpm

Background Levels 2/8/93
Hnu = 0ppm
Bγ = 40-60 cpm
α = 0 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.04.28 WBA-40	PROJECT NAME. RCRA Phase II	
BORING NUMBER. 3452	COORDINATES:	DATE 2/8/93
ELEVATION:	GWL: Depth 63.5 Ft Date/Time 2/5/93/750	DATE STARTED 1/27/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 61.7 Ft Date/Time 2/17/93/1550	DATE COMPLETED: 2/16/93
DRILLING METHODS Cable Tool		PAGE 11 OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
112.5	107046 955 2/8/93	10 24 24	12	Dense Brown (10YR, 4/3) well Graded Fine Sand with a Trace of Gravel, wet	SW	N/A	Hnu = 0ppm Bx = 60cpm α = 0cpm
114.0				Soft, Dark Gray (10YR, 4/1) Silty clay with a Trace of Sand, Low Plasticity, moist	CL	.5	
	107047 1020 2/8/93	12 12 42	9	Very Soft, Dark Gray (10YR, 4/1) Silty Sandy clay, Low Plasticity, moist	CL	.25	Hnu = 0ppm Bx = 60cpm α = 0cpm
115.5	107048 1340 2/8/93	10 13 24	18	Very Stiff, Dark Gray (5Y, 4/1) Silty clay with Some black (5Y, 2.5/1) mottling, medium Plasticity, moist	CL	2.0	Hnu = 0ppm Bx = 60cpm α = 0cpm
117.0	107050 1515 2/8/93	Shelby N/A Tube	18	Very Stiff, Dark Gray (5Y, 4/1) Silty Clay with a Trace of Sand and Gravel, medium Plasticity, moist	CL	2.0	Hnu = 0ppm Bx = 60cpm α = 0cpm Shelby Tube
119.0				Bottom of Boring at 119.0 Ft. Pushed Shelby Tube From 117.0 Ft - 119.0 Ft.			Composite Sieve Sample #107049 From 105.0 - 115.5 Ft

NOTES:

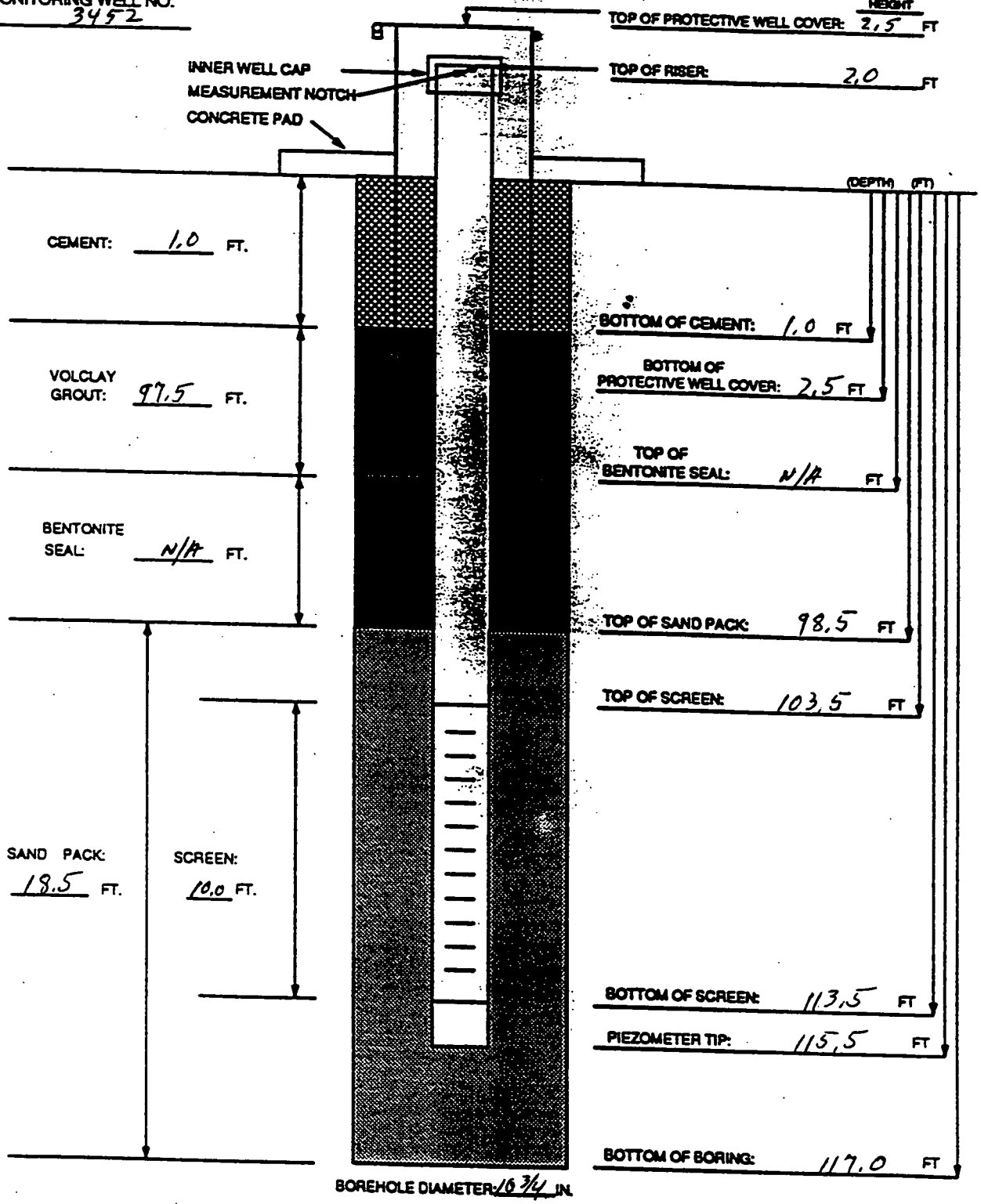
See Page 1

Background Levels
Hnu = 0ppm
Bx = 40-60cpm
α = 0cpm

402-11-86

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3452

INSTALLATION DATE: 2/16/93



MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 14/80 lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 20 - 50 lb bags
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 860 Gallons
OTHER: Riser Pipe Sections 1-10' Screen-7ft 2'Sump 10-10' 1-3.5'
: (602.64.28) WBA-40

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 4.7 FT/ 2/17/93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Ken Geiger

ASI FORM 0157 REV. (0)

page 1 of 1.

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase II
PROJECT NO. (602.04.28) WBA-40
BORING NO. 3452
~~PIEZOMETER NO.~~ monitoring well 3452

FIELD ENG./GEO Ken Geiger DATE 2/17/9
CHECKED BY (Brier) DATE 3/01/93
DATE OF INSTALLATION 2/16/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 ft TO 65.0 ft
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 115.0 ft
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring well
DIAMETER OF PERFORATED SECTION 4.0 in I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS .010
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 1-10' Screen with 2' Sump 10-10 ft, 1-3.5 ft
JOINING METHOD Screw Type - Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 98.5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 98.5	BOTTOM 117.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 103.5	BOTTOM 113.5	TOP	BOTTOM
PIEZOMETER TIP	115.5			
BOTTOM OF BOREHOLE	117.0			
GWL AFTER INSTALLATION	61.7 (GL)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS

Ken Geiger
MW 3452

MW

Customer Number: 107049

MATERIAL: _____ SAMPLE NUMBER: 930208-112

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 142.8

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	10.25	7.2	7.2	78.7
20	10.24	7.2	14.4	33.5
40	20.36	14.3	28.7	16.7
60	41.63	29.2	57.9	9.8
100	31.63	22.1	80.0	5.9
200	9.66	6.8	86.8	3.0
Pan	16.26	11.4	98.2	

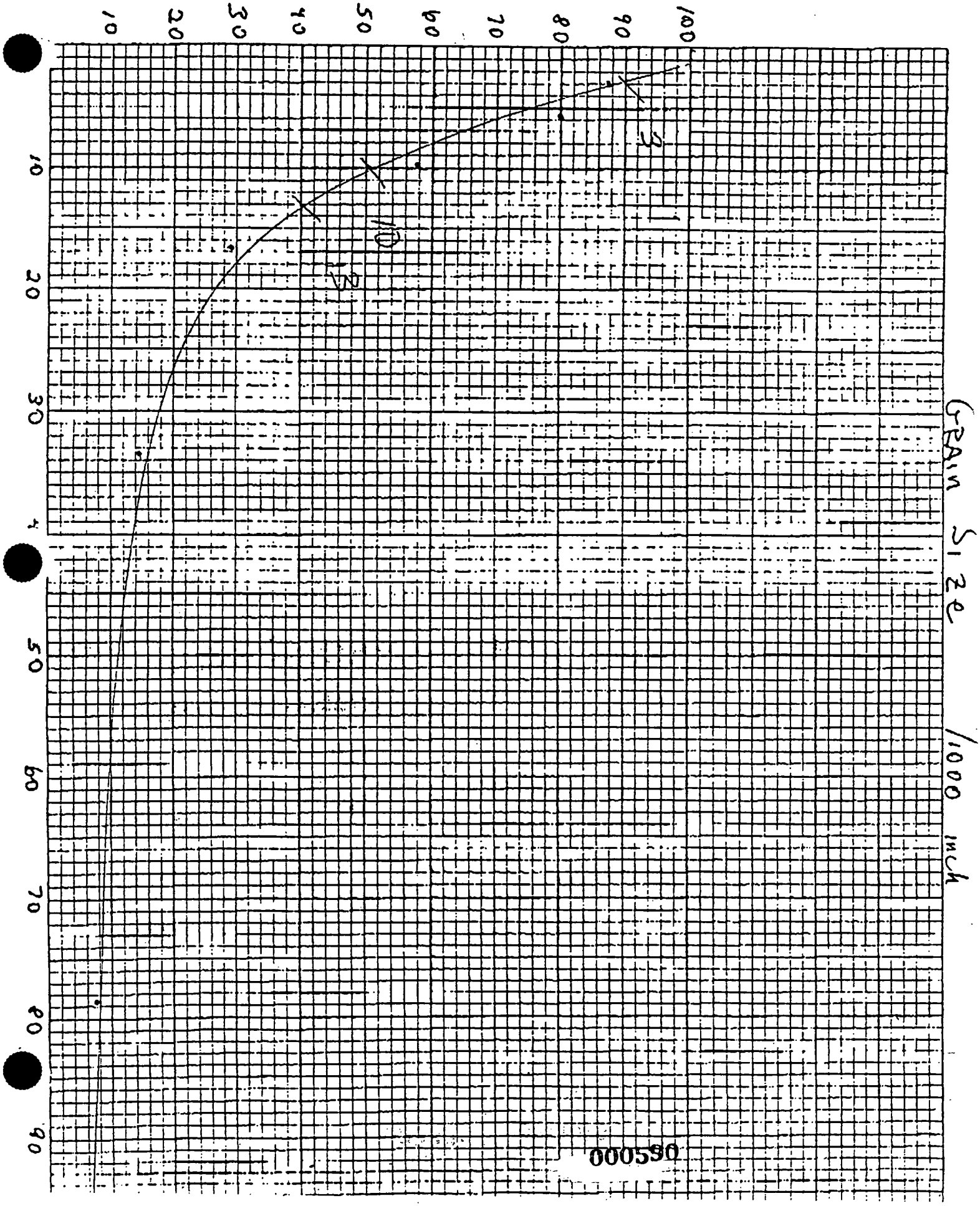
$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by: John Fobert | Checked by: J. Hooker | Date analyzed:

Grain Size Retained

40 %	13
50 %	10
90 %	3

MW 3452
Sample #107049



Sieve Analysis

Well #3452
Ken Geiger

2/9/93
sample #107049

Retained Values

90% = .003
50% = .010
40% = .013

$\frac{.013}{.003} = 4.3$ 4.3 > 3 use a factor of 4

4X .010 = .040

.040 most closely fits the medium Grain Sand and The .010 Screen size.

FERMALab
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

SP 7-28-93 PROJECT NUMBER ~~04.28~~ 50.09.22	SP 7-28-93 PROJECT NAME ~~RCRA Phase 2~~ Additional monitoring well installation	
BORING NUMBER 2454	COORDINATES:	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 1 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5	107550 0950 7-16-93	7	6	Very Stiff (2.5Y, 5/4) light olive Brown, Clay with trace sand, slight plasticity, moist	CL	3.0	m-tip = 0.0 ppm Bγ : 60 cpm Total U, Total Th 00-0.5 FT #107551
1.0	0950 7-16-93	12	0	No Recovery	N/A	N/A	
1.5	0950 7-16-93	7	0	No Recovery	N/A	N/A	
2.0	107552 0855 7-16-93	3	6	Very Stiff (2.5Y, 5/3) light olive Brown, Clay, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm Bγ = 50 cpm Total U, Total Th 20-2.5 FT #107553
2.5	0855 7-16-93	7	4	SAA	CL	2.0	
3.0	0855 7-16-93	9	0	No Recovery	N/A	N/A	
3.5	107554 0900 7-16-93	7	6	Medium Dense (2.5Y, 6/4) Light Yellowish Brown, Clayey Silt, non-plastic, slightly moist	ML	N/A	m-tip = 0.0 ppm Bγ = 50 cpm
4.0	0900 7-16-93	12	0	No Recovery	N/A	N/A	
4.5	0900 7-16-93	11	0	No Recovery	N/A	N/A	
5.0	107555 0905 7-16-93	6	6	Medium Dense (2.5Y, 6/6) Olive Yellow, Clayey Silt, non-plastic, slightly moist	ML	N/A	m-tip = 0.0 ppm Bγ = 80 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings

000592

FINAL
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93 KP 7-28-93

PROJECT NUMBER ~~04-28~~ 50.03.28	PROJECT NAME. ~~RCRA Phase 2~~ Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE 2 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	0905 7-16-93	6	6	SAA	ML	N/A	Total U, Total Th 5.0-5.5 FT #107556
6.0	107557 0905 7-16-93	9	6	SAA	ML	N/A	
6.5	107558 0910 7-16-93	6	6	Medium Dense (2.5 Y, 5/4) light olive brown, clayey silt, slight plasticity, wet	ML	N/A	m-tip = 0.0 ppm βγ = 80 cpm
	107559 0910 7-16-93	11	6	Medium Dense (2.5Y, 5/4) light olive brown, clayey silt, slight plasticity, moist	ML	N/A	Sieve #107630 6.0-10.5 ft
7.5	107560 0910 7-16-93	13	6	SAA	ML	N/A	
8.0	107561 0920 7-16-93	12	6	Medium Dense (2.5 Y, 5/4) light olive brown, clayey silt, slight plasticity, wet	ML	N/A	m-tip = 0.0 ppm βγ = 70 cpm
8.5	107562 0920 7-16-93	9	6	Medium Dense (2.5 Y, 6/2) light brownish gray, clayey silt, slight plasticity, moist	ML	N/A	
9.0	107563 0920 7-16-93	9	6	Medium Dense (10 YR, 6/1) Gray, clayey silt, slight plasticity, moist	ML	N/A	
9.5	107564 0925 7-16-93	3	6	Medium Dense (10 YR, 5/1) Gray, clayey silt, slight plasticity, moist	ML	N/A	m-tip = 0.0 ppm βγ = 80 cpm
10.0	107565 0925 7-16-93	4	6	Loose (10 YR, 5/1) Gray, clayey silt, slight plasticity, moist	ML	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

000593

Background Readings

FERNALD RI/FS

- 5713

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93 KP 7-28-93

PROJECT NUMBER ~~6H.28~~ 50.03.22	PROJECT NAME ~~RI Ph Phase II~~ Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 3 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	107566 0925 7-16-93	7	KP 7-16-93 ~~6~~ 3	Medium Dense (10 YR, 5/1) Gray, Clayey Silt, slight plasticity, moist	ML	N/A	Total U, Total Th 10.0-10.5 FT #107567
11.0	~~107568~~ 0935 7-16-93	3	6	Soft (10 YR, 5/1) Gray, Clay, High Plasticity, Very moist	CL	.5	m-tip = 0.0 ppm βγ = 70 cpm
11.5	107569 0935 7-16-93	5	6	SAA	CL	.5	
12.0	107570 0935 7-16-93	7	3	~~SAS~~ KP 7-16-93 SAA	CL	.5	
12.5	107571 1320 7-16-93	2	6	Medium Stiff (10 YR, 5/1) Gray, Clay, High Plasticity, very moist	CL	1.0	m-tip = 0.0 ppm βγ = 50 cpm
13.0	107572 1320 7-16-93	2	6	Very Loose (10 YR, 5/1) Gray, Sandy Silt, very moist, Non-plastic	ML	N/A	Since #107631 12.5-19.5 FT
13.5	~~107573~~ KP 7-16-93 1320 7-16-93	7	0	No Recovery	N/A	N/A	
14.0	107573 1330 7-16-93	2	6	Loose (10 YR, 5/1) Gray, Sandy Silt, Very moist, Non-plastic	ML	N/A	m-tip = 0.0 ppm βγ = 60 cpm
14.5	107574 1330 7-16-93	4	3	Loose (10 YR, 5/1) Gray, Sandy Silt, Very moist, Non-plastic	ML	N/A	
15.0	1330 7-16-93	9	0	No Recovery	N/A	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

000594

Background Readings 0.0 ppm

FERRALLOY
RI/FS

571

VISUAL CLASSIFICATION OF SOILS

7-29-93 KP KP 7-26-93

PROJECT NUMBER ~~04.28~~ 90.03.22	PROJECT NAME ~~RCRA Phase 2~~ Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 4 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	1345 7-16-93	5	0	No Recovery	N/A	N/A	2 spoons driven Not Enough Recovery for 15.0 - 15.5 Total U, Total Th sample
16.0	1345 7-16-93	21	0	No Recovery	N/A	N/A	
16.5	1345 7-16-93	17	0	No Recovery	N/A	N/A	
17.0	107575 1400 7-16-93	4	1	Medium Dense (10YR, 5/1) Gray, Poly Graded Coarse Gravel, wet, Non-plastic	GP	N/A	2 spoons driven
17.5	1400 7-16-93	8	0	No Recovery	N/A	N/A	
18.0	1400 7-16-93	17	0	No Recovery	N/A	N/A	
18.5	107576 1410 7-16-93	1	6	medium Dense (10YR, 6/1) light gray, silt with trace sand, moist, slight plasticity	ML	N/A	m-tip = 0.0 ppm βγ = 40 cpm
19.0	107577 1410 7-16-93	2	6	Very Loose (10YR, 6/1) light gray, silt with trace sand, moist, slight plasticity	ML	N/A	
19.5	1410 7-16-93	7	0	No Recovery	N/A	N/A	
20.0	107578 1425 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay, with trace sand, low plasticity moist	CL	2.0	m-tip = 0.0 ppm βγ = 60 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

000595

Background Readings ... ppm ... m-tip = 0.0 ppm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

KP 7-21-93 7-21-93

PROJECT NUMBER ~~04.28~~ 50.03.22	PROJECT NAME RCRA Phase 2 Additional Monitoring Well Installation		
BORING NUMBER 2454	COORDINATES.		DATE 7-21-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 5 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.5	1425 7-21-93	4	4	SAA	CL	2.0	Total VOTh 200-205 FT #107579
21.0	1425 7-21-93	10	0	No Recovery	N/A	N/A	
21.5	107580 1440 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 90 cpm
.0	1440 7-21-93	32	0	No Recovery	N/A	N/A	
22.5	1440 7-21-93	60	0	No Recovery	N/A	N/A	
23.0	107581 1510 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 60 cpm
23.5	107582 1510 7-21-93	5	5	SAA	CL	2.0	
24.0	1510 7-21-93	11	0	No Recovery	N/A	N/A	
24.5	107583 1525 7-21-93	1	5	Stiff (10YR, 5/1) Gray, Gravelly Clay low plasticity, moist	CL	1.0 ~~N/A~~ KP 7-21-93	m-tip = 0.0 ppm βγ = 60 cpm
25.0	1525 7-21-93	5	0	No Recovery	N/A	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background readings
7-21-93 { m-tip = 0.0

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOILS — 5 of 1

KP 7-22-93 KP 7-22-93

PROJECT NUMBER ~~04.28~~ 20.03.22	PROJECT NAME: ~~FERA Phase 2~~ Additional Monitoring Well Installation		
DRILLING NUMBER 2454	COORDINATES.	DATE 7-21-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93	
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93	
DRILLING METHODS Cable Tool		PAGE 6 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25.5	1525 7-21-93	7	0	No Recovery	N/A	N/A	
26.0	0745 7-22-93	10	6	Stiff (10YR, 5/1) Gray, Silty Clay ~~slight plastic~~ KP 7-22-93 slight plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 40 cpm
26.5	0745 7-22-93	15	0	No Recovery	N/A	N/A	Total V, Total Th 25.5 - 26.0 FT #107584
	0745 7-22-93	15	0	No Recovery	N/A	N/A	
27.5	107585 0755 7-22-93	7	6	Very Stiff (10YR, 5/1) Gray, Silty Clay ~~slight plast~~ KP 7-22-93 with trace sand, slight plasticity, moist	CL	3.0	m-tip = 1.2 ppm βγ = 70 cpm
28.0	107586 0755 7-22-93	12	5	SAA	CL	3.5	
28.5	0755 7-22-93	15	0	No Recovery	N/A	N/A	
29.0	107587 0810 7-22-93	8	6	Medium Dense (10YR, 5/1) Gray, Sandy Silt, non-plastic, moist	KP 7-22-93 ~~CL~~ ML	KP 7-22-93 ~~2.5~~ N/A	m-tip = 0.0 ppm βγ = 50 cpm
29.5	107588 0810 7-22-93	8	6	Very Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.5	Rinsate #107590
30.0	107589 0810 7-22-93	18	4	SAA	CL	KP 7-22-93 ~~N/A~~ 2.5	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

000597

Background Readings
(m-tip = 0.0 ppm (m-tip = 0.0 ppm 7-22-93

FEDERALLY
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93 KP 7-28-93

PROJECT NUMBER ~~04-28-03.22~~	PROJECT NAME RCRA Phase 2 Addition/Monitoring Well Installation	DATE 7-22-93
BORING NUMBER 2454	COORDINATES.	DATE STARTED 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED 8-8-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	PAGE 7 OF 20
DRILLING METHODS Cable Tool		

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	KP 7-22-93 107590 107621 0910 7-22-93	8	6	Very Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.5	m-tip = 0.0 ppm βγ = 50 cpm
30.5	107591 0910 7-22-93	20	6	Dense (2.5Y, 6/6) olive yellow, Silty Sand, slightly moist	KP 7-22-93 ~~PAK~~ SM	N/A	Total V, Total Th 29.0-30.5 ft ~~#107592~~ KP 7-22-93 ~~107595~~ KP 7-22-93 #107597
31.0	0910 7-22-93	28	0	No Recovery	N/A	N/A	
31.5	107592 1020 7-22-93	6	6	Dense (2.5Y, 6/6) Olive yellow, Silty sand, slightly moist	SM	N/A	m-tip = 0.0 ppm βγ = 50 cpm
32.0	107593 1020 7-22-93	16	6	SAA	SM	N/A	
32.5	107594 1020 7-22-93	17	3	Dense (2.5Y, 6/3) light Yellowish Brown, clayey silt with trace sand, moist	ML	N/A	
33.0							
33.5							
34.0							
34.5							
35.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

000598

Background Readings = 0.4 ppm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS - 5711

KP 1-28-93 KP 7-24-93

PROJECT NUMBER ~~04-28~~ 90.03.22	PROJECT NAME: ~~RCRA Phase 2~~ Additional Monitoring Well Installation		
BORING NUMBER 2454	COORDINATES.	DATE 7-22-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93	
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93	
DRILLING METHODS Cable Tool		PAGE 8 OF 20	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35.5 36.0 36.5	107595 1035 7-22-93	16 17 27	14	Dense (2.5Y, 6/4) light yellowish brown, Poorly Graded Fine Sand, Dry	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
37.0 38.0 39.0							
40.0 41.0	107596 1045 7-22-93	65 35 25	18	Very Dense (2.5Y, 6/4) light yellowish brown, Well Graded Sand with trace gravel, Dry	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm
42.0 43.0 44.0							
45.0 46.0	KP 7-22-93 ~~107597~~ 107617 1410 7-22-93	50 35 28	15	Very Dense (2.5Y, 5/6) light olive brown, Well Graded Sand with trace gravel, Dry	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm
47.0 48.0 49.0 50.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
m-tip = 0.0 ppm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93

PROJECT NUMBER 04-18 90.03.22	PROJECT NAME: RCRA Phase 2 Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 9 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1545	107598 1545 7-22-93	8 14 24	12	Dense (2.5Y, 5/4) light olive brown, Poorly Graded Fine Sand Dry	SP	N/A	m-tip = 0.0 ppm βγ = 70 cpm
52.0							
53.0							
54.0							
55.0							
56.0	107599 0910 7-23-93	10 20 50	10	Very Dense (5Y, 5/3) Olive, Poorly Graded Fine Sand, moist	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
57.0							
58.0							
59.0							
60.0	107600 0925 7-23-93	8 17 14	17	Very Dense (5Y, 4/4) Olive, Well Graded Sand with trace gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
61.0							
62.0	107601 1030 7-23-93	6 17 20	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand with trace gravel, wet	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
63.0							
64.0	107602 1315 7-23-93	9 20 24	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0 ppm βγ = 10 cpm
65.0				see p. 10			

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leen

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
m-tip = 0.0 ppm (m-tip = 0.0 ppm

000600

FERNALD RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~04.28~~ 50.03.22 (KP 7-23-93)	PROJECT NAME. ~~RCRA Phase 2~~ Additional Monitoring Well Installation (KP 7-23-93)	
BORING NUMBER 2454	COORDINATES.	DATE 7-23-93
ELEVATION:	GWL: Depth 57.25 FT Date/Time 7-24-93/0630	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K Payne	Depth Date/Time	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE 10 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
66.0	107603 1340 7-23-93	15 25 30	16	Very Dense (2.5Y, 3/3) Dark Olive Brown, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm βγ = 70 cpm
67.0	107604 1400 7-23-93	35 35 50	18	Very Dense (10YR, 5/4) Yellowish Brown, well Graded Sand with trace ~~Stone~~ Gravel, wet (KP 7-23-93)	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
68.0	107605 1415 7-23-93	35 24 20	17	Dense (2.5Y, 5/4) light olive brown ~~Poorly Gra~~ (KP 7-23-93) well Graded Sand with trace Gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm Hydropunch 68.0 FT #107606
69.0	107608 1015 7-24-93	15 25 33	18	Very Dense (2.5Y, 5/4) light olive brown, well Graded sand with trace Gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm Sieve #107607
70.0							
71.0							
72.0							
73.0							
74.0							
75.0	107609 1045 7-24-93	7 17 24	18	Dense (2.5Y, 5/4) light olive brown, well Graded sand with trace gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
76.0							
77.0							
78.0							Hydropunch 78.0 ft # 107610
79.0							
80.0							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Readings m-tip = 0.0 ppm / m-tip = 0.0 ppm

000601

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER ~~04-28~~ 50.03.22 (KP 7-28-93)	PROJECT NAME ~~RCRA Phase 2~~ (KP 7-28-93) Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-24-93
ELEVATION:	GWL: Depth 54.80 FT Date/Time 7-25-93/~~8:00~~ 0710	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 11 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USSF)	REMARKS
81.0	107611 1535 7-24-93	18	7 17 27	Dense (2.5Y, 5/4) light olive brown well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
82.0							
83.0							
84.0							
85.0	107612 0750 7-25-93	18	18 43 50	Very Dense (2.5Y, 5/3) olive, Poorly Graded fine sand, wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
86.0							
87.0							
88.0							Hydropunch 88.0 FT #107613
89.0							
90.0	107614 1245 7-25-93	17	4 5 11	Medium Dense (2.5Y, 5/3) olive, well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm Rinsate #107615
91.0							
92.0							
93.0							
94.0							
95.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings (m-tip = 0.0 ppm ... (m-tip = 0.0 ppm

000602

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER ~~04-28~~ 50.03.22 KP 7-29-93	PROJECT NAME RCRA Phase I Monitoring Well Installation KP 7-29-93	
BORING NUMBER 2454	COORDINATES.	DATE
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 12 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
96.0	107616 1453 7-26-93	35 37 50/2	KP 7-28-93 ~~18~~ 15	Very Dense (2.5Y, 5/3) light olive brown, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
97.0							
98.0							Hydropunch 98.0 ~~64~~ FT 7-26-93 KP #107618
99.0							
100.0	107619 0725 7-27-93	8 14 30	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
101.0							
102.0							
103.0							
104.0							
105.0	7-27-93						
106.0	~~10-90~~ 107620 0900 7-27-93	4 14 27	18	SAA	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
107.0							
108.0							Hydropunch 108.0 FT #107622
109.0							
110.0							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Readings: m-tip = 0.0 ppm (m-tip = 0.0 ppm

FERRALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~04.28~~ 50.03.22 (KP 7-28-93)	PROJECT NAME. ~~FCRA Phase 2~~ Additional Monitoring Well Installation (KP 7-28-93)		
BORING NUMBER 2454	COORDINATES.		DATE 7-27-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 13 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
111.0	107623 1330 7-27-93	1 6 13	18	Medium Dense S A A	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
112.0							
113.0							
114.0							
115.0							
116.0	107624 1535 7-27-93	7 11 20	18	Dense (5Y, 4/4) Olive, Poorly Graded Fine Sand, Wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
117.0							
118.0							Hydropunch Rinsate #107625 Hydropunch 118.0 FT #107626
119.0							
120.0							
121.0	107627 1315 7-28-93	7 12 28	18	S A A	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
122.0							
123.0							
124.0							
125.0	107628 0925 7-27-93	6 16 23	18	Dense (5Y, 4/1) Dark Gray, Silty Clay, Low Plasticity, Moist	CL	2.0	m-tip = 0.0 ppm βγ = 70 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

000604

Background Readings (m-tip = 0.0 ppm) (m-tip = 0.0 ppm)

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES	DATE 7-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 14 OF 20

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				see previous page			
126.0	1300 7-29-93			Bottom of Boring			Shelby Tube #107629 Driven 1.5 ft
127.0				Bottom of Sampling			
128.0							
129.0							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Soil Color Chart

KP 7-29-93

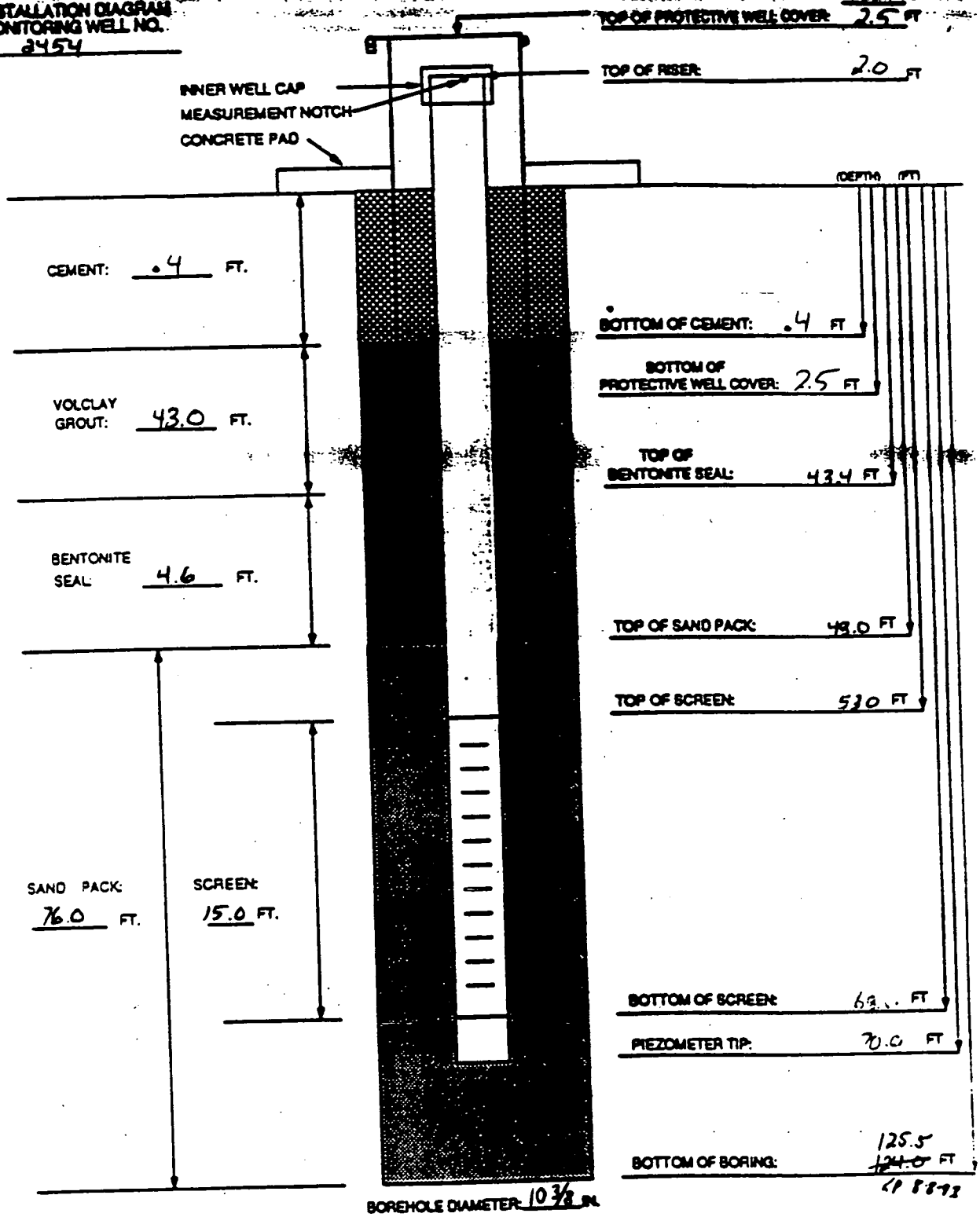
000605

D. Kessard Reading

5711

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2454

INSTALLATION DATE: 8-8-93



MATERIALS USED

SAND TYPE AND QUANTITY: 34 50lb bags of 1020
BENTONITE PELLETS (5-GALLON BUCKETS): 5 buckets
BAGS OF VOLCLAY GROUT: 650 lbs
AMOUNT OF CEMENT: 47 lbs.
AMOUNT OF WATER USED: 700 gallons
OTHER: 18 Drums Soil, 1 Drum Grout, 2 Drums Decon/Rinsate
TASK: 50.03.28

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH MACHINED END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 55.39 FT 8-
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Ryan

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Additional Monitoring Well Installation FIELD ENG./GEO. K. Payne DATE
PROJECT NO. 2489-193 50.03.22 CHECKED BY DATE
BORING NO. 2454
PIEZOMETER NO. 2454 DATE OF INSTALLATION 8-8-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 70.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion
CASING SIZE (S) USED:
SIZE 10.0 ID FROM 0.0 FT TO 125.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 1/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 5-10 FT, 1-5 FT
JOINING METHOD Screw type-flush joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 IN

OTHER PROTECTION Hinged Locking Cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM 0.4 FT		
Cement GROUT/SLURRY	TOP 0.4 FT	BOTTOM 43.4 FT	TOP	BOTTOM
BENTONITE	TOP 43.4 FT	BOTTOM 48.0 FT	TOP	BOTTOM
SAND	TOP 48.0 FT	BOTTOM 125.5 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 53.0 FT	BOTTOM 68.0 FT	TOP	BOTTOM
PIEZOMETER TIP	70.0 FT			
BOTTOM OF BOREHOLE	125.5 FT			
GWL AFTER INSTALLATION	55.39 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement was placed from 0.0 to 0.4 ft to hold the protective cover in place.

K. Pagne 2457 [illegible]

DATE 26-JUL-93
TIME 14:21:05

WORK CARD REPORT
INORGANICS-EPM

5711

SAMPLE ID: 200008401

P/A

USER SAMPLE ID: 107607
SAMPLE FAMILY NO: 9307261400

24 hr

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: FACILITIES CHARACTERIZATION
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 1000002750
RELEASE NUMBER: 1000000430
CHARGE NUMBER: RJV01
DATE SAMPLED: 23-JUL-93
SPL RECEIVED: 26-JUL-93
LOGGED SINCE:

739 [illegible] phone

COMMENT: No comments entered.

send results to Mike Franz

****

TASK ID: 300011188

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	6	7-27-93	BB/TOM	[illegible]

TASK ID: 300011189

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC.

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	34	7-27-93	BB/TOM	[illegible]

TASK ID: 300011190

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

.E 26-JUL-93
.ME 14:21:05

WORK CARD REPORT - 5711
INORGANICS-EPM

MPLE ID: 200008401

USER SAMPLE ID: 107607
SAMPLE FAMILY NO: 9307261400

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	53	7-27-93	BB/TMB	[illegible]

3 TASKS PRINTED

*** END OF REPORT ***

Customer Number: 107607

MATERIAL: _____ SAMPLE NUMBER: 200008401

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 125.5375 ✓

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	39.30 ✓	31.30 ✓	31.30 ✓	78.7
20	23.80 ✓	18.96 ✓	50.26 ✓	33.5
40	22.81 ✓	18.17 ✓	68.43 ✓	16.7
60	15.54 ✓	12.38 ✓	80.81 ✓	9.8
100	11.56 ✓	9.21 ✓	90.02 ✓	5.9
200	8.24 ✓	6.56 ✓	~~99.58~~ 96.58 T.O.M.	3.0
Pan	3.30 ✓	2.63 ✓	99.21 ✓ 7-27-93	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left|\frac{\text{Original} - \text{Duplicate}}{\text{Average}}\right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:
BReagle	Tom Mc Cullough	7-27-93

GRAIN SIZE RETAINED

40 % ~~52.7~~ 53 T.O.M. 7-27-9 ✓

50 % ~~34.0~~ 34 T.O.M 7-27-

90 % ~~5.9~~ 6 T.O.M 7-27-9

BReagle 7-27-93

Tom Mc Cullough

B Beagle 7-27-93

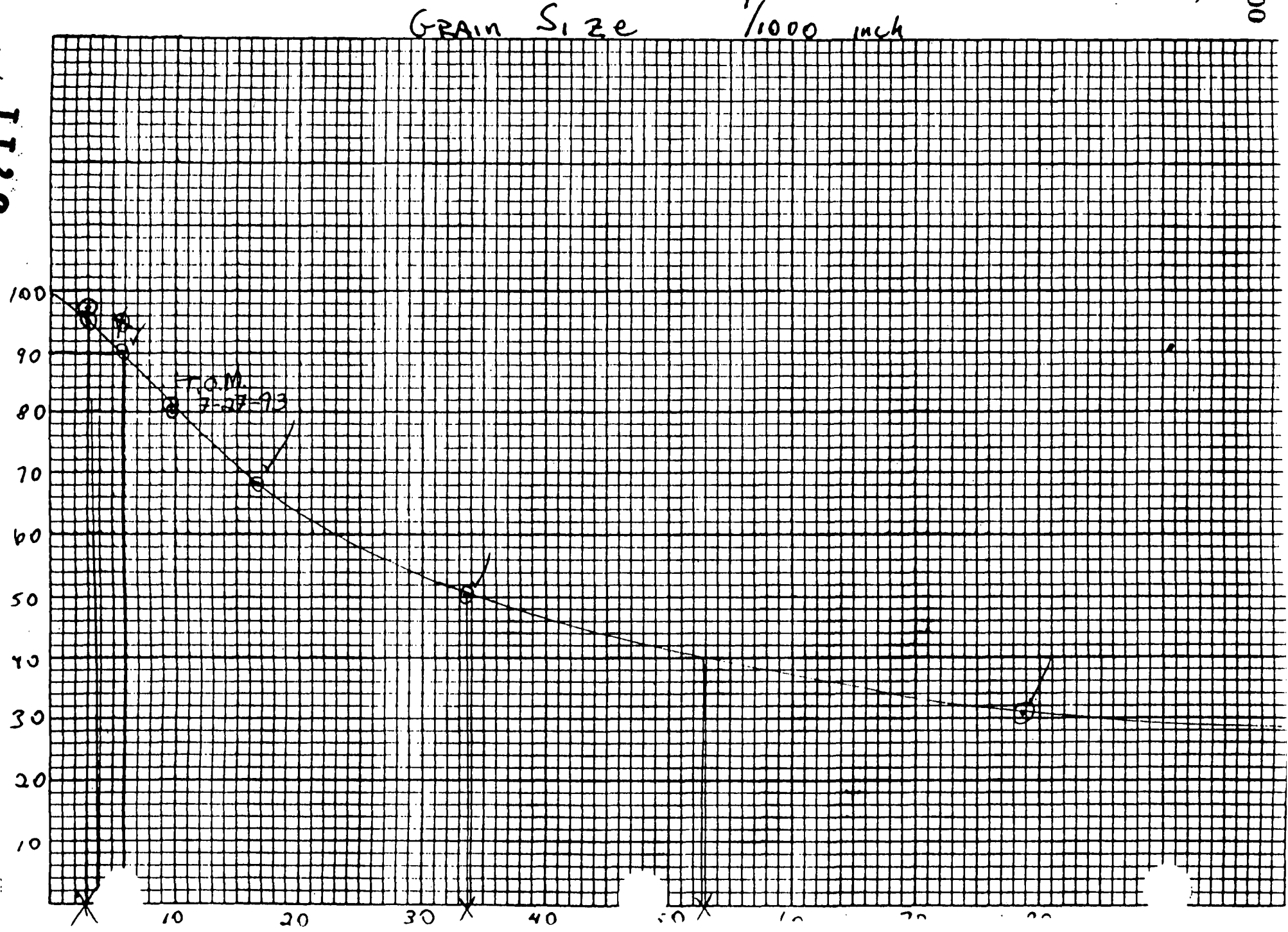
NO. 340/ ..10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO
MADE IN U. S. A.

Part # 200008401
customer # 107607

000611

- 5711



11

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS TRENCHING	
BORING NUMBER: 1455	COORDINATES: N.477,915, E.1,379,479	DATE: 11-04-89 / 11-05-89
ELEVATION: 577.9	GWL: Depth None Date/Time	DATE STARTED: 11-04-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-05-89
DRILLING METHODS: CAT 225 B LC BACKHOE TRENCHING		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (FT) N/A	RECOVERY N/A	DESCRIPTION TRENCH #1 South End	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS TRENCH #1
1				TOP 8 INCHES CONSISTS OF OVERGROWTH GRASS, ROOTS, ETC.. FILL MATERIAL MADE FROM NON-NATIVE SOIL, SOME CONSTRUCTION RUBBLE EVIDENT IN FILL. CONCRETE (.5 - 1.5 FT.), METAL SCRAP (1000 cpm) βγ (.5-1.0 FT.)			
2							
	Sample # ↓	Time ↓					ESP-1 = 16,000 CPM
3	55900	0930		LOOSE, BROWN (7.5 YR 4/2) SILTY SAND; TRACE OF GRAVEL (.50-1.5 in)	SM	N/A	Hnu = 0.4 ppm α = 0 cpm βγ = 60-100 cpm METAL SCRAP (βγ) = 600-800 cpm
				FILL/TILL BOUNDARY 3.6 FT.			
4	55901	0935		VERY STIFF, YELLOWISH BROWN (10YR 5/6) MOTTLED GRAY (10YR 5/1), TRACE OF SILTY LAYERS, TRACE OF GRAVEL (.5-1.0 in), LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0	Hnu = 0.0 ppm α = 0 cpm βγ = 60 cpm 16,100 CPM USING ESP-1/SPA-3
5				* FILL AT SOUTH END OF TRENCH 1 IS 3.6 FT. THICK			

NOTES:

BACKHOE OPERATOR: DAVID ORPHEY (IT)

Samples 55902, 55901 are for Full RIM, Archive Samples have different #'s. Archive 3.0FT = 55907 [illegible] Archive 3.75FT = 55903 [illegible]

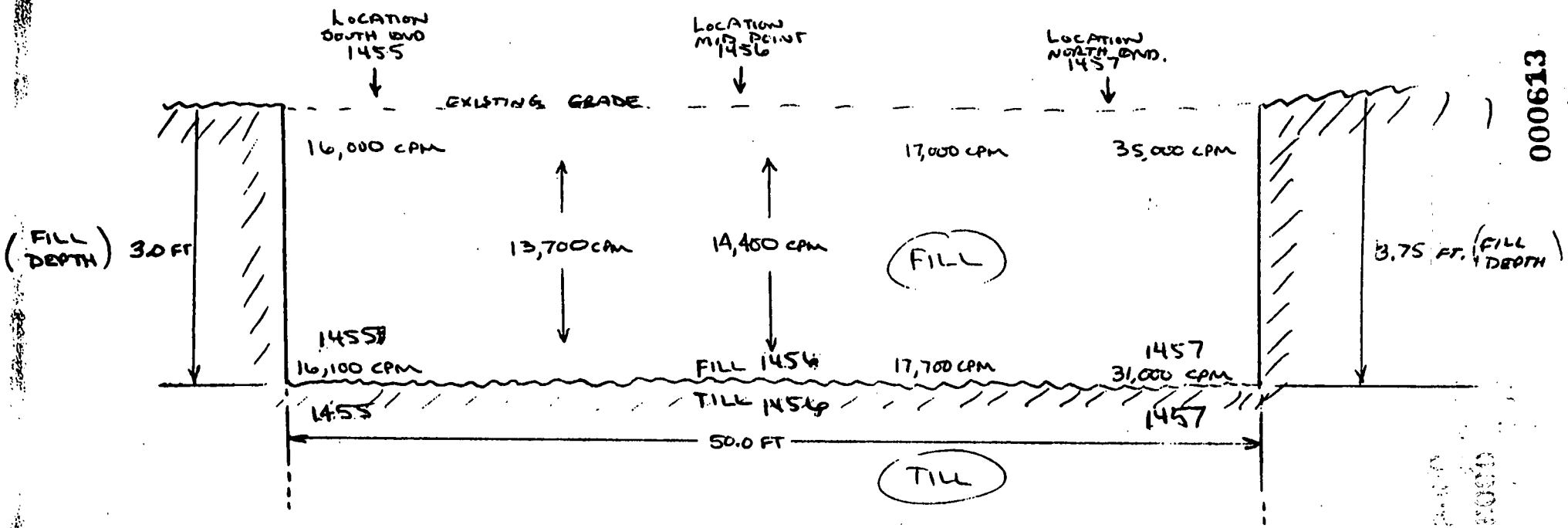
INSTRUMENT BACKGROUND

Hnu = 0.0-0.4 ppm
α = 0 cpm
βγ = 100-120 cpm
SERIAL NO. 2057: ESP-1 = 11,800 CPM

000612

REVIEWED BY QA [illegible] DATE 1/17/90

GEOLOGIC PROF[illegible] (TRENCH No. 1)



READINGS ON TRENCH WALL WERE MEASURED WITH ESP-1 SERIAL NO. 2057
BACKGROUND = 11,800 CPM

FILL MATERIAL PRIMARILY SILTY SAND (SM) WITH GRAVEL (.50 - 2.5 IN), RUBBLE MIXED WITH FILL SOIL. SEVERAL PIECES OF CONCRETE (5 IN. - 2.0 FT).
TILL MATERIAL COMPOSED OF SILTY CLAY, (10YR 5/1) AND (10YR 5/6)
* DEEPEST AREA OF FILL AT 3.75 - 4.0 FT.
*2 SAMPLES TAKEN AT EACH LOCATION ONE IN BASE OF FILL AND ONE ~1.0 FT. INTO TILL.

→ N

000613

FERNALD RI/FS

(TRENCH 1)

VISUAL CLASSIFICATION OF SOILS

Date	12-28-89			
Initial	HA			
	Final Check	1st Key In	2nd Key In	Hard Copy Verification

5711

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS TRENCHING		
BORING NUMBER: 1456	COORDINATES: N. 477,940, E. 1,379,479	DATE: 11-04-89	
ELEVATION: 577.9	GWL: Depth NONE Date/Time	DATE STARTED: 11-04-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-05-89	
DRILLING METHODS: CAT 225B LC		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY ( ) N/A	DESCRIPTION TRENCH #1 Mid Point	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				8 IN. TOP OVERGROWTH, GRASS, ROOTS.			
1				FILL MATERIAL, CONSTRUCTION RUBBLE, NON NATIVE SOIL, CONCRETE, ASPHALT, ~~BRICK~~ET. METAL SCRAP. ~~ASBESTOS IS A POSSIBLE HAZARD NOT FOUND IN TRENCH 1.~~			
2							
3	Sample # ↓	Time ↓					
4	55902	@0955		LOOSE, BROWN (7.5 YR 4/2) SILTY SAND, TRACE OF GRAVEL (.50-2.5 in), TRACE OF CLAY, SLIGHTLY COHESIVE, MOIST. FILL TILL BOUNDARY = 4.0 FT.	SM	N/A	ESP-1 = 14,400 cpm Hnu = 0.0 ppm α = 0 cpm βγ = 100-140 cpm
	55903	@1000		VERY STIFF, MOTTLED GRAY WITH YELLOWISH BROWN (10YR 5/1) (10YR 5/6) CLAY TRACE OF FINE GRAVEL (.5-1.0) MEDIUM PLASTICITY, MOIST.	CL	2.0	ESP-1 = 14,400 cpm Hnu = 0.0 ppm α = 0 cpm βγ = 100 cpm
5				*HSL SAMPLE TAKEN AT 3.75 FT. sample # 55906			

NOTES:

BACKHOE OPERATOR: DAVID DRAHEY

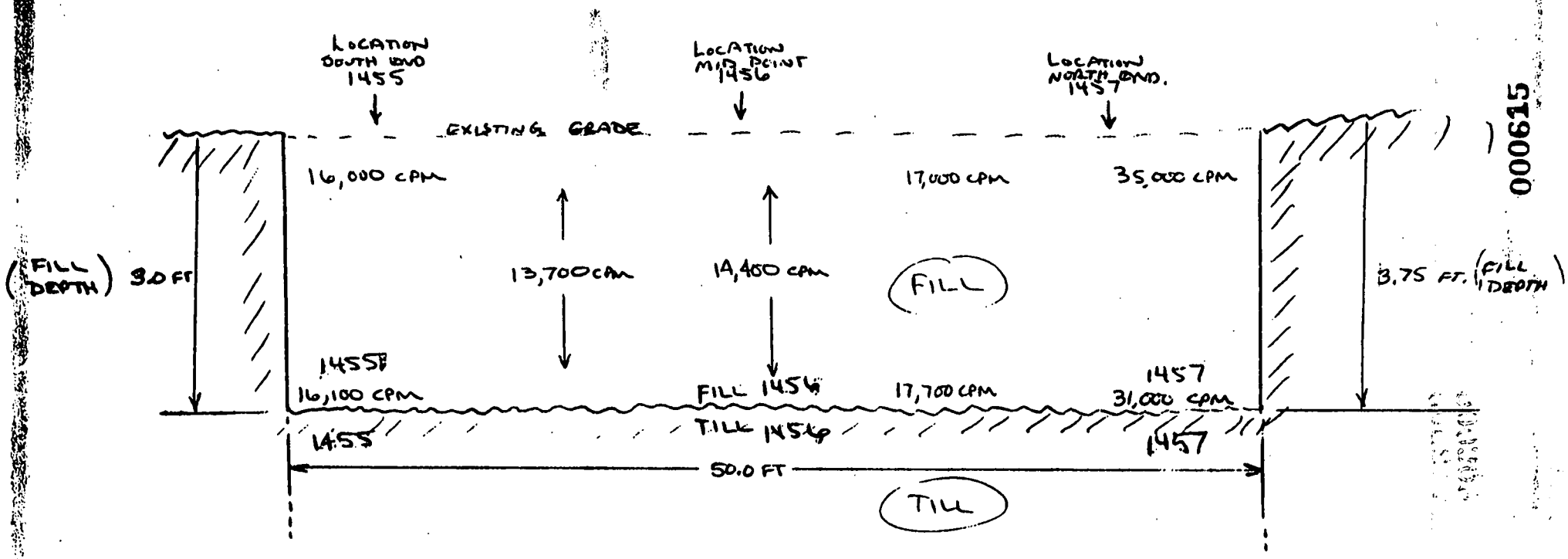
Samples 55902, 55903 ARE FOR FULL RAD, Archive Samples have DIFFERENT #'s Archive #@ 3.75 ft = 55909 } WAH
Archive #@ 4.25 ft = 55910 } 12-27-89

INSTRUMENT BACKGROUND

ESP-1 = 11,800 CPM
Hnu = 0.0-0.4 ppm
α = 0 CPM
βγ = 100-120 CPM

000614

GEOLOGIC PROFILE (TRENCH No. 1)



READINGS ON TRENCH WALL WERE MEASURED WITH ESP-I SERIAL NO. 2057
BACKGROUND = 11,800 CPM

FILL MATERIAL PRIMARILY SILTY SAND (SM) WITH GRAVEL (.50 - 2.5 IN), RUBBLE MIXED WITH FILL SOIL. SEVERAL PIECES OF CONCRETE (5 IN. - 2.0 FT).
TILL MATERIAL COMPOSED OF SILTY CLAY, (10YR 5/1) AND (10YR 5/6)

* DEEPEST AREA OF FILL AT 3.75 - 4.0 FT.

*2 SAMPLES TAKEN AT EACH LOCATION ONE IN BASE OF FILL AND ONE ~1.0 FT. INTO TILL.

→ N

	Initial	Date
Field Check	WAH	12-28-89
1st Key In		
2nd Key In		
Hard Copy		

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

REVIEWED BY CA DATE 2/92

000615

FERNALD RI/FS

5711

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	12-12-89	12-12-89	12-12-89	
Initial	[illegible]	[illegible]	[illegible]	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6022 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1457	COORDINATES: N. 477,965, E. 1,379,479	DATE: 11-04-89
ELEVATION: 577.3	GWL: Depth None Date/Time	DATE STARTED: 11-04-89
ENGINEER/GEOLOGIST: E. TROWNGER	Depth Date/Time	DATE COMPLETED: 11-05-89
DRILLING METHODS: CAT 225 B LC		PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY ( ) N/A	DESCRIPTION TRENCH #1 North End	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				TOP 8 in OVERGROWTH. GRASS, WEEDS, ROOTS.			
1				POSSIBLE HAZARDS IN FILL; FILL COMPOSED OF CONSTRUCTION RUBBLE, CONCRETE, ASPHALT, ~~[illegible]~~ ST., ORGANIC ROOTS, SILTY SAND WITH GRAVEL.			
2							
3	Sample # ↓	TIME ↓					ESP-1 = 35,000 cpm Hnu = 0.2 ppm α = 0 cpm βγ = 200-400 cpm
4	55904	@1030		LOOSE, BROWN (7.5YR 4/2) SILTY SAND, SOME GRAVEL (.50-2.5 in) SLIGHTLY COHESIVE, MOIST.	SM	N/A	
				FILL/TILL BOUNDARY = 4.0 FT.			
	55905	@1040		VERY STIFF, YELLOWISH BROWN (10YR 5/6) CLAY, TRACE OF SILTY LAYERS THROUGHOUT SOME GRAVEL (.5-1.5 in), LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0	ESP-1 = 31,000 cpm Hnu = 0.2 ppm α = 0 cpm βγ = 60-80 cpm
5							

NOTES

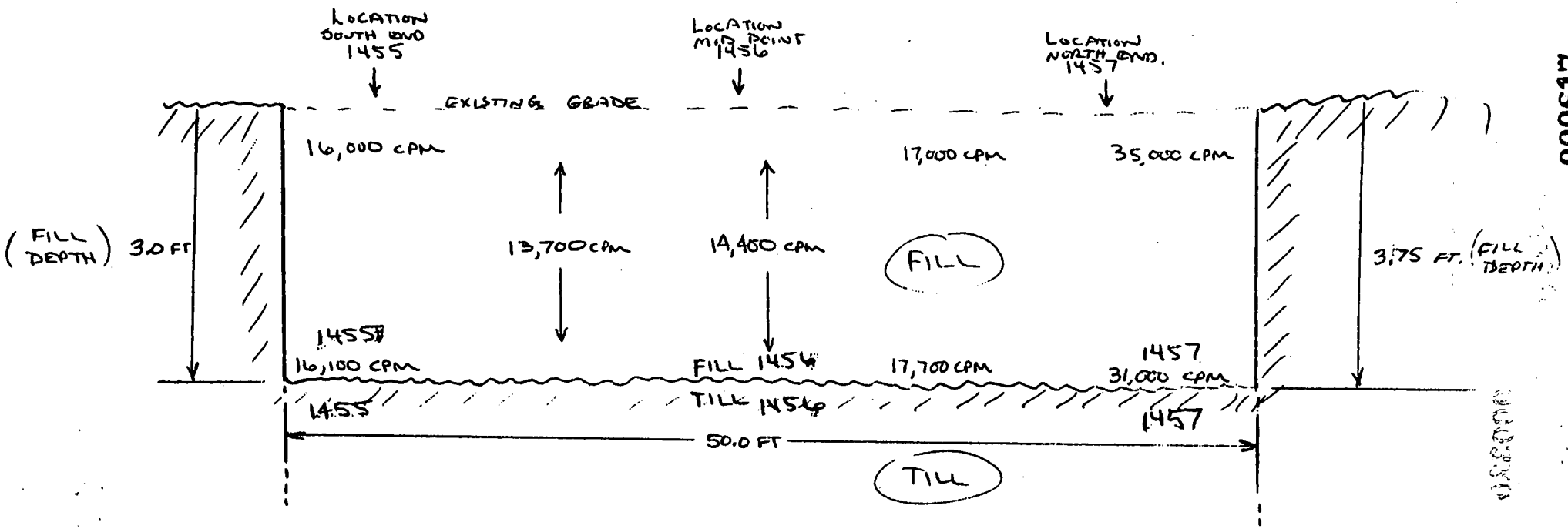
BACKHOE OPERATOR: DAVID ORPHEY

Samples 55904, 55905 are for Fernald, Archive samples have different #'s. Archive # @ 3.75 ft = 55917 [illegible]
Archive # @ [illegible] ft = 55912 [illegible]

INSTRUMENT BACKGROUND
ESP-1 = 11,800 cpm
Hnu = 0.0-0.4 ppm
α = 0 cpm
βγ = 100-120 cpm

	Initial	Date
1st Key	JAS	3-26-90
2nd Key	JEL	5-14-90
Hard Copy Verification		

GEOLOGIC PROFILE (TRENCH No. 1)



READINGS ON TRENCH WALL WERE MEASURED WITH ESP-I SERIAL NO. 2057
BACKGROUND = 11,800 CPM

FILL MATERIAL PRIMARILY SILTY SAND (SM) WITH GRAVEL (.50 - 2.5 IN), RUBBLE MIXED WITH FILL SOIL. SEVERAL PIECES OF CONCRETE (5 IN. - 2.0 FT).
TILL MATERIAL COMPOSED OF SILTY CLAY, (10YR 5/1) AND (10YR 5/6)
* DEEPEST AREA OF FILL AT 3.75 - 4.0 FT.
*2 SAMPLES TAKEN AT EACH LOCATION ONE IN BASE OF FILL AND ONE ~1.0 FT. INTO TILL.

→ N

	Initial	Date
Field Check	WAH	12-28-89
1st Key In		
2nd Key In		
Hard Copy Verification		

000617

FERNALD RI/FS

(TRENCH 2)

5711

Date:	12-28-89			
Initial				
	Field Check	1st Ck'ly Ic.	2nd Ck'ly Ic.	Field Copy Verification

VISUAL CLASSIFICATION OF SOILS

477,880 N, E 1,379,631

~~477,892 N, E 1,379,784~~

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1458	COORDINATES: ~~N 477,892 E 1,379,784~~	DATE: 11-06-89
ELEVATION: ~~579.0~~ 578.6	GWL: Depth None Date/Time	DATE STARTED: 11-06-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth None Date/Time	DATE COMPLETED: 11-06-89
DRILLING METHODS: BACKHOE TRENCH CAT 225 B LC		PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NOT APPLICABLE			(Trench #2) SOUTH END (5-8 in OVERGROWTH) FILL MATERIAL FROM 0.0 TO 4.0 FT., OCCASIONAL PIECES OF CONSTRUCTION RUBBLE, CONCRETE, ASPHALT, <1% OF FILL COMPOSED OF RUBBLE. FILL MATERIAL MAINLY SILTY SAND, TRACE OF GRAVEL (.5-3.0 IN), MOIST. RUBBLE CONCRETE 3 in-10 in SIZE.			
1							
2							
3	Sample # ↓	time ↓		LOOSE, BROWN (7.5YR 4/2) SILTY SAND TRACE OF GRAVEL (.5-3.0 IN) TRACE OF CLAYEY LENSES OR LAYERS. MOIST. FILL/TILL BOUNDARY 4.0 FT.	SM	n/a	Hnu = 0.0 ppm α = 0 CPM βγ = 100-200 CPM ESP-1 = 13,000 CPM
	55913	0960					
4							
	55914	0920		VERY STIFF, GRAYISH BROWN (10YR 4/2) CLAY, TRACE OF SILT, TRACE OF GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	2.5	Hnu = 0.0 ppm α = 0 CPM βγ = 300-400 CPM ESP-1 = 13,500 CPM
5				* TRENCH DEPTH AT S. END @ 4.5 FT.			* INTERFACE BETWEEN FILL AND TILL SHOWED SOME OXIDATION FROM MOISTURE OR WATER LEACHING, βγ READING WERE ELEVATED RELATIVE TO FILL MATERIAL.
6							

NOTES

BACKHOE OPERATOR: DAVID ORPHEY

Archive sample # @ 55920 @ 4.0 Ft. Z-DAH

Archive sample # @ 55921 @ 4.5 Ft. Z-DAH

INSTRUMENT BACKGROUND

Hnu = 0.0-0.4 ppm

α = 0 CPM

βγ = 100-120 CPM

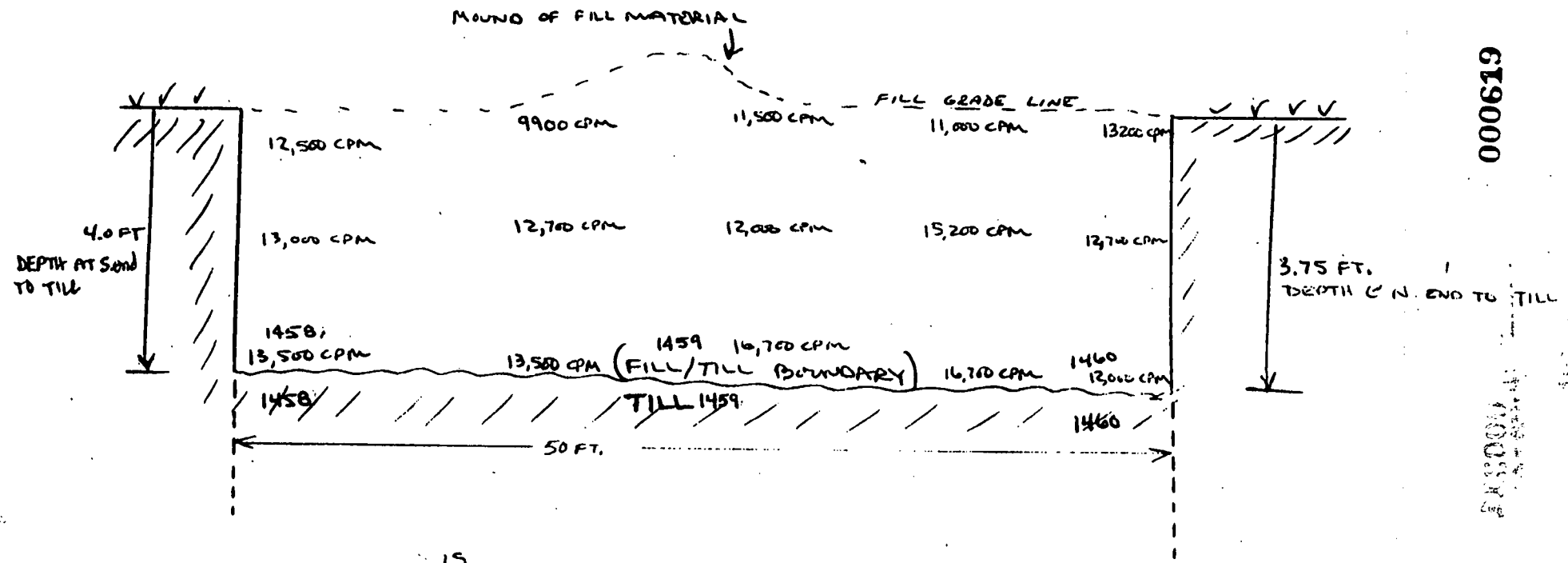
ESP-1 = 13,000 CPM

REVIEWED BY QA DATE 1/21/92

TRENCH #2 PROFILE

* LOCATION'S SAMPLED, 1458, 1459, 1460 (SOUTH END, MID-POINT, NORTH END OF TRENCH)

RADIATION SURVEY PERFORMED WITH ESP-1 (SPA-3) SERIAL #2057, BKg. = 13,000 CPM



FILL MATERIAL ~~WAS~~ IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE FROM CONSTRUCTION. RUBBLE ENCOUNTERED: CONCRETE (.5 FT-2.0 FT), ASPHALT (.5 FT.), SMALL PIECES OF METAL (6 IN LONG). FILL/TILL BOUNDARY AT 4.0 FT. SOUTH END 3.75 FT. NORTH END. HSL SAMPLES TAKEN AT LOCATION 1459 @ 5.0 FT. BELOW BACKGROUND LEVELS ON HNU METER.

→ N

DIMENSIONS OF TRENCH: #2
50 FT. LONG
24 INCHES: WIDTH
4.0 FT. DEPTH @ S. END
3.75 FT. NORTH END.

REVIEWED BY QA [illegible] DATE 1/21/92

000619

FERNALD RI/FS

5711

Date	12-28-89	2-5-90	2-16-90	
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS TRENCHING		
BORING NUMBER: 1459	COORDINATES: ~~N 477,905 E 1,379,744~~ N 477,905, E. 1,379,631 FT.	DATE: 11-06-89	
ELEVATION: 581.0	GWL: Depth None Date/Time	DATE STARTED: 11-06-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-06-89	
DRILLING METHODS: BACKHOE 225 B LC		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION (TRENCH #2 Mid Point)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NOT APPLICABLE			5-8 in ORGANIC UNDERGROWTH			
1				FILL MATERIAL FROM SURFACE TO 5.5 FT., OCCATIONAL PIECES OF CONSTRUCTION RUBBLE, CONCRETE ASPHALT, METAL < 1%.			
2				FILL MATERIAL MOSTLY UNIFORM THROUGHOUT, SILTY SAND, TRACE OF GRAVEL (.5-3.0 in), MOIST. CONCRETE PIECES (5 in -1.0 FT) DIAMETER. ASPHALT PIECES (5-10 in)			
3							
4							
5	Sample # 55915	Time @0950		LOOSE, BROWN (7.5 YR 4/2) SILTY SAND, TRACE OF GRAVEL (.5-1.0 in) TRACE OF GRAVEL (.5-1.0 in) MOIST. FILL/TILL BOUNDARY 5.5 FT.	SM	N/A	ESP-1 = 11,500 CPM H_{nu} = 0 ppm α = 0 cpm $\beta\gamma$ = 100-120 cpm
6	55916	@1000		VERY STIFF, YELLOWISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5 in), MEDIUM PLASTICITY, MOIST. HSL SAMPLES TAKEN AT THIS LOCATION @ 5.0 FT. #55919	CL	2.5	ESP-1 = 13,600 CPM H_{nu} = 0.0 ppm $\beta\gamma$ = 300-450 CPM α = 0.0 cpm

NOTES

Archive Sample #@ 5.0 ft = 55922 } WAD
Archive Sample #@ 6.0 ft = 55923 } 12-27-89

INSTRUMENT BACKGROUND

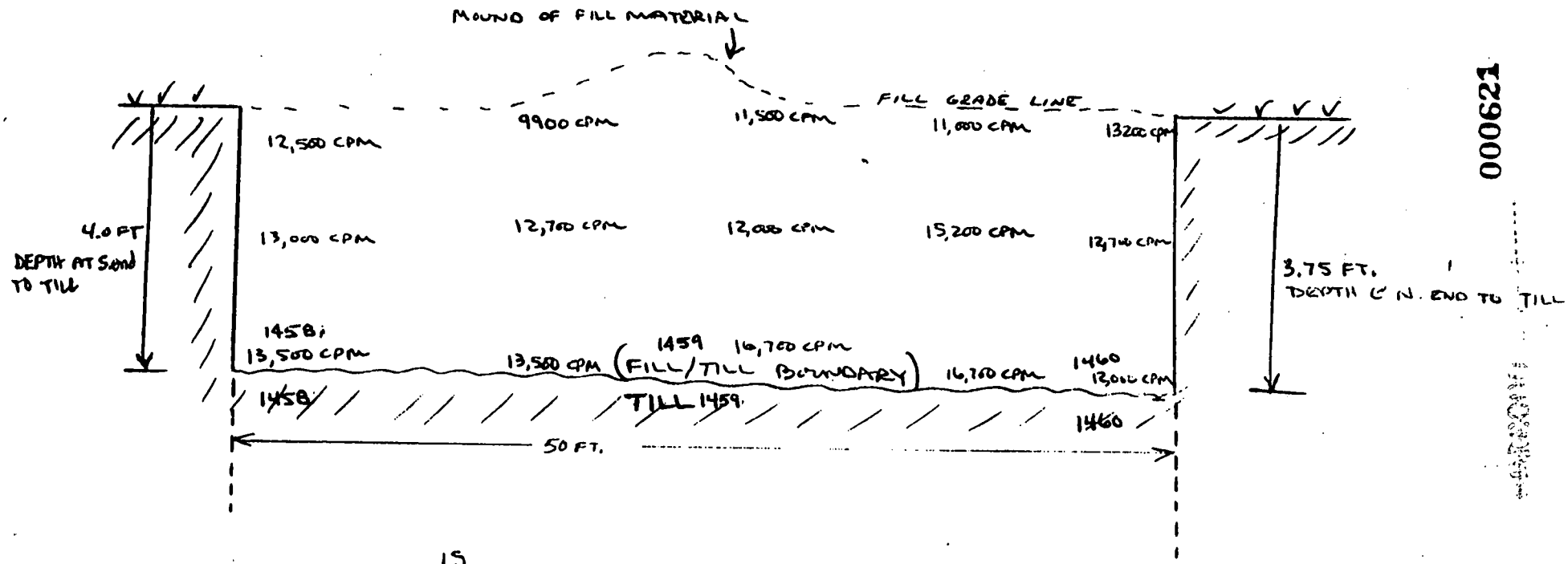
H_{nu} = 0.0-0.4 ppm
α = 0 CPM
$\beta\gamma$ = 100-120 cpm
ESP-1 = 13,000 cpm

26/13/11

TRENCH #2 PROFILE

* LOCATIONS SAMPLED, 1458, 1459, 1460 (SOUTH END, MID-POINT, NORTH END OF TRENCH)

RADIATION SURVEY PERFORMED WITH ESP-1 (SPA-3) SERIAL #2057, 13Kg. = 13,000 CPM



FILL MATERIAL ~~WAS~~ IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE FROM CONSTRUCTION. RUBBLE ENCOUNTERED: CONCRETE (.5 FT - 2.0 FT), ASPHALT (.5 FT.), SMALL PIECES OF METAL (6 in LONG). FILL/TILL BOUNDARY AT 4.0 FT. SOUTH END 3.75 FT. NORTH END. HSL SAMPLES TAKEN AT LOCATION 1459 @ 5.0 FT. BELOW BACKGROUND LEVELS ON HNU METER.

→ N

DIMENSIONS OF TRENCH: #2
50 FT. LONG
24 INCHES: WIDTH
4.0 FT. DEPTH @ S. END
3.75 FT. NORTH END

REVIEWED BY QA Onn DATE 1/21/92

000621

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS (TRENCHING)		
BORING NUMBER: 1460	COORDINATES: ~~N. 477,442, E. 1,379,984~~ N. 477,930, E. 1379631	DATE: 11-06-89	
ELEVATION: 578.8	GWL: Depth NONE Date/Time	DATE STARTED: 11-06-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-06-89	
DRILLING METHODS: BACKHOE CAT 225B LC		PAGE 3 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				(TRENCH No. 2) North End			
1	NOT APPLICABLE			5-8 in. ORGANIC OVERGROWTH. FILL MATERIAL FROM .5 FT TO 3.75 FT. IN THIS AREA, COMPOSED MAINLY OF SOIL, SOME LARGE GRAVEL AND COBBLES, SEVERAL PIECES OF CONCRETE (.5 FT. -1.0 FT.) SEVERAL PIECES OF SCRAP METAL 6 in LONG.			
2							
3	Sample # ↓ 55917	time ↓ 0840		LOOSE, BROWN (7.5 YR 4/2) SILTY SAND, TRACE TO SOME GRAVEL (.5-1.0 in) MOIST. FILL/TILL BOUNDARY 3.75 FT.	SM	N/A	Hnu = 0.0 ppm α = 0 CPM βγ = 150 CPM ESP-1 = 13,200 CPM
4	55918	1055		VERY STIFF, YELLOWISH BROWN TO GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5-1.0 in) LOW PLASTICITY, MOIST.	CL	2.0	Hnu = 0.0 ppm α = 0 CPM βγ = 300-500 CPM ESP-1 = 12,000 CPM
5							
6							

NOTES

Archive Sample # @ 3.5 ft = 55924 } WAH
Archive Sample # @ 4.25 ft = 55925 } 12-27-89

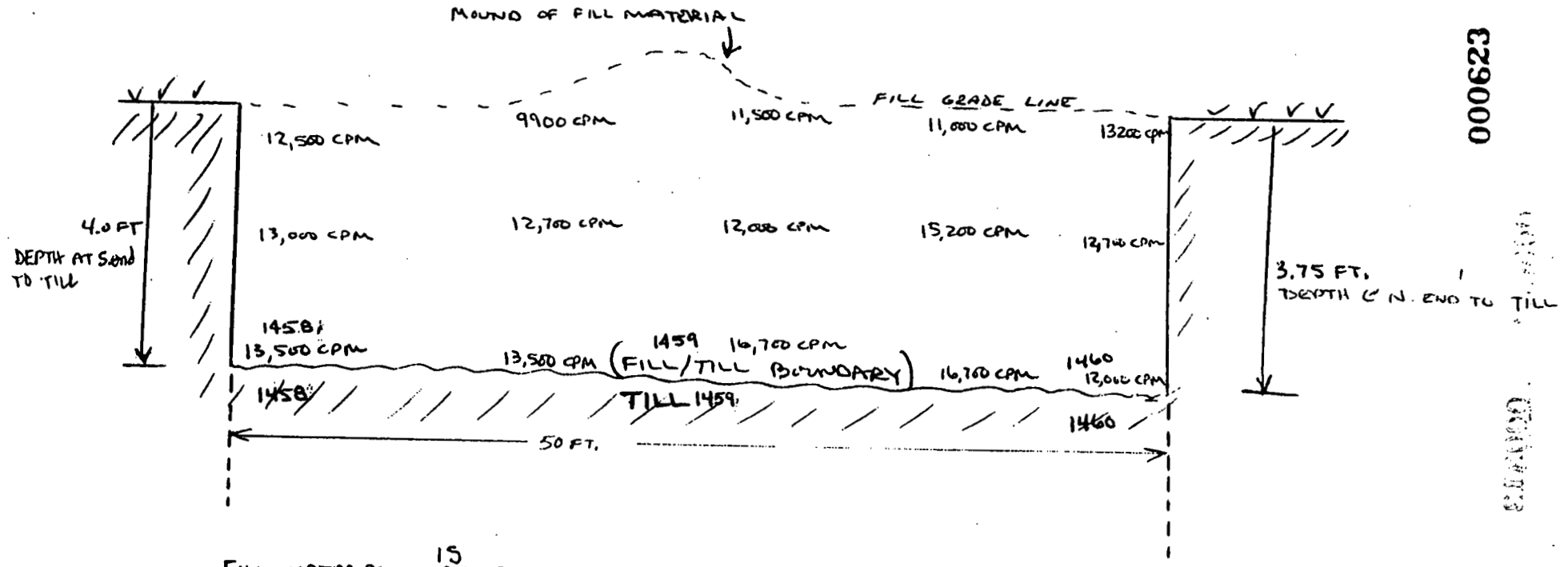
INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 CPM
βγ = 90-110 CPM
ESP-1 = 13,000 cpm

TRENCH #2 PROFILE

* LOCATIONS SAMPLED, 1458, 1459, 1460 (SOUTH END, MID-POINT, NORTH END OF TRENCH)

RADIATION SURVEY PERFORMED WITH ESP-1 (SPA-3) SERIAL #2057, 13Kg. = 13,000 CPM



FILL MATERIAL ~~WAS~~ IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE FROM CONSTRUCTION. RUBBLE ENCOUNTERED: CONCRETE (.5 FT-2.0 FT), ASPHALT (.5 FT.), SMALL PIECES OF METAL (6 IN LONG). FILL/TILL BOUNDARY AT 4.0 FT. SOUTH END 3.75 FT. NORTH END. HSL SAMPLES TAKEN AT LOCATION 1459 @ 5.0 FT. BELOW BACKGROUND LEVELS ON HNU METER.

→ N

DIMENSIONS OF TRENCH: #2
50 FT. LONG
24 INCHES: WIDTH
4.5 FT. DEPTH @ S. END
4.25 FT. NORTH END.

REVIEWED BY QA [illegible] DATE 1/21/92

000623

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 11/21/90

(TRENCH 3) **5711**

Date	12-28-89	12-28-89	12-28-89
Initial	JH	[illegible]	
	Field Check	1st Key In	2nd Key In

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS TRENCHING		
BORING NUMBER: 1461	COORDINATES: N.477,842, E.1,379,784	DATE: 11-07-89	
ELEVATION: 579.2	GWL: Depth NONE Date/Time	DATE STARTED: 11-07-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-07-89	
DRILLING METHODS: BACKHOE CAT 225B LC		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY	DESCRIPTION (TRENCH #3 SOUTH END)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1			N/A	3-5 in. OF OVERGROWTH FILL MATERIAL ~~WAS~~ IS PREDOMINANTLY FREE OF CONSTRUCTION RUBBLE AT THIS LOCATION TO THE DEPTH OF THE GLACIAL TILL. ONE OR 2 PIECES OF CONCRETE FOUND (6 in IN SIZE).			FILL MATERIAL WAS MONITORED AND BACKGROUND LEVELS OF SOIL DETECTED.
2							
3	Sample # ↓	TIME ↓					
4	55926	@ 1107		LOOSE, BROWN (7.5YR 4/2) SILTY SAND, SOME GRAVEL (.5-3.0 in) SLIGHTLY COHESIVE, MOIST FILL/TILL BOUNDARY @ 4.25 FT	SM	N/A	Hnu = 0.2 ppm α = 0 cpm βγ = 80-100 cpm ESP-1/SPA-3 = 7630 cpm
5	55927	@ 1110		VERY STIFF, YELLOWISH BROWN (10YR 4/4 WITH 10YR 4/2 MOTTLED) SILTY CLAY LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.5	Hnu = 0.2 ppm α = 0 cpm βγ = 100-120 cpm ESP 1 - SPA3 = 12,600
6							

NOTES

BACKHOE OPERATOR: DAVID GRIMEY

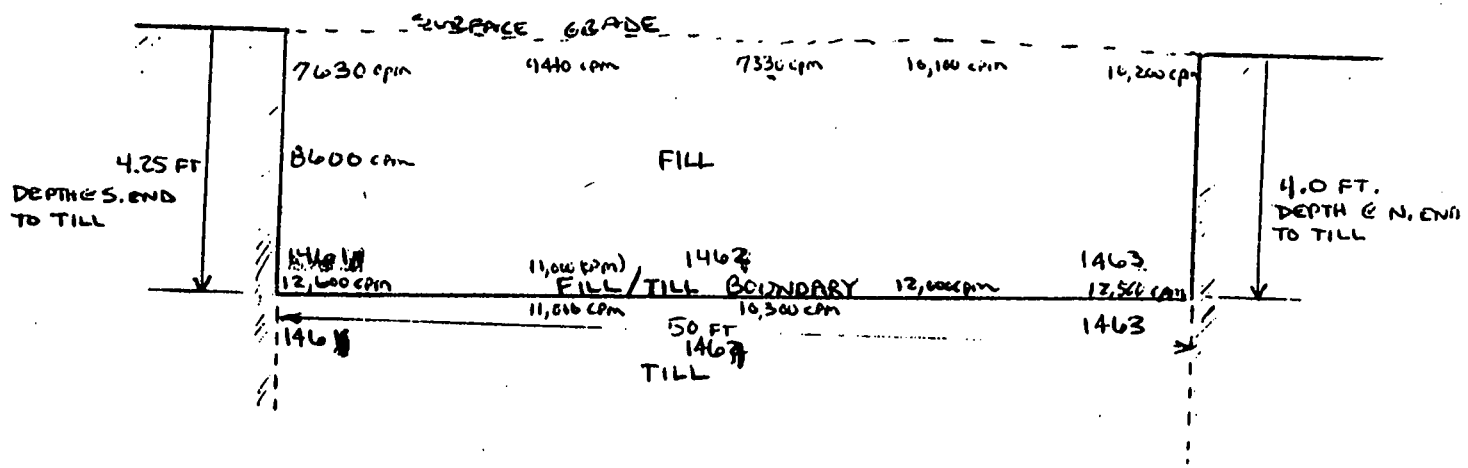
*SAMPLE #'S ARE FOR FULL RAD SAMPLES ONLY, ARCHIVE SAMPLES FOR THE SAME INTERVAL WERE COLLECTED BUT HAVE DIFFERENT #'S.

Archive #'S
55933 - 4.0 FT
55934 - 5.0 FT

INSTRUMENT BACKGROUND
Hnu = 0.2 ppm
α = 0 cpm
βγ = 80-110 cpm
ESP 1/SPA-3 = 7300-8630 cpm

TRENCH #3 PROFILE

REVIEWED BY QA DATE 1/21/92



NOTE: FILL MATERIAL IS PREDOMINANTLY A SILTY SAND WITH TRACE TO SOME GRAVEL RANGING FROM (.5-3.0 INCHES) ROUND TO ANGULAR. FILL MATERIAL CONDITIONS ARE MOIST AND LOOSE DENSITY. LESS THAN 1% RUBBLE ENCOUNTERED MAINLY CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT. LONG)

- RAD. SURVEY CONDUCTED WITH ESP-1/SPA 3 PROBE WERE TAKEN ALONG EAST WALL OF TRENCH AND READING ARE AS INDICATED IN (CPM).
- SAMPLING LOCATIONS SOUTH END, MID POINT, NORTH END

SPA 3 BKG READING = 7,300 CPM SEQ: 0.2057

N

DIMENSIONS:
TRENCH IS 50 FT. LONG RUNNING N-S, AVERAGE WIDTH IS [illegible] INCHES

000625

FERNALD RI/FS

REVIEWED BY GA DATE 11/21/89

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1462	COORDINATES: N. 477,867, E. 1,379,784	DATE: 11-07-89
ELEVATION: 579.1	GWL: Depth NONE Date/Time	DATE STARTED: 11-07-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-07-89
DRILLING METHODS: BACKHOE TRENCHING CAT 225 B LC		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY ( ) N/A	DESCRIPTION (TRENCH #3) MID-POINT	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				3-5 in OVERGROWTH			
1				FILL MATERIAL IN THIS LOCATION ~~WAS~~ IS FREE OF CONSTRUCTION RUBBLE AND NO CONCRETE WAS FOUND. PREDOMINANTLY SILTY SAND WITH TRACE OF GRAVEL.			FILL MATERIAL WAS PERIODICALLY MONITORED AND BACKGROUND LEVELS DETECTED.
2							
3	Sample # ↓	TIME ↓					
4	55928	@1130		LOOSE, BROWN (7.5YR 4/2) TO (7.5YR 4/3) SILTY, SAND, TRACE OF GRAVEL (.5 - 3.0 in), MOIST FILL/TILL BOUNDARY @ 4.25 FT.	SM	N/A	Hnu = 0.2 ppm α = 0 cpm βγ = 100 cpm ESP-1/SPA-3 = 11,000
5	55929	@1135		STIFF, YELLOWISH BROWN (10YR 4/3) CLAY, SOME SILT, LOW PLASTICITY, SLIGHTLY OXIDIZED, MOIST.	CL	1.5	Hnu = 0.2 ppm α = 0 cpm βγ = 110-120 cpm ESP 1/SPA-3 = 11,000
6							
7				* HSL SAMPLES TAKEN AT 4.0 FT. ON THIS LOCATION. #55932			

NOTES

BACKHOE OPERATOR: David Copley

Archive #'s
55935 - 4.0 FT.
55936 - 5.0 FT.

* SAMPLES 55928, 55929 ARE FOR FULL RAD ANALYSIS ONLY, ARCHIVE SAMPLES FOR THE SAME INTERVAL WERE COLLECTED BUT HAVE DIFFERENT SAMPLE #'S.

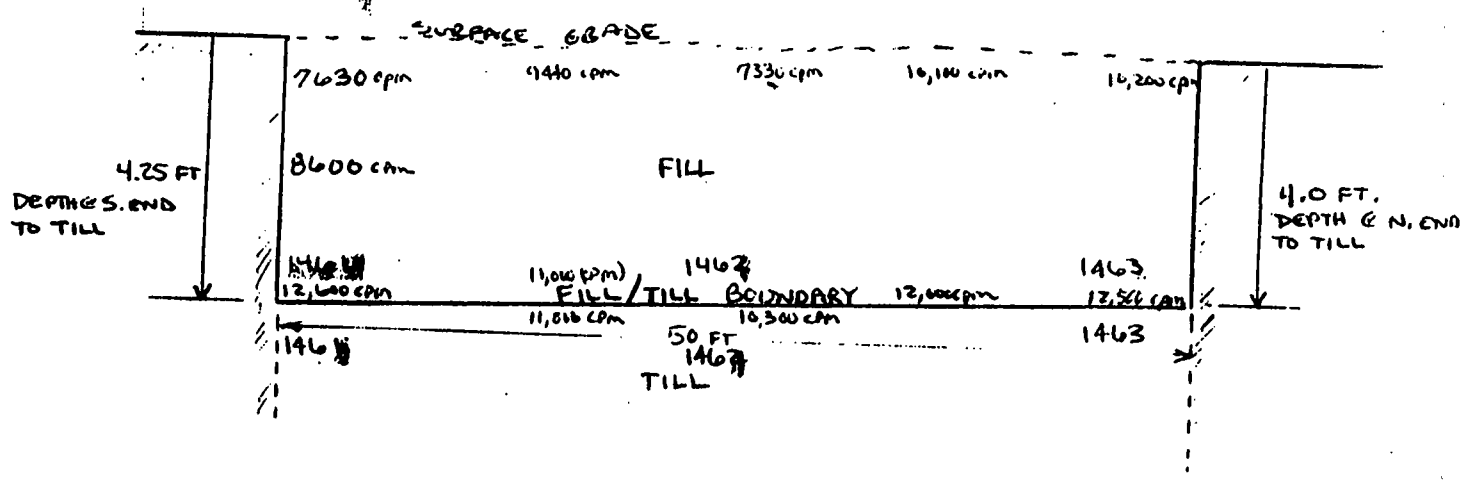
INSTRUMENT BACKGROUND

Hnu = 0.2 ppm
α = 0 cpm
βγ = 80-110 cpm
ESP-1/SPA-3 = 7,320-8,630 cpm

000626

TRENCH #3 PROFILE

REVIEWED BY QA DATE 11/21/92



NOTE: FILL MATERIAL IS PREDOMINANTLY A SILTY SAND WITH TRACE TO SOME GRAVEL RANGING FROM (.5-3.0 INCHES) ROUND TO ANGULAR. FILL MATERIAL CONDITIONS ARE MOIST AND LOOSE DENSITY. LESS THAN 1% RUBBLE ENCOUNTERED MAINLY CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT. LONG)

- RAD. SURVEY CONDUCTED WITH ESP-1/SPA 3 PROBE WERE TAKEN ALONG EAST WALL OF TRENCH AND READING ARE AS INDICATED IN (CPM).
- SAMPLING LOCATIONS SOUTH END, MID POINT, NORTH END

SPA 3 BKG READING = 7,300 CPM SER. 0.2057

N

DIMENSIONS:
TRENCH IS 50 FT. LONG RUNNING N-S, AVERAGE WIDTH IS [illegible] INCHES

000427

FERNALD RI/FS

REVIEWED BY QA DATE 12/6/89

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1463	COORDINATES: N.477,892, E.1,379,784	DATE: 11-07-89
ELEVATION: 579.0	GWL: Depth None Date/Time	DATE STARTED: 11-07-89
ENGINEER/GEOLOGIST: E. TOLLINGER	Depth Date/Time	DATE COMPLETED: 11-07-89
DRILLING METHODS: ~~CARE E.T. 300~~ CAT 225 B LL BACKHOE		PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (-) N/A	RECOVERY N/A	DESCRIPTION TRENCH #3 NORTH ENDED	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				5-6in OVERGROWTH, GRASS, ROOTS			
1				FILL MATERIAL ~~WAS~~ IS PREDOMINANTLY FREE OF CONSTRUCTION RUBBLE AND MAINLY SILTY SAND WITH GRAVEL (.5-3.0 inches), MOIST AND LOOSE DENSITY. 2 PIECES OF WOOD FOUND (2 by 4) 2 FT. LONG ERODED (80-100 cpm βγ).			FILL MATERIAL MONITORED AND BACKGROUND LEVELS OF DETECTION FOUND.
2							
3	Sample # ↓	Time ↓					
	55930	@1420		→ LOOSE TO MEDIUM DENSE, BROWN (7.5YR 4/2) TO GRAYISH BROWN (10YR 4/3). SILTY SAND MOIST. FILL/TILL BOUNDARY @ 4.0 FT.	SM	N/A	H_{mu} = 0.2 ppm α = 0 cpm βγ = 80-100 cpm ESP-1/SPA-3 = 12,000 cpm
4							
	55931	@1425		→ STIFF, BROWNISH GRAY WITH YELLOWISH BROWN (10YR 4/4) AND (10YR 4/2) SILTY CLAY LOW PLASTICITY, MOIST.	CL	2.0	H_{mu} = 0.2 ppm α = 0 cpm βγ = 100 cpm ESP-1/SPA-3 = 12,500 cpm
5							
6							

NOTES

BACKHOE OPERATOR: DAVID GRAHEY

* SAMPLES 55930, 55931 ARE FOR FULL RAD ANALYSIS ONLY. ARCHIVE SAMPLES WERE COLLECTED AT SAME LOCATIONS.

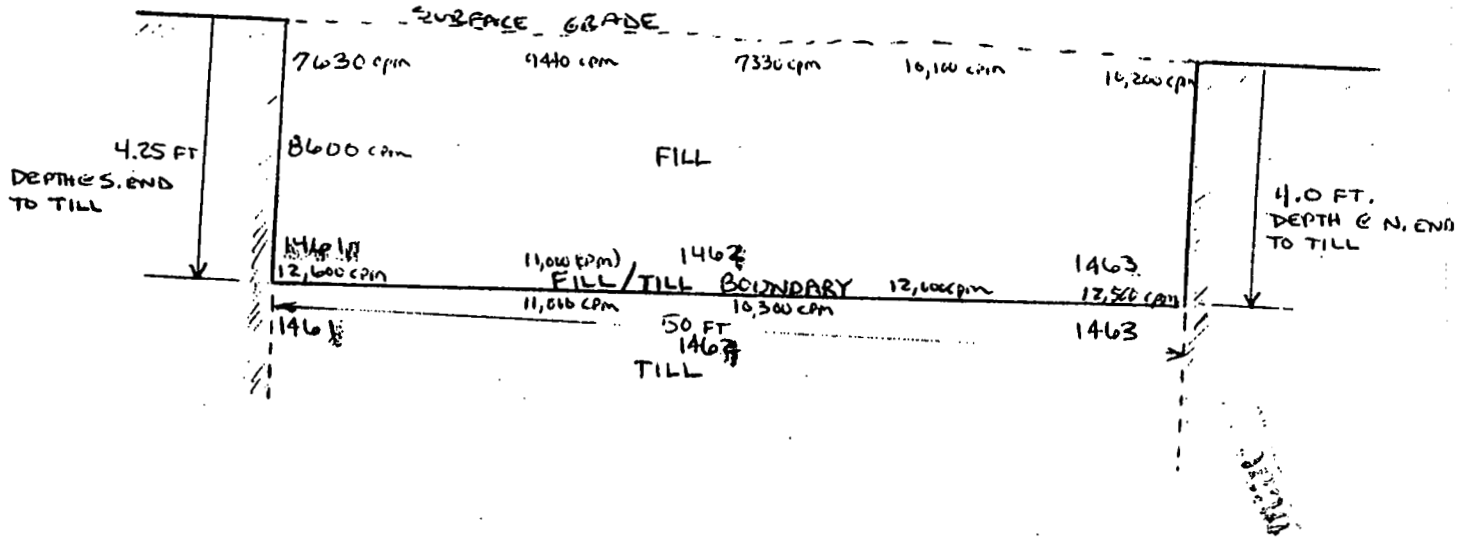
Archive #'s
3.5 FT. - ~~55936~~ 55937
4.5 FT. - 55938

INSTRUMENT BACKGROUND
H_{mu} = 0.2 ppm
α = 0 cpm
βγ = 80-110 cpm
ESP-1/SPA-3 = 7200-9030 cpm

page 4/4

TRENCH #3 PROFILE

REVIEWED BY QA DATE 11/21/92



NOTE: FILL MATERIAL IS PREDOMINANTLY A SILTY SAND WITH TRACE TO SOME GRAVEL RANGING FROM (.5-3.0 INCHES) ROUND TO ANGULAR. FILL MATERIAL CONDITIONS ARE MOIST AND LOOSE DENSITY. LESS THAN 1% RUBBLE ENCOUNTERED MAINLY CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT. LONG)

- RAD. SURVEY CONDUCTED WITH ESP-1/SPA 3 PROBE WERE TAKEN ALONG EAST WALL OF TRENCH AND READING ARE AS INDICATED IN (CPM).
- SAMPLING LOCATIONS SOUTH END, MID POINT, NORTH END

SPA 3 BKG READING = 7,300 CPM SER. No. 2057

FINISHED DEPTH OF TRENCH AT 5.0 FT. FROM SURFACE

N

DIMENSIONS:
TRENCH IS 50 FT. LONG RUNNING N-S, AVERAGE WIDTH IS [illegible] INCHES

629000

FERNALD RI/FS

REVIEWED BY QA (TRENCH 4) DATE 1/21/92

5711

Date	12-28-89	12-28-89	12-28-89
Initial	[illegible]	[illegible]	[illegible]
	Field Check	1st Key In	2nd Key In

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1464	COORDINATES: N. 477,734, E. 1,379,566	DATE: 11-08-89
ELEVATION: 575.7	GWL: Depth none Date/Time	DATE STARTED: 11-08-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth FOUND Date/Time	DATE COMPLETED: 11-08-89
DRILLING METHODS: CAT 225 BACKHOE (TRACKS)		PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (") N/A	RECOVERY (") N/A	DESCRIPTION TRENCH # 4 NORTH END	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				4 INCHES OVERGROWTH - GRASS			
1				FILL MATERIAL IS A SILTY SAND, WITH GRAVEL (.5-3.0 IN), CONDITIONS ARE MOIST AND LOOSE DENSITY, SAME (3 PIECES) CONCRETE WAS FOUND (2 FT LONG.) GM READINGS ON CONCRETE (100 cpm βγ)			MATERIAL WAS MONITORED AS STOCKPILED WITH METERED, BACKGROUND LEVEL DETECTED.
2							
3	Sample # ↓	Time ↓					
4	55939	@1100		LOOSE, BROWN TO GRAYISH BROWN (7.5YR 4/2 / 10YR 4/3) SILTY SAND, 30-40% SILT TRACE OF GRAVEL (.5-3.0 IN) MOIST. FILL/TILL BOUNDARY 4.6 FT	SM	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 60-90 cpm ESP/SPA 3 = 8000 cpm
5	55940	@1115		STIFF, YELLOWISH BROWN (10YR 4/4) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	1.5	Hnu = 0.0 ppm α = 0 cpm βγ = 60-80 cpm ESP/SPA 3 = 10,000 cpm
6				~~USE SAMPLE # @ 4.5 FT.~~ ~~# 55945~~ WAH 12-27-89 See Log of Location 1465			

NOTES

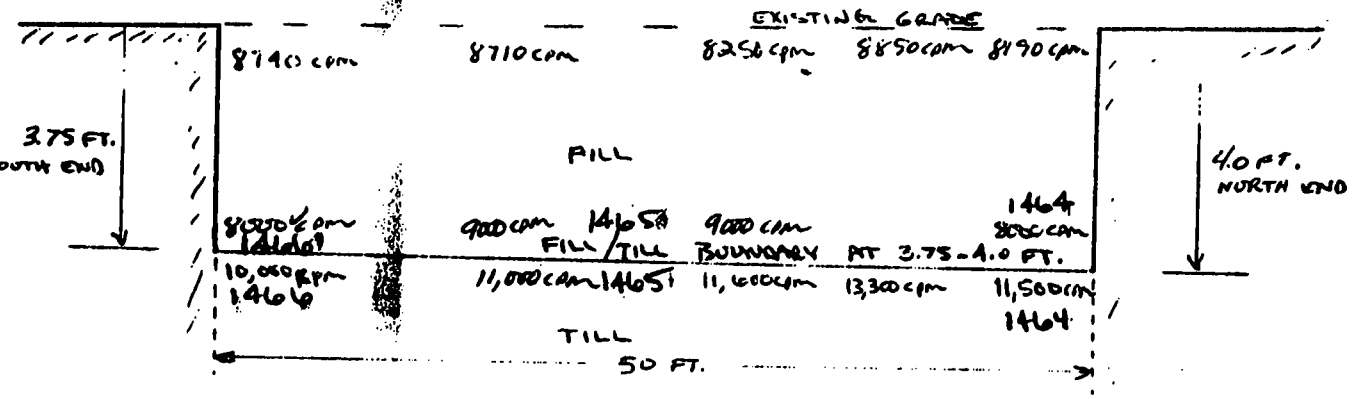
OPERATOR: DAVID ORMEY (IT)

SAMPLES 55939, 55940 ARE FULL RAD SAMPLES, Archive samples HAVE DIFFERENT NUMBERS.

Archive #'s
55946 - 3.75 FT.
55947 - 4.5 FT.

INSTRUMENT BACKGROUND
Hnu = 0.0 - 0.4 ppm
α = 0 cpm
βγ = 60-80 cpm
ESP-1/SPA 3 = 6000 cpm

TRENCH #4 PROFILE



NOTE: FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5-4.0 in) ROUND TO ANGULAR, DENSITY IS LOOSE, MOIST, LESS THAN 1% RUBBLE ENCOUNTERED AS CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT)

RAD SURVEY CONDUCTED ESP/SPA 3 AND READINGS ARE AS INDICATED ON PROFILE (EAST WALL SURVEYED) SAMPLING LOCATIONS ARE HIGH LIGHTED.

FINISHED DEPTH OF TRENCH AT 4.5 FT.

→ N

DIMENSIONS:
TRENCH IS 50 FT. LONG RUNNING N-S, AVERAGE WIDTH IS 24 inches

REVIEWED BY QA DATE 11/21/92

000631

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 1/24/90

5711

Date	12-28-89	12-28-89	12-28-89	
Initial	[illegible]	[illegible]	[illegible]	
Field Class.	1st Ksyin	2nd Ksyin	Final Class. Verification	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1465	COORDINATES: N.977,709, E.1,379,566	DATE: 11-08-89
ELEVATION: 575.5	GWL: Depth None Found Date/Time	DATE STARTED: 11-08-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-08-89
DRILLING METHODS: CAT 225 TRENCH BACKHOE TRACK MOUNTED		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY (N/A)	DESCRIPTION TRENCH #4 (MID POINT)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				5 in. OVERGROWTH (grass-roots)			
1				FILL MATERIAL IS A SILTY SAND WITH A TRACE OF GRAVEL (.5-3.0 in), 3 PIECES OF WOOD FOUND (100 cpm) BY AS CONSTRUCTION RUBBLE.			MATERIAL WAS MONITORED AS IT WAS STOCKPILED NO READINGS ABOVE BACKGROUND.
2							
3	Sample # ↓ 55941	Time ↓ @1135		LOOSE, BROWN (7.5YR 4/2) SILTY SAND, CONSIDERABLE GRAVEL. (.5-3.0 in), MOIST. FILL/TILL BOUNDARY @3.75 FT	SM	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 60-100 cpm ESP/SPA-3 = 9000 cpm
4	55942	@1325		MEDIUM STIFF, YELLOWISH BROWN, (10YR 4/4) SILTY CLAY, TRACE OF FINE GRAVEL (.5 in), LOW TO MEDIUM PLASTICITY, MOIST.	CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 100 cpm. ESP/SPA3 = 11,000 cpm
5							
6			WMH 12-27 89	HSL Sample taken @ 3.5 ft Sample # 55945			

NOTES

BACKHOE OPERATOR: DAVID ORAHEY (IT)

Samples 55941, 55942 ARE FULL RAD, ARCHIVE SAMPLES HAVE DIFFERENT NUMBERS.

Archive #'s

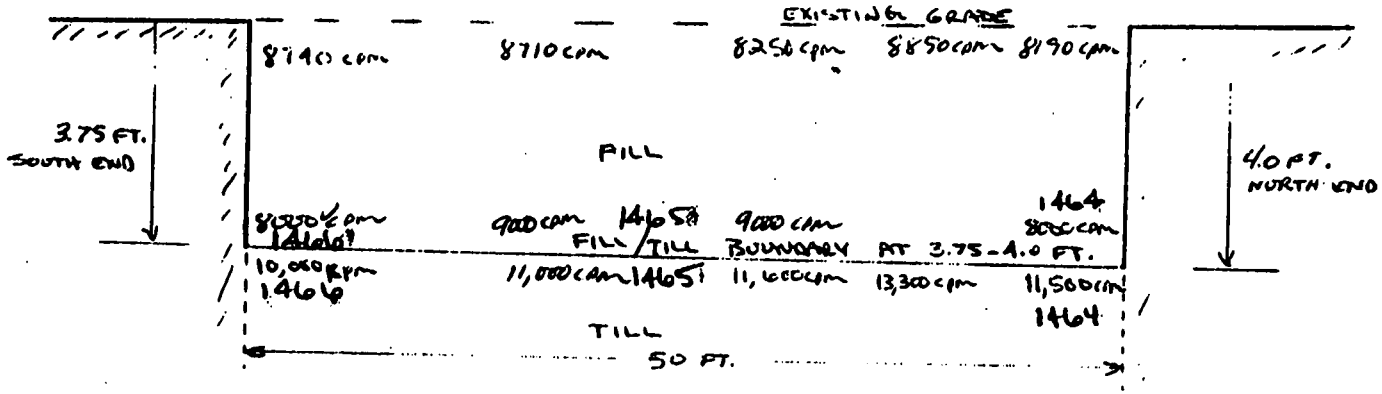
55948 ~~3.75~~ 3.5 FT

55949 ~~4.75~~ 4.5 FT.

INSTRUMENT BACKGROUND

Hnu = 0.0 - 0.4 ppm
α = 0 cpm
βγ = 60-80 cpm
ESP/SPA 3 = 6000 cpm

TRENCH #4 PROFILE



NOTE: FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5-4.0 in) ROUND TO ANGULAR, DENSITY IS LOOSE, MOIST, LESS THAN 1% RUBBLE ENCOUNTERED AS CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT)

RAD SURVEY CONDUCTED ESP/SPA 3 AND READINGS ARE AS INDICATED ON PROFILE (EAST WALL SURVEYED) SAMPLING LOCATIONS ARE HIGH LIGHTED.

FINISHED DEPTH OF TRENCH AT 4.5 FT.

→ N

DIMENSIONS:
TRENCH IS 50 FT. LONG RUNNING N-S, TRENCH WIDTH IS 24 INCHES

REVIEWED BY QA DATE 1/21/92

000633

FERNALD RI/FS

REVIEWED BY: JM DATE: 1/21/92

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1466	COORDINATES: N.477,684 : E.1,378,566	DATE: 11-08-89
ELEVATION: 575.3	GWL: Depth None FOUND Date/Time	DATE STARTED: 11-08-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-08-89
DRILLING METHODS: CAT 225 BACKHOE		PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION (TRENCH #4 SOUTH END)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				5 in. OVERGROWTH			
1				FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5-4.0 in), NO RUBBLE FOUND IN SOUTH END OF TRENCH.			MATERIAL MONITORED AS IT WAS STOCKPILED SOIL BELOW BACKGROUND.
2							
	Sample # ↓	Time ↓					
3	55943	@1345		→ LOOSE, BROWN (7.5YR 4/2) SILTY SAND, TRACE OF GRAVEL (.5-4.0 in), MOIST. FILL/TILL BOUNDARY @ 3.75 FT	SM	N/A	Hnu = 0.0 ppm α = 0 cpm β/γ = 60-80 cpm ESP/SPA-3 = 9000
4							
	55944	@1350		→ MEDIUM STIFF, YELLOWISH BROWN (10YR 4/4) SILTY CLAY, TRACE OF FINE GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	1.0	Hnu < 0 ppm α = 0 cpm β/γ = 60-80 cpm ESP/SPA 3 = 11,500
5							
6							

NOTES

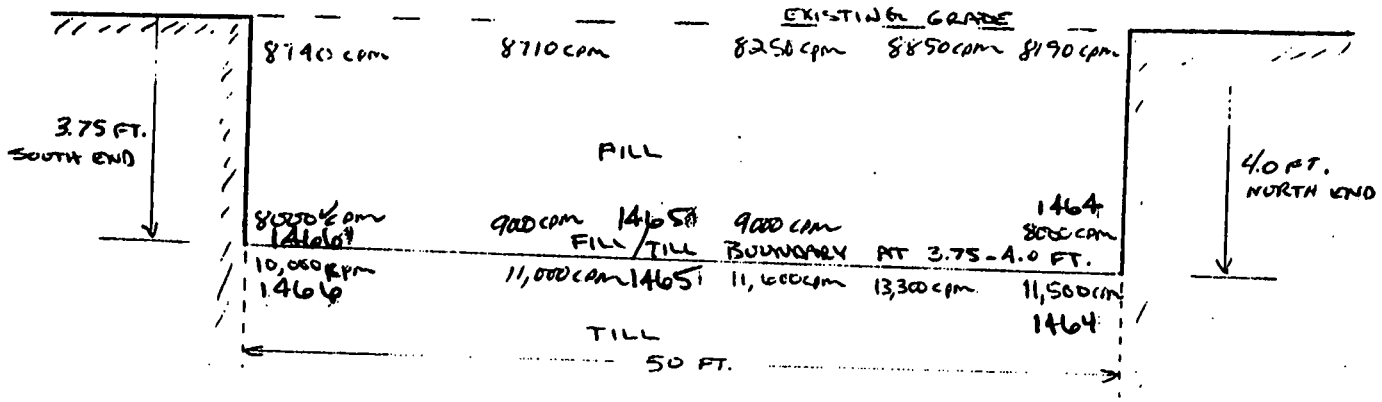
BACKHOE OPERATOR: DAVID Orphey

Samples 55943, 55944 ARE FOR FULL RAD, Archive Samples HAVE DIFFERENT NUMBERS.

Archive #'s
55950 - 3.0 FT.
55951 - 4.5 FT.

INSTRUMENT BACKGROUND
Hnu = 0.0-0.4 ppm
α = 0 cpm
β/γ = 60-100 cpm
ESP/SPA 3 = 6000 cpm

TRENCH #4 PROFILE



NOTE: FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5-4.0 in) ROUND TO ANGULAR, DENSITY IS LOOSE, MOIST, LESS THAN 1% RUBBLE ENCOUNTERED AS CONCRETE AND WOOD FROM CONSTRUCTION (.5 FT - 1.5 FT)

RAD SURVEY CONDUCTED ESP/SPA 3 AND READINGS ARE AS INDICATED ON PROFILE (EAST WALL SURVEYED). SAMPLING LOCATIONS ARE HIGH LIGHTED.

FINISHED DEPTH OF TRENCH AT 4.5 FT.

→ N

DIMENSIONS:
TRENCH IS 50 FT., LONG
RUNNING N-S, AVERAGE WIDTH
IS 24 inches

REVIEWED BY QA DATE 1/21/92

000635

FERNALD RI/FS

REVIEWED BY QA JM DATE 1/16/92

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC/RI-FS	
BORING NUMBER: 1467	COORDINATES: N.477,658, E.1,379,700	DATE: 11-14-89
ELEVATION: 576.3	GWL: Depth none Date/Time	DATE STARTED: 11-14-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-14-89
DRILLING METHODS: CAT 225 B LC BACKHOE		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				TRENCH #5 North End			
1				4-5 INCHES OF OVERGROWTH GRASS, ROOTLETS, WEEDS. FILL MATERIAL COMPOSED OF SOIL AND SEVERAL PIECES OF CONSTRUCTION RUBBLE, CONCRETE .5FT, ASBESTOS (6in long) BUILDING SIDING, WOOD FRAGMENTS.			SURVEY OF FILL MATERIAL PRODUCED READINGS OF BACKGROUND,
2	Sample # ↓ 55952	Time ↓ @0940		LOOSE, BROWN (7.5YR 4/2) SILTY SAND, SOME GRAVEL (.5-2.0 in), MOIST. FILL/TILL BOUNDARY AT 2.75 FT.	SM	N/A	H_m = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40-60 cpm SPA3/ESP1 = 8200
3	55953	@0950		STIFF, YELLOWISH BROWN (10YR 4/4) WITH GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF GRAVEL (.5 in), LOW PLASTICITY, MOIST.	CL	1.5	H_m = 0.0 cpm α = 0 cpm $\beta\gamma$ = 40 cpm ESP/SPA 3 = 11,300
4							
5							
6							

NOTES

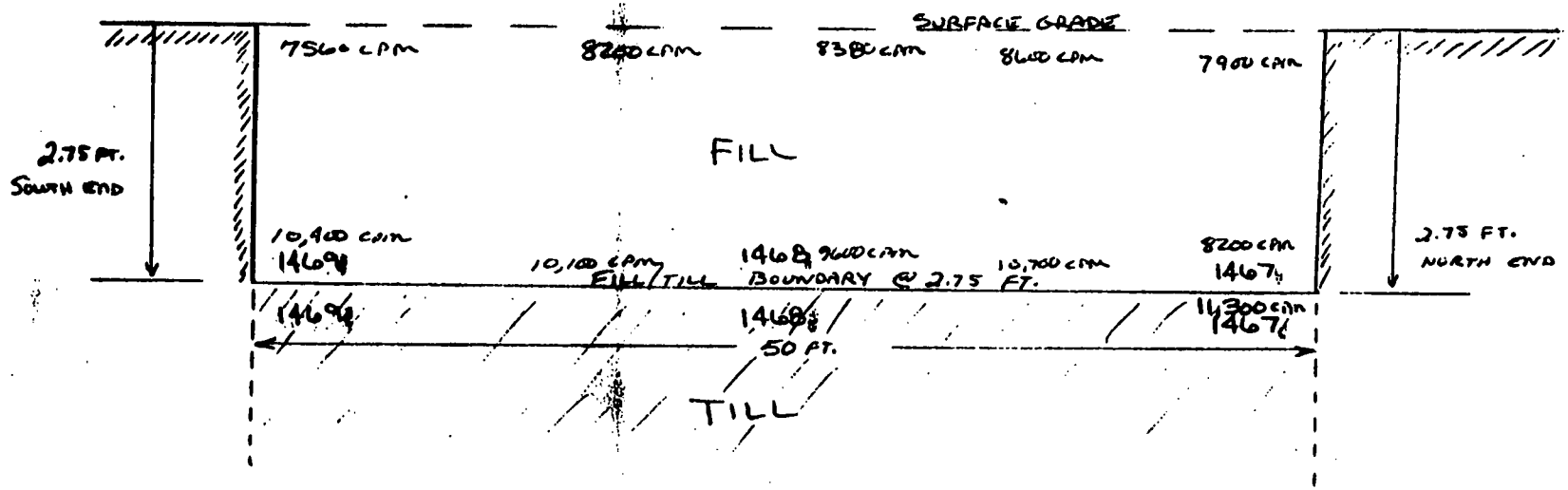
BACKHOE OPERATOR: DAVID ORPHEY

BACKHOE Sample #'s 55960, 55961
2.5 FT, 3.5 FT.

INSTRUMENT BACKGROUND

H_m = 0.0 - 0.2 ppm
α = 0 cpm
$\beta\gamma$ = 40-60 cpm
ESP/SPA 3 = 5200 cpm

TRENCH #5 PROFILE



NOTE: SAMPLING LOCATIONS ARE AS INDICATED 1467, 1468, 1469; ONE SAMPLE FROM FILL AND ONE FROM TILL AT EACH LOCATION.
FILL IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE: concrete, ASBESTOS SIDING, WOOD FRAGMENTS. SOIL IS A SILTY SAND WITH A TRACE OF GRAVEL (.5-2.0 IN), BROWN TO GRAYISH BROWN IN COLOR AND LOOSE DENSITY.

N

Dimentions:
LONGITH: 50 LINE FT.
HEIGHT: 2.75 FT. FILL

REVIEWED BY QA DATE 11/6/87

000637

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1468	COORDINATES: N. 477,633 E. 1,379,900	DATE: 11-14-89	
ELEVATION: 575.7	GWL: Depth none Date/Time	DATE STARTED: 11-14-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-14-89	
DRILLING METHODS: CAT 225B LC BACKHOE		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (-) N/A	RECOVERY (-) N/A	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				TRENCH #5 Mid Point			
				4-5 INCHES OVERGROWTH.			
1				FILL MATERIAL COMPOSED OF SOIL WITH LESS THAN 1% CONSTRUCTION RUBBLE, CONCRETE (.5-1.0 FT.), TRACE OF WOOD FRAGMENTS.			FILL MATERIAL SURVEYED AS IT WAS STOCKPILED, READINGS ON SOIL AT BACKGROUND LEVELS.
2	Sample # ↓	Time ↓					
	55954	@1000		LOOSE, BROWN (7.5YR 4/2) TO GRAYISH BROWN (10YR 4/2) SILTY SAND, TRACE OF GRAVEL (.5in), MOIST. FILL/TILL BOUNDARY 2.75 FT.	SM	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 40-80 cpm ESP/SPA 3 = 8900
3							Hnu = 0.0 ppm α = 0 cpm βγ = 40-60 cpm ESP/SPA 3 = 9600
	55955	@1005		STIFF, YELLOWISH BROWN (10YR 4/3), SILTY CLAY, TRACE OF GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	1.0	
4							
5							
6							

NOTES

BACKHOE OPERATOR: DAVE Orphey

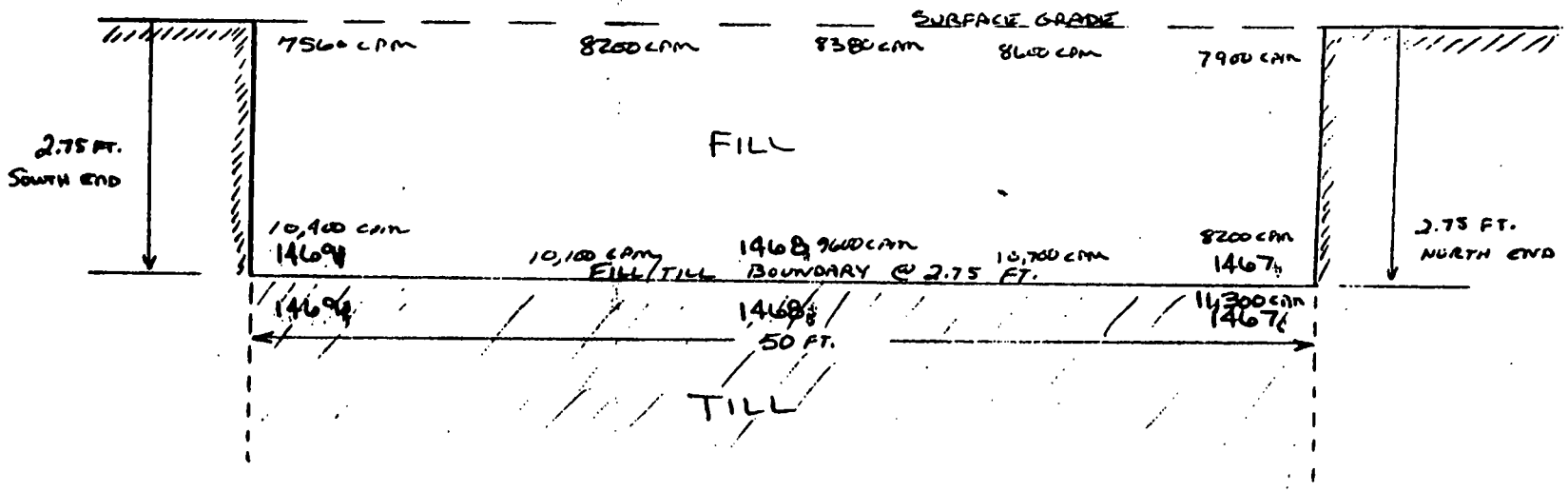
Archive Sample #'s 55962, 55963
2.5 FT., 3.5 FT.

INSTRUMENT BACKGROUND

Hnu = 0.0-0.2 ppm
α = 0 cpm
βγ = 60-80 cpm
ESP/SPA 3 = 5500 cpm

000638

TRENCH #5 PROFILE



NOTE: SAMPLING LOCATIONS ARE AS INDICATED 1467, 1468, 1469; ONE SAMPLE FROM FILL AND ONE FROM TILL AT EACH LOCATION.
FILL IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE: concrete, ASBESTOS SIDING, WOOD FRAGMENTS. SOIL IS A SILTY SAND WITH A TRACE OF GRAVEL (.5-2.0 IN), BROWN TO GRAYISH BROWN IN COLOR AND LOOSE DENSITY.

N

Dimensions:

LENGTH: 50 LINE FT.
HEIGHT: 2.75 FT.

REVIEWED BY QA DATE

Page 11 of 126

PSA00000 000639

FERNALD RI/FS

REVIEWED BY QA DATE 11/16/92

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 3.7.4	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1469	COORDINATES: N. 477,608, E. 1,379,700	DATE: 11-14-89
ELEVATION: 575.9	GWL: Depth None Date/Time	DATE STARTED: 11-14-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-14-89
DRILLING METHODS: BACKHOE CAT 225 B LC		PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY ( ) N/A	DESCRIPTION TRENCH #5 South End	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				4-5 inches OVERGROWTH			
1				FILL MATERIAL IS composed OF SOIL WITH LESS THAN 1% RUBBLE ENCOUNTERED, Concrete (.5 FT), WOOD FRAGMENTS.			FILL MATERIAL SURVEYED AS IT WAS STOCKPILED READINGS AT BACKGROUND LEVELS.
2	55956	@1040		LOOSE, BROWN WITH GRAYISH BROWN (10YR 4/2) WITH (7.5YR 4/2), SILTY SAND, TRACE OF GRAVEL (.5-1.0 in), MOIST. FILL/TILL BOUNDARY @ 2.75 FT.	SM	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 60 cpm ESP/SPA3 = 89,000
3	55957	@1045		STIFF, YELLOWISH BROWN (10YR 4/4) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 40-60 cpm ESP/SPA3 = 10,400
4							
5							
6				HSL Sample TAKEN @ 3.75 FT. # 55959			

NOTES

BACKHOE OPERATOR: DAVE ORPHEY

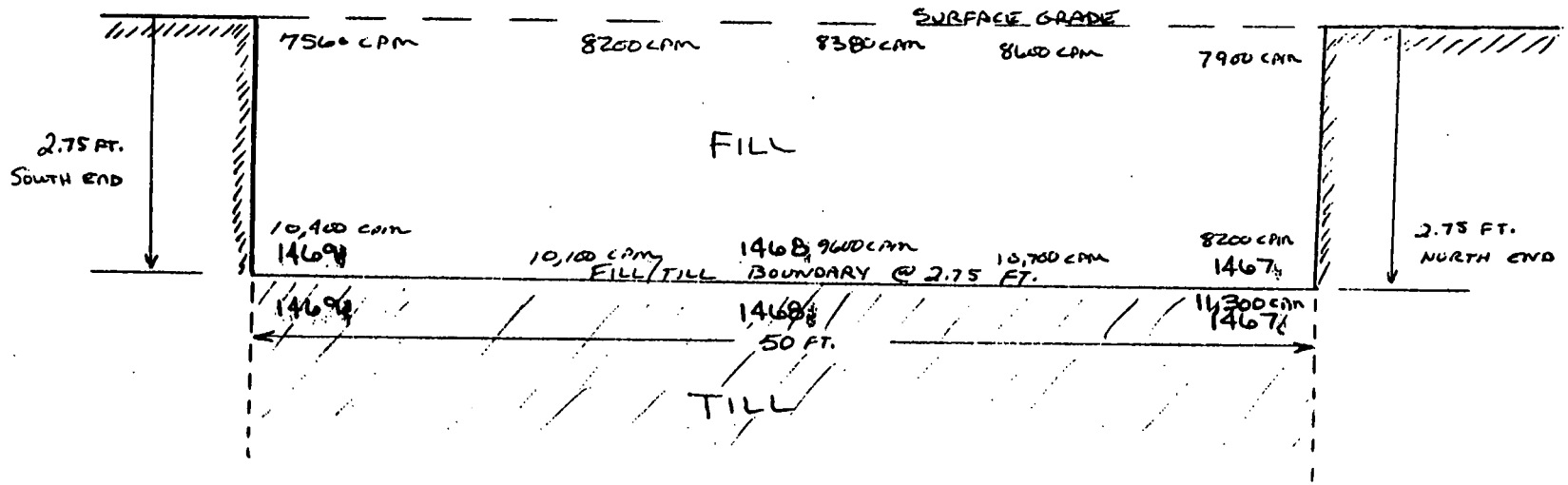
Archive Sample #'s 55954, 55955 2.5 FT, 3.5 FT.

INSTRUMENT BACKGROUND

Hnu = 0.0-0.2 ppm
α = 0 cpm
βγ = 40-60 cpm
ESP/SPA3 = 5500 cpm

000640

TRENCH #5 PROFILE



NOTE: SAMPLING LOCATIONS ARE AS INDICATED 1467, 1468, 1469; ONE SAMPLE FROM FILL AND ONE FROM TILL AT EACH LOCATION.
FILL IS PREDOMINANTLY SOIL WITH LESS THAN 1% RUBBLE: concrete, ASBESTOS SIDING, WOOD FRAGMENTS. SOIL IS A SILTY SAND WITH A TRACE OF GRAVEL (.5-2.0 IN), BROWN TO GRAYISH BROWN IN COLOR AND LOOSE DENSITY.

→ N

Dimensions:

LENGTH: 50 LINE FT.
HEIGHT: 2.75 FT. TILL
WIDTH: 20 inches

REVIEWED BY QA DATE 11/6/90 page 4/4

000641

FERNALD RI/FS

REVIEWED BY: GM DATE: 11/16/92

571

	Date			
Initials				
	Field Check	1st Key In	2nd Key In	Hard Copy Validation

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: EMPC RI/FS	
BORING NUMBER: 1470	COORDINATES: N. 477,370, E. 1379639	DATE: 11-15-89 / 11-16-89
ELEVATION: 568.1	GWL: Depth none Date/Time	DATE STARTED: 11-15-86
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-16-89
DRILLING METHODS: CAT 225B LC TRACK HOE		PAGE 1 OF 4

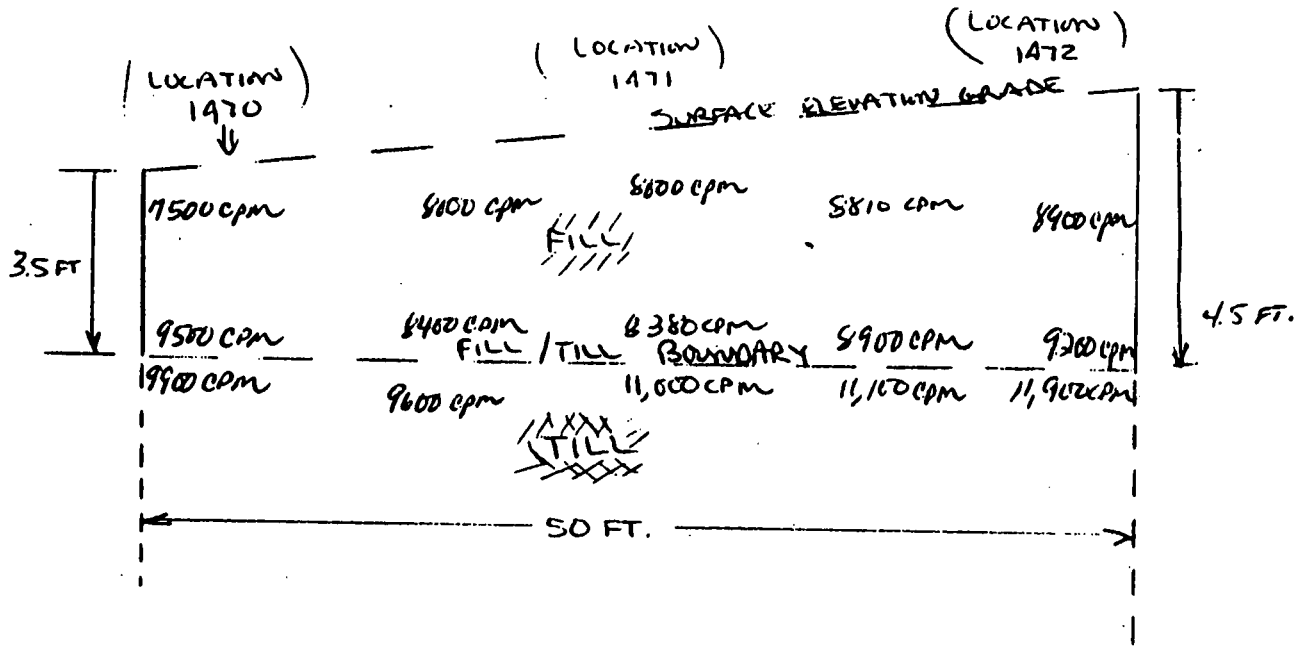
DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (-) N/A	RECOVERY (-) N/A	DESCRIPTION (TRENCH 6 SOUTH END)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				3-5 INCHES OVERGROWTH; GRASS, ROOTS, WEEDS. FILL MATERIAL ~~IS~~ IS ET PREDOMINATELY SOIL WITH LESS THAN 1% RUBBLE WHICH CONSISTED OF SMALL BROKEN PIECES OF CONCRETE SLAB (.5FT), ~~SEVERAL~~ SEVERAL ET PIECES OF ASPHALT (3-4in). FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5in-3.0in), LOOSE DENSITY.			FILL MATERIAL MONITORED DURING STOCKPILING, READINGS ET ~~ARE~~ ARE BACKGROUND OR LESS.
2							
3	Sample # ↓ 55966	Time ↓ 0900		→ LOOSE, BROWN, (7.5YR 4/2) SILTY SAND, TRACE OF GRAVEL (.5in-3.0in), MOIST. FILL/TILL BOUNDARY @ 3.5 FT.	SM	N/A	Hmu = 0.0-0.2 ppm α = 0 CPM βγ = 40-60 CPM ESP/SPA 3 = 8500 CPM
4	55967	1112		→ MEDIUM STIFF, YELLOWISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF COARSE SAND TO FINE GRAVEL, MOIST, LOW PLASTICITY.	CL	1.0	Hmu = 0.2 ppm α = 0 CPM βγ = 40 CPM ESP/SPA 3 = 9900 CPM
5							
6							

NOTES:
BACKHOE OPERATOR: DAVE ORPHEY

ARCHIVE NUMBERS: 3 FT = 55973
4 FT = 55974

INSTRUMENT BACKGROUND
Hmu = 0.0-.20 ppm
α = 0 cpm
βγ = 40-80 cpm
ESP/SPA 3 = 5750 CPM TO 6800 CPM

TRENCH #6 PROFILE



TRENCH 6: FILL MATERIAL ENCOUNTERED IS PREDOMINANTLY A SILTY SAND, TRACE OF GRAVEL (.5-3.0 in) BROWN (7.5YR 4/2), LOOSE DENSITY, MOIST. NO ELEVATED READINGS FOUND ON RUBBLE ENCOUNTERED, CONCRETE (.5-1.5 FT.), ASPHALT, (3.0-4.5 in.)

RADIOACTIVE SURVEY PERFORMED WITH SPA3 (ESP. 1)
BACKGROUND = 5750 CPM

N

Dimensions
50 linear FT.
3.5 FT. S [illegible]

000643

REVIEWED BY [illegible] DATE 11/16/87 P. 4/4

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 1/16/90

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1471	COORDINATES: N 477,395, E 1,379,639	DATE: 11-16-89	
ELEVATION: 570.8	GWL: Depth none Date/Time	DATE STARTED: 11-15-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-16-89	
DRILLING METHODS: CAT 225 B LC TRACKHOE		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION (TRENCH 6 MID-POINT)	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
				3-5 inches OVERGROWTH			
1				FILL MATERIAL IS PREDOMINANTLY SOIL WITH 1% OR LESS RUBBLE MATERIAL. 2 SMALL PIECES (.5 FT-1.0 FT) OF CONCRETE WAS UNCOVERED.			FILL MATERIAL MONITORED DURING EXCAVATION OPERATIONS READINGS ON SOIL AND MATERIAL = BKG.
2							
3							
4	55968	@0837		LOOSE, BROWN 7.5YR 4/2 TO (10YR 5/3) SILTY SAND, TRACE OF GRAVEL AT (.5in-1.0in), MOIST.	SM	n/a	Hnu = 0.0 cpm α = 0 cpm βγ = 20-40 cpm SPA3/ESP = 8300 cpm
5				FILL TILL BOUNDARY @ 5.25 FT.			
6	55969	@0845		MEDIUM STIFF, GRAYISH BROWN (10YR 5/2) SILTY CLAY, TRACE OF GRAVEL (.5-.75in), LOW PLASTICITY, MOIST. HSL @ 5.25 FT. # 55972	CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 40 cpm SPA3 = 11,000 cpm

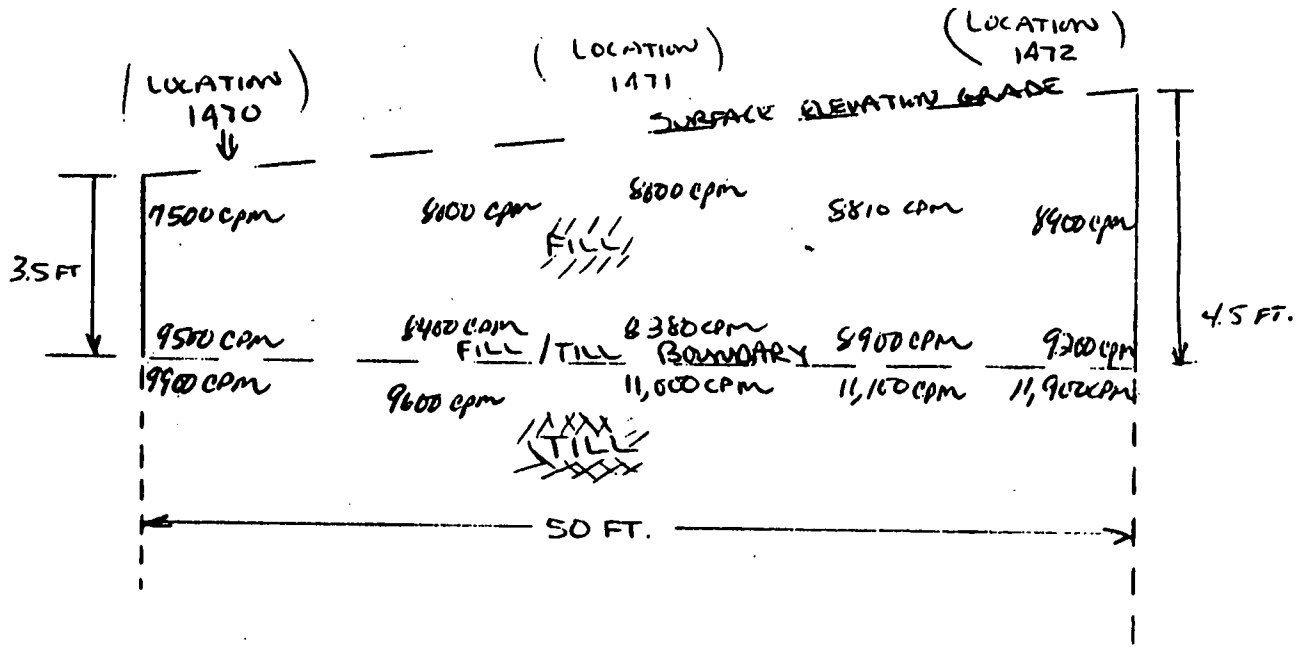
NOTES

BACKHOE OPERATION: DAVE ORAHEY

Archive #'s 4.0' = 55975
5.5' = 55976

INSTRU. BKG.
Hnu = 0.0 ppm
α = 0 cpm
βγ = 40-80 cpm
SPA3 = 5700-6500 cpm

TRENCH #6 PROFILE



TRENCH 6: FILL MATERIAL ENCOUNTERED IS PREDOMINANTLY A SILTY SAND, TRACE OF GRAVEL (.5-3.0 in) BROWN (7.5YR 4/2), LOOSE DENSITY, MOIST. NO ELEVATED READINGS FOUND ON RUBBLE ENCOUNTERED, CONCRETE (.5-1.5 FT.), ASPHALT, (3.0-4.5 in.)

RADIOACTIVE SURVEY PERFORMED WITH SPA3 (ESP. 1)
BACKGROUND = 5750 CPM

Dimensions
50 linear FT.
3.5 FT. S[illegible]

N

000645

REVIEWED BY [illegible] DATE 11/19/87 P. 4/4

FERNALD RI/FS

REVIEWED BY QA JM DATE 11/16/92

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1472	COORDINATES: N, 477,420, E.1,379,639	DATE: 11-16-89	
ELEVATION: 571.7	GWL: Depth none Date/Time	DATE STARTED: 11-15-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-16-89	
DRILLING METHODS: CAT 225 BACKHOE		PAGE 3 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				TRENCH 6 North End			
				3-5in. OVERGROWTH.			
1				FILL MATERIAL IS PREDOMINANTLY SOIL WITH 1% OR LESS CONSTRUCTION RUBBLE. / PIECE OF concrete FOUND (.5 FT) SILTY SAND, TRACE OF GRAVEL (.5-3.0in), MOIST. LOOSE DENSITY.			FILL MATERIAL MONITORED DURING EXCAVATION OF TRENCH, READINGS ARE BKG.
2							
3							
4	Sample # 55970	Time @0900		LOOSE, BROWN TO GRAYISH BROWN (10YR 5/2), SILTY SAND TRACE OF GRAVEL (.5-1.5in), MOIST FILL/TILL BOUNDARY 4.5 FT.	SM	N/A	H_{2u} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40 cpm ESP/SPA3 = 9,200 cpm
5	55971	@0905		MEDIUM DENSE, GRAYISH BROWN (10YR 5/2) SILTY CLAY, TRACE OF FINE GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	1.0	H_{2u} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40 cpm ESP/SPA3 = 11,900 cpm
6							

NOTES

BACKHOE OPERATOR: DAVID ORPHEY

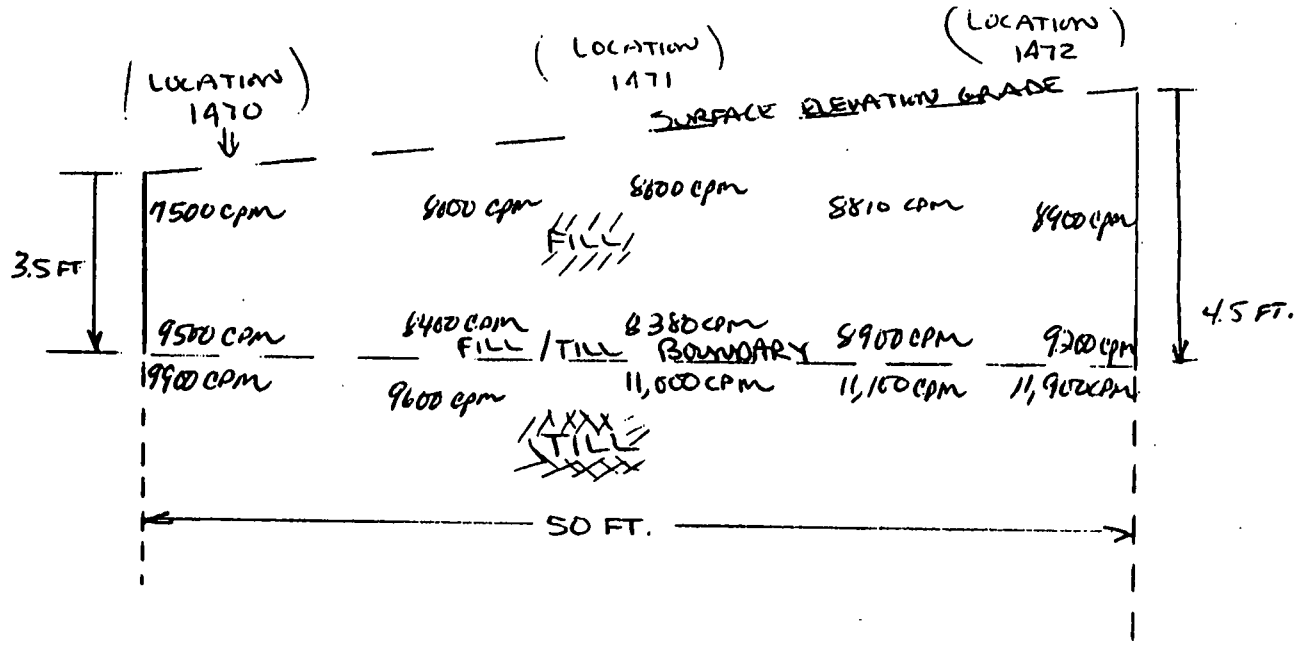
Archive #'s 4.0 FT = 55977
5.0 FT = 55978

INSTRUMENT BKG.

H_{2u} = 0.0-0.4 ppm
α = 0 cpm
$\beta\gamma$ = 40-60 cpm
ESP/SPA3 = [illegible] cpm

000646

TRENCH #6 PROFILE



TRENCH 6: FILL MATERIAL ENCOUNTERED IS PREDOMINANTLY A SILTY SAND, TRACE OF GRAVEL (.5-3.0 in) BROWN (7.5YR 4/2), LOOSE DENSITY, MOIST. NO ELEVATED READINGS FOUND ON RUBBLE ENCOUNTERED, CONCRETE (.5-1.5 FT.), ASPHALT, (3.0-4.5 in.)

RADIOACTIVE SURVEY PERFORMED WITH SPA 3 (ESP. 1)
BACKGROUND = 5750 CPM

N

Dimensions
50 linear FT.
3.5 FT. S [illegible] and Depth

REVIEWED BY [illegible] DATE 11/16/87 P. 4/4

479000

FERNALD RI/FS

REVIEWED BY QA JM DATE 1/17/92

(TRENCH # 7) **5711**

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6602 9.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1473	COORDINATES: N. 478,370, E. 1379,280	DATE: 11-17-89	
ELEVATION: 574.8	GWL: Depth none Date/Time	DATE STARTED: 11-17-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-17-89	
DRILLING METHODS: CAT 225B LC BACKHOE		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1	RECOVERY (N/A)	DESCRIPTION (TRENCH #7 East End)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				3in. GRASS OVERGROWTH			SOIL BACKFILL MAT'L SURVEYED; BELOW BACKGROUND READINGS
2	Sample # ↓	time ↓					
3	55979	@ 1000		LOOSE, GRAYISH BROWN (10YR 4/2) CLAYEY SAND, TRACE OF FINE GRAVEL (.5-1.0 in) MOIST.	SC	N/A	Hnu = 0 ppm α = 0 cpm βγ = 10-20 cpm SPA 3 = 7000 cpm
4				MEDIUM DENSE, YELLOWISH BROWN, (10YR 4/3) CLAYEY SILT, SLIGHTLY COHESIVE, MOIST TO WET (surface water penetration).	ML	N/A	Hnu = 0 ppm α = 0 cpm βγ = 40 cpm SPA-3 = 7700 cpm
5	55980	@ 1005					
6							
7							
8							
9				MEDIUM STIFF, GRAYISH BROWN (10YR 4/2) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 20 cpm SPA-3 = 8500 cpm
10	55981	@ 1345		BOTTOM OF TRENCH @ 10.0 FT. SAMPLING ENDED @ 10.0 FT.			

NOTES

OPERATOR: DAVID ORPHEY

ARCHIVE NUMBERS = 55989 @ 3.5'
55990 @ 5.0'
55991 @ 10.0'

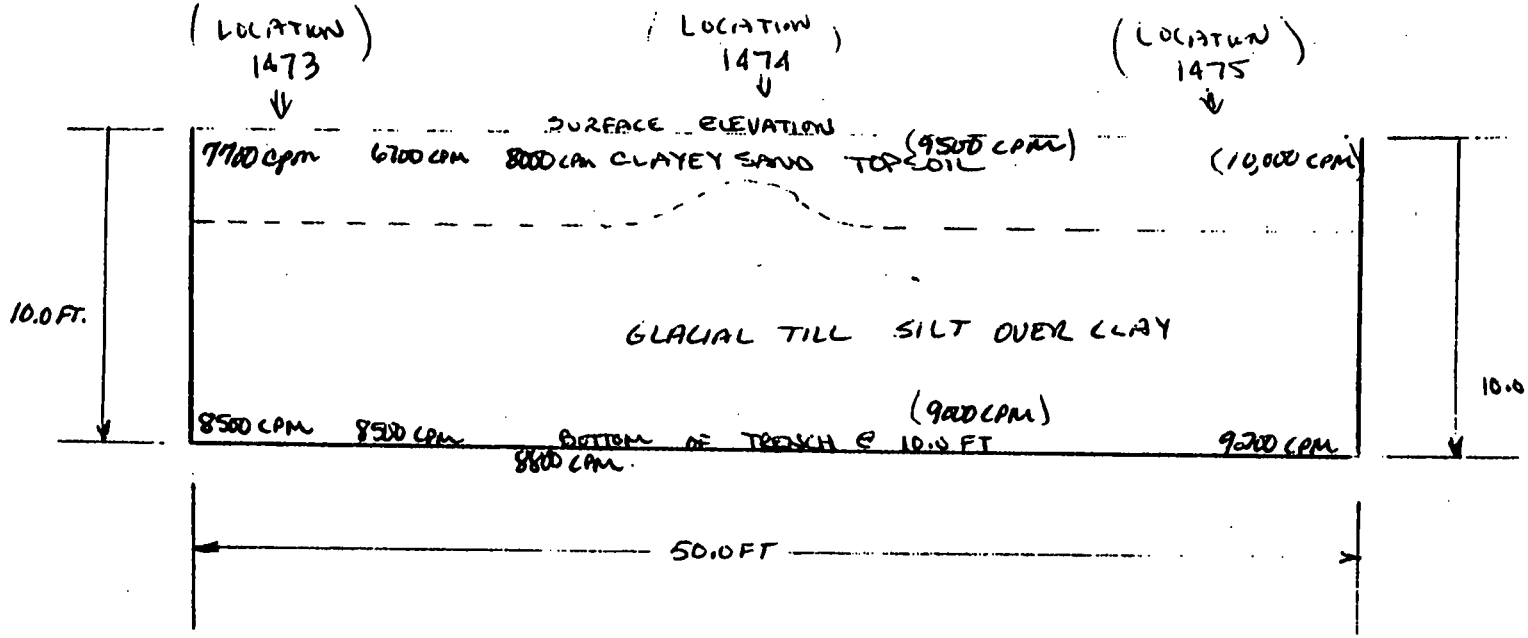
INSTRUMENT BKG

Hnu = 0.0 ppm
α = 0 cpm
βγ = 20-40 cpm
SPA-3 = 6500 cpm

000648

4/4

TRENCH #7 PROFILE



TRENCH NUMBER 7 HAD NO RUBBLE OR ANY METAL SCRAP FOUND AT THE DEPTH EXCAVATED. ANOMALY WAS NOT ENCOUNTERED WITHIN TRENCH BOUNDARIES. SOIL ENCOUNTERED FROM SURFACE WAS A CLAYEY SAND WITH A TRACE OF GRAVEL (.5-1.0 in), A CLAYEY SILT WAS the NEXT SOIL ENCOUNTERED FOLLOWED BY A SILTY CLAY TO MAKE UP THE GLACIAL TILL DEPOSIT.

PROFILE SURVEY CONDUCTED WITH SPA 3, READINGS ARE IN (CPM)
BKG = 6500 CPM.

E → W

DIMENSIONS:
WIDTH/20 in
DEPTH/10 FT.

REVIEWED BY [illegible] DATE

000649

FERNALD RI/FS

REVIEWED BY GA DATE 1/17/90

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1474	COORDINATES: N.478,376, E.1,379,255	DATE: 11-17-89	
ELEVATION: 574.3	GWL: Depth none Date/Time	DATE STARTED: 11-17-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-17-89	
DRILLING METHODS: CAT 225 BACKHOE		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (-) N/A	RECOVERY (-) N/A	DESCRIPTION (TRENCH #7 Mid Point)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				3 in. GRASS OVERGROWTH			
1							
2							
3	Sample # ↓	Time ↓		LOOSE, GRAYISH BROWN (10YR 4/2) CLAYEY SAND, TRACE OF FINE GRAVEL (.5-1.0 in), MOIST.	SC	N/A	Hm = 0.0 ppm α = 0 cpm βγ = 20-40 cpm SPA3 = 8000 cpm
4	55982	@1020					
5	55983	@1045		MEDIUM DENSE, YELLOWISH BROWN (10YR 4/3) CLAYEY SILT, SLIGHTLY COHESIVE, MOIST TO WET. (Surface water) SILT STARTING AT 3.5 FT.	ML	N/A	Hm = 0.0 ppm α = 0 cpm βγ = 20-40 cpm SPA3 = 8000 cpm
6							
7							
8							
9				MEDIUM STIFF, GRAYISH BROWN (10YR 4/2) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	1.0	Hm = 0.0 ppm α = 0 cpm βγ = 20-40 cpm SPA3 = 8000 cpm
10	55984	@1400					
				BOTTOM OF TRENCH @ 10.0 FT. SAMPLING ENDED @ 10.0 FT. NO ANOMOLY FOUND HSL sample collected @ 10.0 FT Sample # 55988 WAH 12-27-89			

NOTES

OPERATOR: DAVID ORPHEY

Archive numbers: 55992 @ 3.5'
55993 @ 5.0'
55994 @ 10.0'

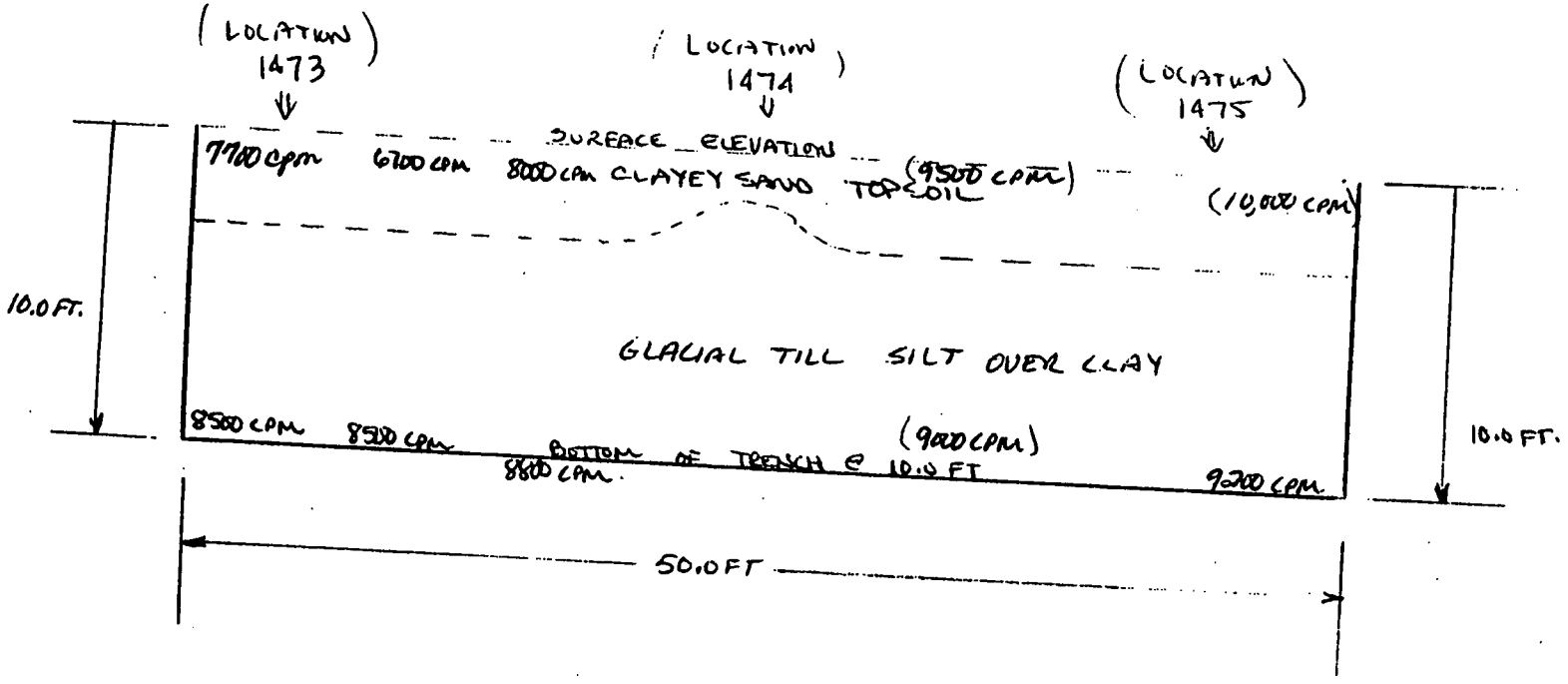
INSTRUMENT BKG.

Hm = 0.0 ppm
α = 0 cpm
βγ = 20-40 cpm
SPA3 = 6517 cpm

000650

4/4

TRENCH #7 PROFILE



TRENCH NUMBER 7 HAD NO RUBBLE OR ANY METAL SCRAP FOUND AT THE DEPTH EXCAVATED. ANOMOLY WAS NOT ENCOUNTERED WITHIN TRENCH BOUNDARIES. SOIL ENCOUNTERED FROM SURFACE WAS A CLAYEY SAND WITH A TRACE OF GRAVEL (.5-1.0 in), A CLAYEY SILT WAS the NEXT SOIL ENCOUNTERED FOLLOWED BY A SILTY CLAY TO MAKE UP THE GLACIAL TILL DEPOSIT.

REVIEWED BY [illegible] DATE [illegible]

000651

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1102 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1475	COORDINATES: N.478,370 E1,379,230	DATE. 11-17-89	
ELEVATION: 573.9	GWL: Depth none Date/Time	DATE STARTED: 11-17-89	
ENGINEER/GEOLOGIST. E. TRILLINGER	Depth Date/Time	DATE COMPLETED. 11-17-89	
DRILLING METHODS: CAT 225 B LC BACKHOE		PAGE 3 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( ) N/A	RECOVERY ( ) N/A	DESCRIPTION (TRENCH #7 West End)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				3 in. GRASS OVERGROWTH.			
2							
3				LOOSE, BROWN (10YR 4/3) CLAYEY SAND, TRACE OF FINE GRAVEL (.5-1.0 in), MOIST.	SC	N/A	Hnu = 0.0 ppm α = 0 CPM βγ = 20-40 CPM SPA 3 = 9000 CPM
4	55985	@ 1105					
5	55986	@ 1110		MEDIUM DENSE, YELLOWISH BROWN (10YR 4/3) CLAYEY SILT, SLIGHTLY COHESIVE, MOIST.	ML	N/A	Hnu = 0.0 ppm α = 0 CPM βγ = 20-40 CPM SPA 3 = 10,000 CPM
6							
7							
8				MEDIUM STIFF, GRAYISH BROWN (10YR 4/2), SILTY CLAY, TRACE OF FINE GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	1.0	
9							Hnu = 0.0 ppm α = 0 CPM βγ = 20-40 CPM SPA3 = 9200 CPM
10	55987	@ 1425					
				BOTTOM OF BORING TRENCH @ 10.0 FT SAMPLING ENDED AT 10.0 FT.			
				~~HSL TAKEN AT 10.0 FT.~~ ~~#55988~~ WAH 12-27-89 See Log of Location 1474			

NOTES

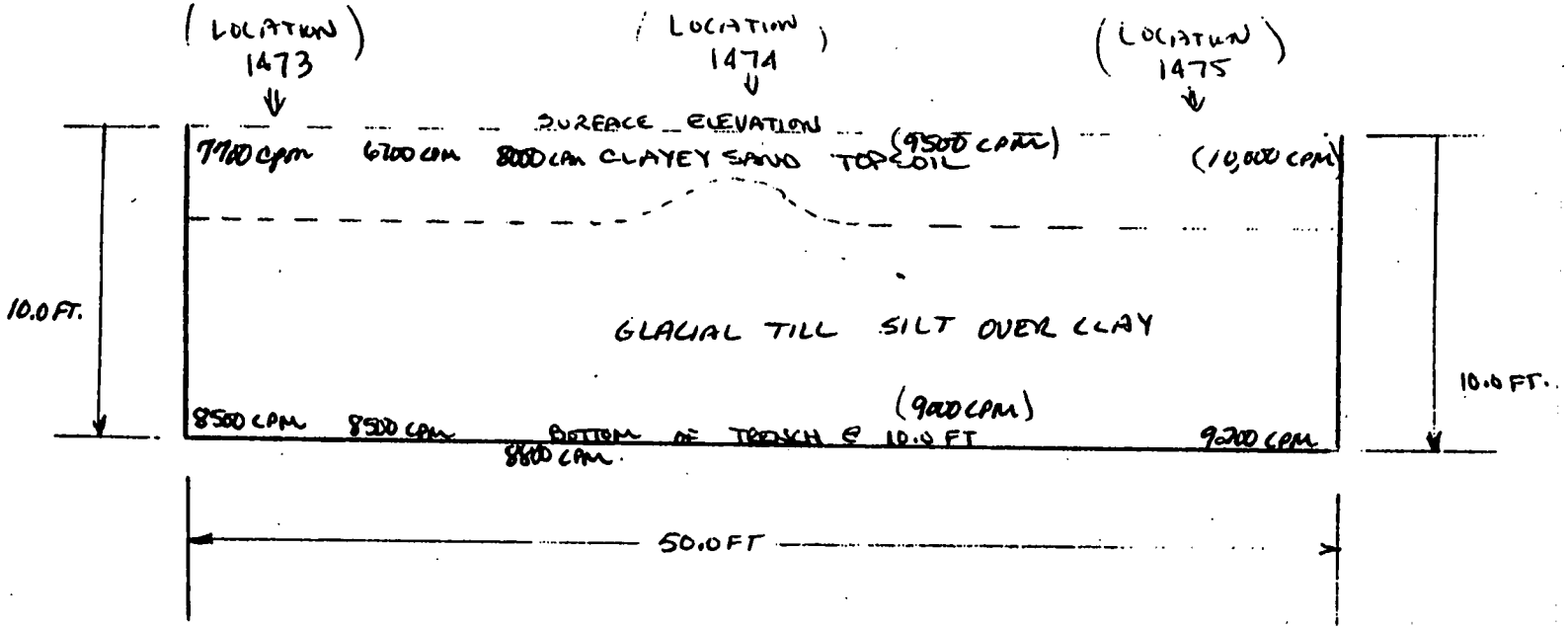
OPERATOR: DAVID ORAHEY

ARCHIVE NUMBERS = 55995 for 3.75'
55996 for 5.0'
55997 for 10.0'

INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 CPM
βγ = 20-40 CPM
SPA 3 = 6500 CPM

TRENCH #7 PROFILE



TRENCH NUMBER 7 HAD NO RUBBLE OR ANY METAL SCRAP FOUND AT THE DEPTH EXCAVATED. ANOMOLY WAS NOT ENCOUNTERED WITHIN TRENCH BOUNDARIES. SOIL ENCOUNTERED FROM SURFACE WAS A CLAYEY SAND WITH A TRACE OF GRAVEL (.5-1.0 in), A CLAYEY SILT WAS the NEXT SOIL ENCOUNTERED FOLLOWED BY A SILTY CLAY TO MAKE UP THE GLACIAL TILL DEPOSIT.

PROFILE SURVEY CONDUCTED WITH SPA 3, READINGS ARE IN (CPM) BKG = 6500 CPM.

E ⟶ W

DIMENSIONS:
WIDTH/20 in
DEPTH/10 FT.

REVIEWED BY QA DATE

9/4

000653

FERNALD RI/FS

(TRENCH #8) North End

5711

VISUAL CLASSIFICATION OF SOILS

	Date	Initial	Field Check	1st Key In	2nd Key In	Hard Copy Verification
	12-28-89					

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1476	COORDINATES N.480,445, E.1,378,252	DATE: 11-18-89/11-19-89	
ELEVATION: 567.5	GWL: Depth none Date/Time	DATE STARTED: 11-18-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-19-89	
DRILLING METHODS: CAT 225B LC BACKHOE TRACK MOUNTED		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N/A)	RECOVERY (IN/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1				TOP SOIL FROM SURFACE IS COMPOSED OF SILTY SAND FROM SURROUNDING AREA. FROM 3.5 FT SOIL BECOMES MORE GRAVELLY.				EXCAVATED SOIL SURVEYED AT BELOW BACKGROUND LEVELS.
2								
3								
4	Sample # ↓	TIME ↓		DISTURBED				
5	55998	@1025		LOOSE, BROWN (10YR 4/3) WELL GRADED SANDY GRAVEL (.5-1.5 in), MOIST	GW	N/A		Hnu = 0.0 ppm α = 0 cpm βγ = 500-1600 cpm SPA-3 = 500,000 - 700,000 cpm High BKG DUE TO K-65 SILOS nearby. SOIL ≈ 28,700 cpm
6								
7								
8								
9								
10	55999	@1050		MEDIUM DENSE, BROWN (10YR 4/3) SILTY SAND, TRACE OF GRAVEL (.5-2.0 in), MOIST.	SM	N/A		Hnu = 0.0 ppm α = 0 cpm βγ = 500 cpm SPA3 = 24,000 cpm
11								
12								
13								
14								
15	55000	@1100		FIRM, GRAY (7.5YR 5/0) SILTY CLAY, TRACE OF COARSE SAND AND FINE GRAVEL, LOW PLASTICITY, DRY TO MOIST.	CL	1.5		Hnu = 0.0 ppm α = 0 cpm βγ = 500 cpm SPA3 = 23,900 cpm

BOTTOM OF LOCATION 1476 @ 15.0 FT.

NOTES:

Drilling Contractor: ASL/IT

Drilling Equipment: CAT 225B LC

Driller: DAVID ORPHEY

Archive #'s 55000 5'
55007 10'
55008 15'

HSL samples collected @15 ft. Sample # 55005

INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 cpm
βγ = 1200-1800 cpm
SPA-3 = 700,000 cpm

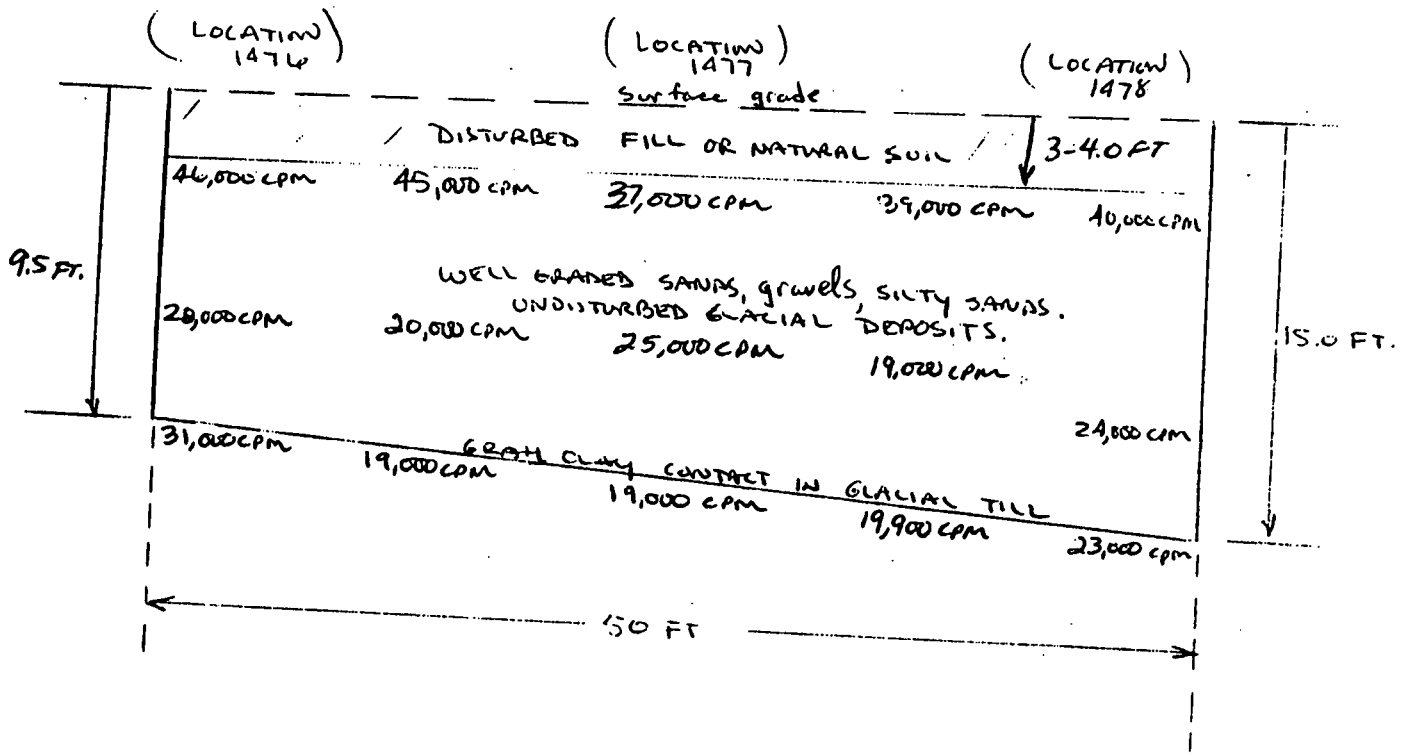
000654

11/21/92

REVIEWED BY CA [illegible] 2/1/90

TRENCH # 8 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND VERY HIGH DUE TO K-65
SILOS NEARBY. Bkg. = 694,000 – 700,000 CPM



SOILS ENCOUNTERED TO A DEPTH OF 4.0 FT APPEARED AS DISTURBED FILL MATERIAL FROM NEARBY SOILS, UNDISTURBED SOILS ENCOUNTERED WERE DESCRIBED AS SILTY SANDS, WELL GRADED GRAVELLY SANDS AND GLACIAL GRAY CLAY AT BOTTOM CONTACT. NO RUBBLE FOUND IN TRENCH EXCAVATION BOUNDARIES.

N

000655

FERNALD RI/FS

REVIEWED BY QA JM DATE 1/21/92

5711

(TRENCH #8) Mid Point

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6.0.2 3.7.4	PROJECT NAME: FMPC RI/FS → 1378292 (WAH 12-28-89)		
BORING NUMBER: 1477	COORDINATES: N. 480,390, E. ~~1374,255~~	DATE: 11-18-89 / 11-19-89	
ELEVATION: 569.4	GWL: Depth none	Date/Time	DATE STARTED: 11-18-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 11-19-89
DRILLING METHODS: CAT 225 B LC BACKHOE			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1, 2, 3, 4				TOP SOIL TO 4.0 FT IS A SILTY SAND WITH GRAVEL (.5-3.0 in), NO RUBBLE FOUND AT THIS LOCATION. DISTURBED				FILL MATERIAL COMPOSED OF SOIL FROM SURROUNDING AREA.
5, 6, 7, 8	Sample # S6001	Time 0115		→ MEDIUM DENSE, BROWN (10YR 4/3) WELL GRADED GRAVELLY SAND, MOIST.	SW	N/A		Hnu = 0.0 ppm α = 0 cpm βγ = 500-1000 cpm SPA-3 = 29,000 cpm
9, 10	S6002	0130		SILT TO CLAY → VERY STIFF, GRAY (7.5YR 5/0) SILTY CLAY, TRACE OF FINE gravel (.5-.75 in), LOW PLASTICITY, MOIST.	CL	2.0	ET ~~2.0~~	Hnu = 0.0 ppm α = 0 cpm βγ = 500 cpm SPA-3 = 25,000 cpm
11, 12, 13, 14				BOTTOM OF LOCATION 1477 @ 10.0 FT ~~HSL Sample~~ WAH 12-27-89 ~~#S6005 @ 10.0 FT.~~ See Log of Location 1476				

NOTES.

Drilling Contractor: ASL / IT

Drilling Equipment: CAT 225 B LC

Driller: DAVID Digby (IT)

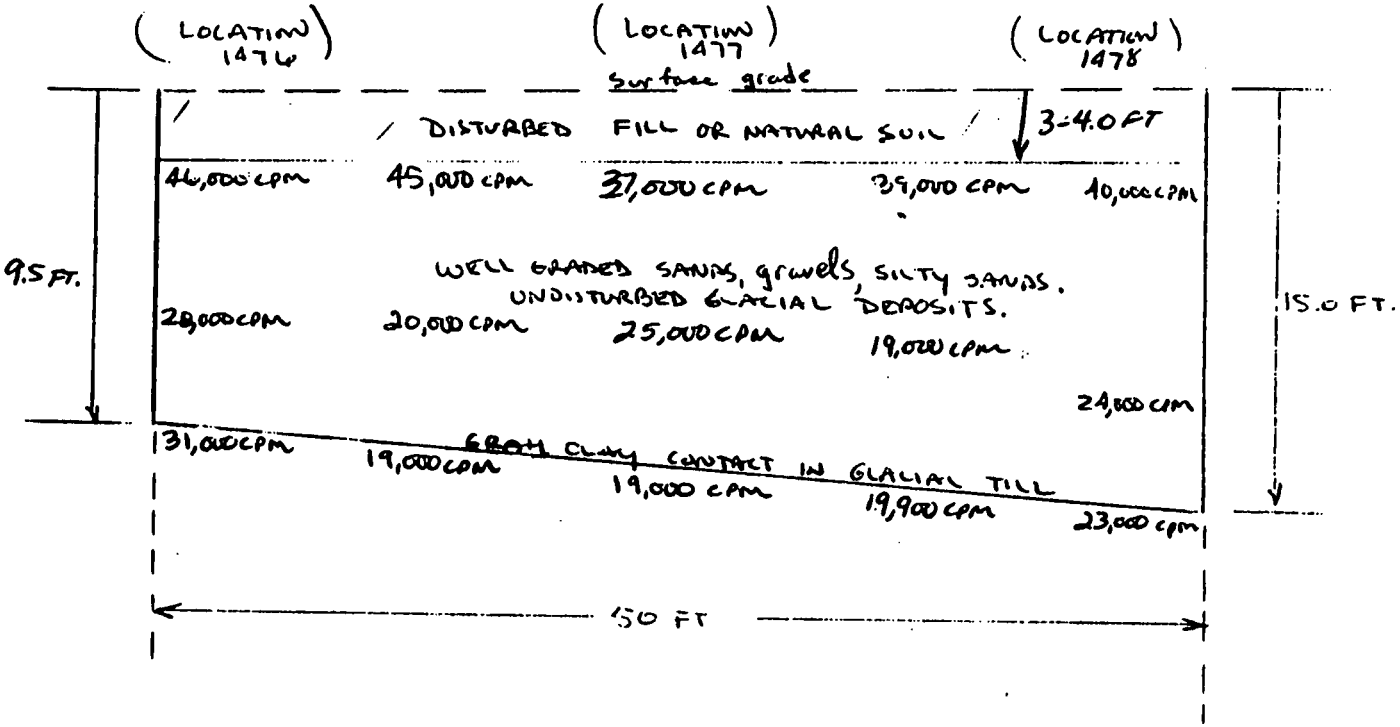
S6009 5' S6010 10' (Archive #15)

INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 cpm
βγ = 1200-1500 cpm
SPA-3 = 500,000 - 700,000 cpm

TRENCH # 8 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND VERY HIGH DUE TO K-65
SILOS NEARBY. Bkg. = 694,000 - 700,000 CPM



SOILS ENCOUNTERED TO A DEPTH OF 4.0 FT APPEARED AS DISTURBED FILL MATERIAL FROM NEARBY SOILS, UNDISTURBED SOILS ENCOUNTERED WERE DESCRIBED AS SILTY SANDS, WELL GRADED GRAVELLY SANDS AND GLACIAL GRAY CLAY AT BOTTOM CONTACT. NO RUBBLE FOUND IN TRENCH EXCAVATION BOUNDARIES.

→ N

Dimensions:
WIDTH = 22 inches
DEPTH = 15 FT North & 9.5 FT South
LENGTH = 50 FT.

000657

FERNALD RI/FS

REVIEWED BY: JM DATE 1/24/92

(TRENCH 8) South End

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1478	COORDINATES: N. 480,365, 1,378,292		DATE: 11-18-89 / 11-19-89
ELEVATION: 569.3	GWL: Depth None	Date/Time	DATE STARTED: 11-18-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 11-19-89
DRILLING METHODS: CAT 225 B LC BACKHOE			PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1, 2, 3				TOP SOIL TO 3.0 FT IS A SILTY SAND WITH GRAVEL, TRACE OF COBBLES (4-5 in), NO RUBBLE ENCOUNTERED.				SURVEYED EXCAVATED SOIL BELOW OR AT BACKGROUND LEVELS.
4	Sample # ↓	Time ↓						
5	56003	@1400	→	MEDIUM DENSE, BROWN (10YR 4/3) WELL GRADED SAND, TRACE OF GRAVEL, (.5-1.5 in), MOIST.	SW	N/A		Hnu = 0.0 ppm; α = 0 cpm; β/γ = 500 cpm; SPA 3 = 40,000 cpm
6, 7, 8				BECOMING MORE SILTY WITH DEPTH AND LESS GRAVEL. ↓				
9	56004	@1430	→	FIRM, GRAY (7.5YR 5/0) SILTY CLAY, LOW PLASTICITY, TRACE OF SAND, MOIST.	CL	1.5		Hnu = 0.0 ppm; β/γ = 500 cpm; α = 0 cpm; SPA 3 = 31,000 cpm
10				BOTTOM OF LOCATION 1478 @ 9.5 FT				
11, 12								

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: David Cipher

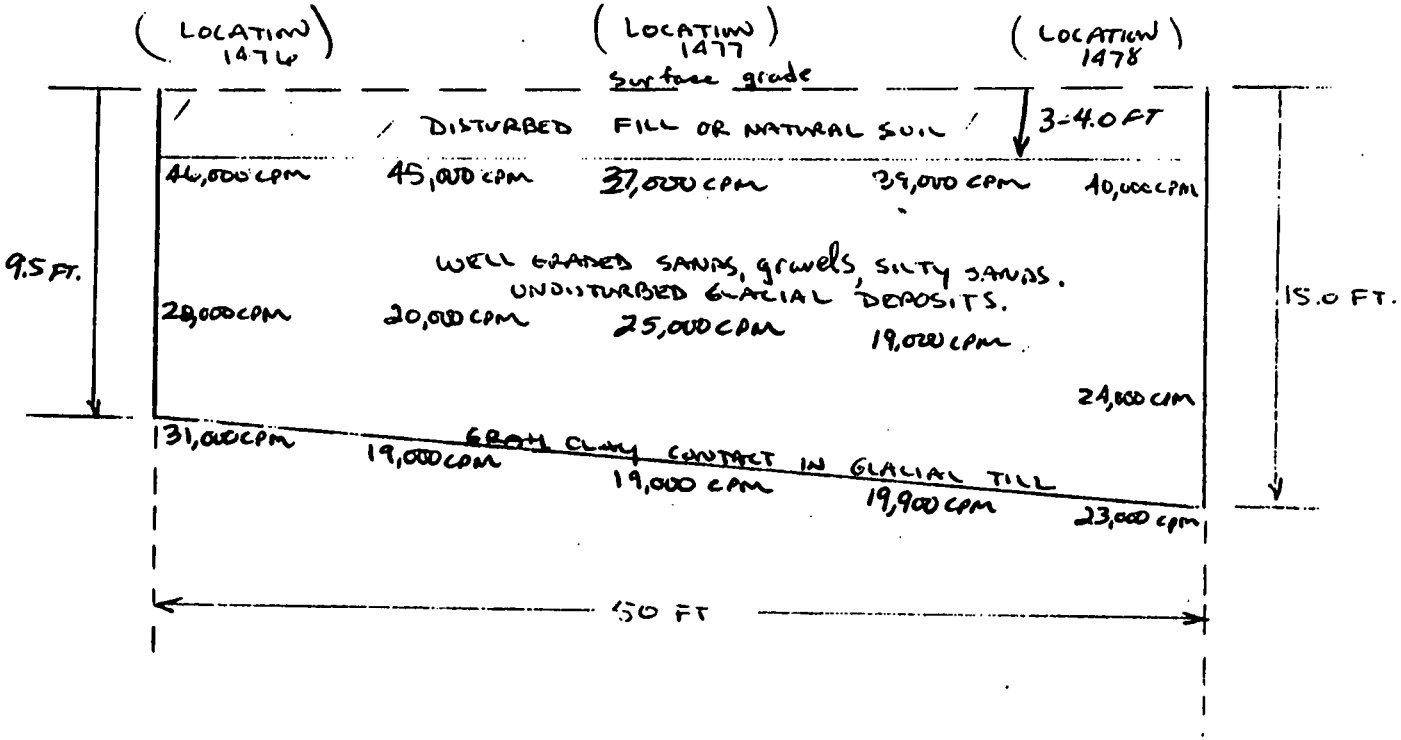
Archive #'s 56011 - 5'
56012 - 9.5'

INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 cpm
β/γ = 1000-1500 cpm
SPA 3 = 500,000-700,000 cpm

TRENCH # 8 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND VERY HIGH DUE TO K-65
SILOS NEARBY. Bkg. = 694,000 – 700,000 CPM



SOILS ENCOUNTERED TO A DEPTH OF 4.0 FT APPEARED AS DISTURBED FILL MATERIAL FROM NEARBY SOILS, UNDISTURBED SOILS ENCOUNTERED WERE DESCRIBED AS SILTY SANDS, WELL GRADED GRAVELLY SANDS AND GLACIAL GRAY CLAY AT BOTTOM CONTACT. NO RUBBLE FOUND IN TRENCH EXCAVATION BOUNDARIES.

→ N

Dimensions:
WIDTH = 22 inches
DEPTH = 15 FT North, 9.5 FT South
LENGTH = 50 FT.

659000

FERNALD RI/FS

REVIEWED DATE 1/26/90

5711

(TRENCH #9) south End

VISUAL CLASSIFICATION OF SOILS

Date	12-28-89	12-28-89	12-28-89	
Initial	JHH	[illegible]	[illegible]	
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1479	COORDINATES: N.480,802, E.1278,343	DATE: 11-19-89 / 11-20-89	
ELEVATION: 578.6	GWL: Depth none Date/Time	DATE STARTED: 11-19-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: CAT 225 B LC		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1, 2				TOP SOIL TO 2.0 FT IS A SILTY SAND WITH CONSTRUCTION RUBBLE MIXED IN. Concrete (1.0-2.0 FT.), Asphalt (3-6 in PIECES).				BACKFILL SURVEYED AS STOCKPILED, BKG. LEVELS DETECTED
3, 4	Sample # ↓	Time ↓						
5, 6, 7, 8, 9	S6013	@1500	→	MEDIUM DENSE, BROWN (10YR 3/3) WELL GRADED SAND, TRACE OF GRAVEL (.5-3.0 in), SEVERAL PIECES OF RUBBLE FOUND Concrete, Asphalt (.5-2.0 FT.).	SW	N/A	→	Hnu = 0.0 ppm α = 0 cpm βγ = 300 cpm SPA-3 = 13,000 cpm
10, 11, 12, 13, 14	S6014	@1515	→	MEDIUM DENSE, GRAY (10YR 5/2) CLAYEY SILT, TRACE OF GRAVEL (.5-2.0 in), BECOMING MORE COHESIVE WITH DEPTH. ↓	ML	N/A	→	Hnu = 0.0 ppm α = 0 cpm βγ = 300-400 cpm SPA 3 = 12,000
15	S6015	@1600		FIRM, GRAY (10YR 5/1) SANDY CLAY, TRACE OF GRAVEL (.5-1.5 in), LOW PLASTICITY, MOIST.	CL	1.5	→	Hnu = 0.0 ppm βγ = 200 cpm α = 0 cpm SPA 3 = 11,500 cpm

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: DAVID Oxley/IT

Archive #15 S6023 5'
S6024 10'
S6025 15'

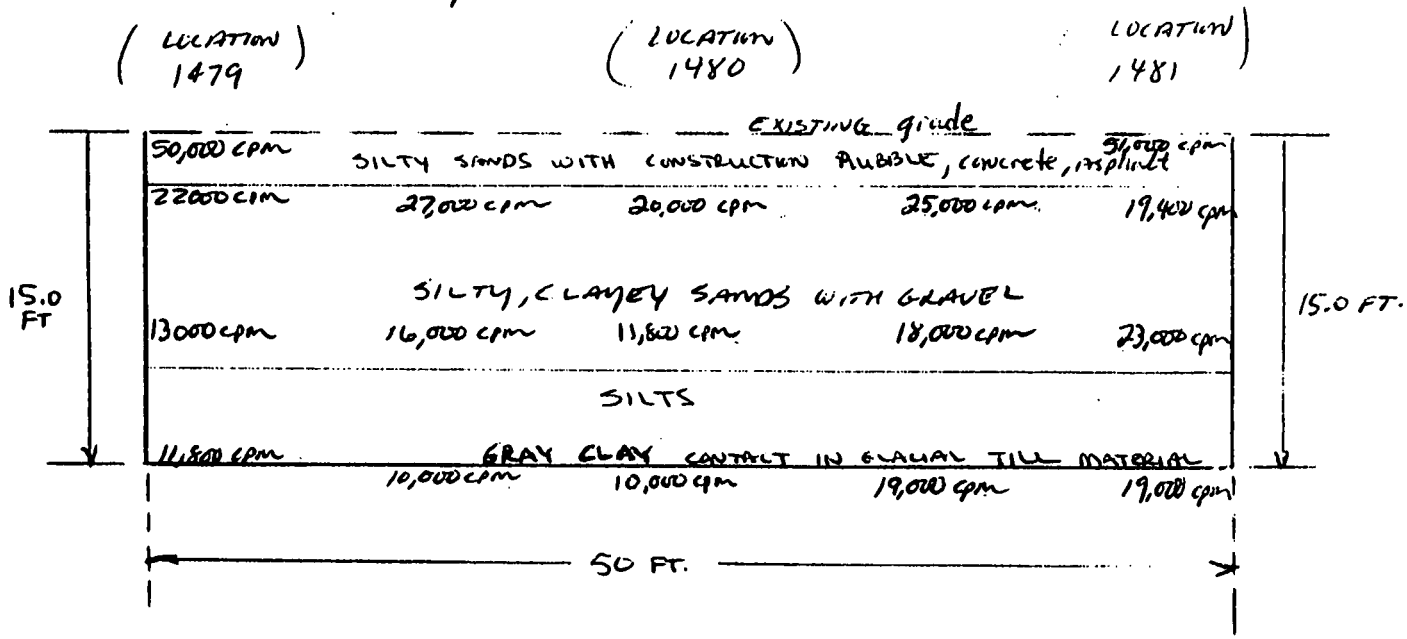
INSTRUMENT BACKGROUND

Hnu = 0.0 ppm
α = 0 cpm
βγ = 600-1000 cpm
SPA 3 = 250,000 - 280,000 cpm
↳ High BKG. DUE TO K-65 SILOS nearby

000660

TRENCH #9 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND LEVEL HIGH DUE TO K-65 SILOS NEARBY.



SOILS ENCOUNTERED TO A DEPTH OF 15.0 FT CONSISTED OF SILTY SANDS, CLAYEY SANDS, WELL GRADED GRAVELLY SANDS TO THE GRAY CLAY CONTACT AT 15.0 FT. RUBBLE ENCOUNTERED CONSISTED OF LESS THAN 2% CONCRETE AND ASPHALT (.5-2.0 FT.)

→ N

Dimensions:
WIDTH: 22 inches
DEPTH: 15.0 FT.
LENGTH: 50 FT.

199000

FERNALD RI/FS

571

(TRENCH #9)
Mid Point

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: AMPC RI/FS		
BORING NUMBER: 1480	COORDINATES: N.480,827, E.1,378,243	DATE: 11-19-89 / 11-20-89	
ELEVATION: 578.7	GWL: Depth none Date/Time	DATE STARTED: 11-19-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: CAT 225 B LC		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS
1, 2				TOP SOIL TO 2.0 FT IS A SILTY SAND WITH RUBBLE MIXED IN, CONCRETE (.5-2.0 FT.), ASPHALT (.5-3.0 in) AND COBBLES (4-5 in.).				SOIL Surveyed, BKG. LEVELS DETECTED
5	S6016	@1000	→	MEDIUM DENSE, YELLOWISH BROWN (10YR 4/4) SILTY SAND, TRACE OF FINE GRAVEL, MOIST.	SM	N/A	→	Hnu = 0.0 ppm α = 0 cpm βγ = 250-300 cpm SPA3 = 40,000 cpm
10	S6017	@1007	→	DENSE, GRAYISH BROWN (10YR 5/2) CLAYEY SAND, TRACE OF GRAVEL (.5-2.0 in), slightly COHESIVE, MOIST.	SC	N/A	→	Hnu = 0.0 ppm α = 0 cpm βγ = 300-500 cpm SPA3 = 27,000 cpm
14				FIRM, GRAY (10YR 5/2) CLAY, TRACE OF SILT AND GRAVEL (.5-1.0 in) MEDIUM PLASTICITY, MOIST.				
15	S6018	@1015			CL	1.0	→	Hnu = 0.0 ppm βγ = 300 cpm α = 0 cpm SPA3 = 18,000 cpm

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: DAVID Oipley

Archive #'s S6026 ~~[illegible]~~ 5'
E1 S6027 ~~[illegible]~~ 10'
12235 S6028 ~~[illegible]~~ 15'

~~[illegible] Sample #S6022~~
~~[illegible]~~ WAH 1-3-90

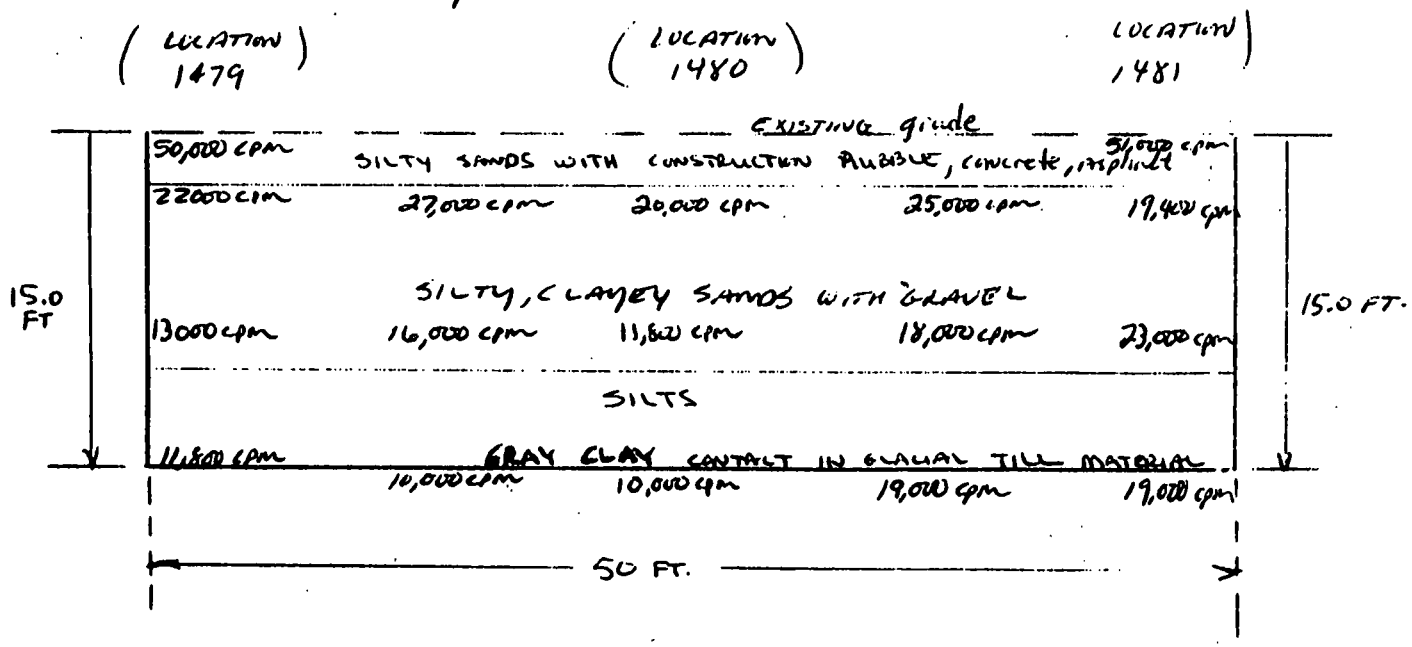
INSTRUMENT BACKGROUND

Hnu = 0.0 ppm - 0.2 ppm
α = 0 cpm
βγ = 600-1000 cpm
SPA3 = 250,000-280,000 cpm
High BKG. DUE TO K-65 SILOS

4/4

TRENCH #9 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND LEVEL HIGH DUE TO K-65
SILOS NEARBY.



SOILS ENCOUNTERED TO A DEPTH OF 15.0 FT CONSISTED OF SILTY SANDS, CLAYEY SANDS, WELL GRADED GRAVELLY SANDS TO THE GRAY CLAY CONTACT AT 15.0 FT. RUBBLE ENCOUNTERED CONSISTED OF LESS THAN 2% CONCRETE AND ASPHALT (.5-2.0 FT.)

N

Dimensions:
WIDTH: 22 inches
DEPTH: 15.0 FT.
LENGTH: 50 FT.

REVIEWED BY QA

000663

FERNALD RI/FS

REVIEWED BY: [illegible] DATE: 4/2/92

5711

(TRENCH #9)
North End

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1481	COORDINATES: N. 480,852, E. 1,378,343	DATE: 11-19-89 / 11-20-89	
ELEVATION:	GWL: Depth none Date/Time	DATE STARTED: 11-19-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 11-20-89	
DRILLING METHODS: CAT 225 B LC		PAGE 3 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1, 2				TOP SOIL TO 2.5 FT. IS A SILTY SAND WITH GRAVEL, SOME RUBBLE FOUND, concrete, Asphalt, (.5-2.0 FT.)				SOIL surveyed as BACKFILLED AND STOCKPILED, LEVELS at BACKGROUND.
3, 4	Sample # ↓	Time ↓						
5, 6, 7, 8, 9	56019	@1257	→	LOOSE, BROWN (10YR 4/3) CLAYEY SAND TRACE OF GRAVEL (.5-1.5in) SLIGHTLY COHESIVE, MOIST.	SC	N/A		Hnu = 0.0 ppm α = 0 cpm βγ = 300 cpm SPA 3 = 40,000 cpm
10, 11, 12, 13, 14	56020	@1305	→	FIRM, GRAYISH BROWN (10YR 5/2) CLAYEY SILT, LOW PLASTICITY, TRACE OF GRAVEL (.5-1.0in), MOIST.	ML	1.0		Hnu = 0.0 ppm α = 0 cpm βγ = 300-400 cpm SPA 3 = 19,400 cpm
15	56021	@1310	→	FIRM, GRAY, (10YR 5/1) CLAY, TRACE OF GRAVEL (.5-2.5 in), LOW PLASTICITY, MOIST.	CL	1.0		Hnu = 0.0 ppm SPA 3 = 23,000 cpm α = 0 cpm βγ = 300 cpm

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: David Crabby

Archive #'s 56029 } 5'
56030 } 10'
56031 } 15'

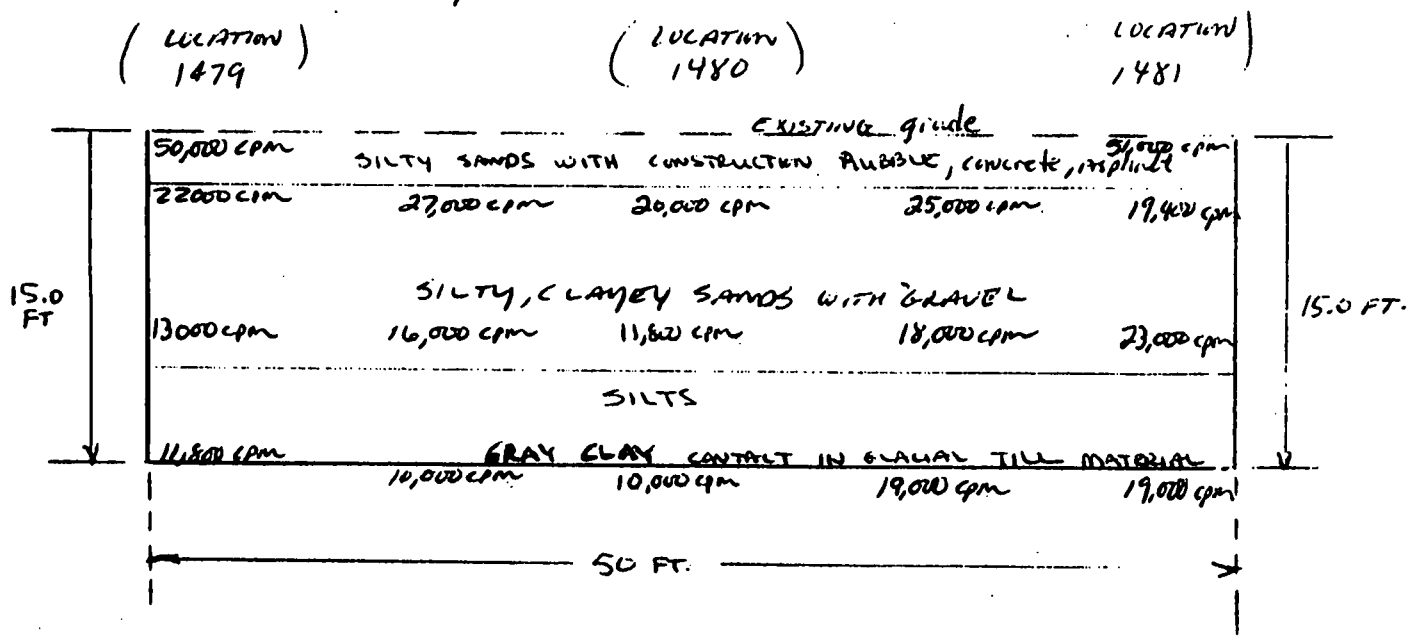
HSL Sample #56022 collected @ 15.0 ft

INSTRUMENT BACKGROUND

Hnu = 0.0-0.2 ppm
α = 0 cpm
βγ = 300-400 cpm
SPA 3 = 250-350,000 cpm
↑ High BK, due to K-65 silos vicinity.

TRENCH #9 PROFILE

SPA-3 READINGS ARE IN CPM
BACKGROUND LEVEL HIGH DUE TO K-65
SILOS NEARBY.



SOILS ENCOUNTERED TO A DEPTH OF 15.0 FT CONSISTED OF SILTY SANDS, CLAYEY SANDS, WELL GRADED GRAVELLY SANDS TO THE GRAY CLAY CONTACT AT 15.0 FT. RUBBLE ENCOUNTERED CONSISTED OF LESS THAN 2% CONCRETE AND ASPHALT (.5-2.0 FT.)

N

Dimensions:
WIDTH: 22 inches
DEPTH: 15.0 FT.
LENGTH: 50 FT.

4/4

REVIEWED BY QA

000665

FERNALD
RI/FS

5711

(TRENCH #10) (K-65 RAFFINATE LINE)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1482	COORDINATES: N480433/E1379047		DATE: 12-5-89
ELEVATION: 575.1	GWL: Depth None	Date/Time	DATE STARTED: 12-5-89
ENGINEER/GEOLOGIST: E. TRALLINGER	Depth	Date/Time	DATE COMPLETED: 12-5-89
DRILLING METHODS: CAT 225 B BACKHOE (TRACK MOUNTED)			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (IN/%)	DESCRIPTION (TRENCH #10 East End)	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS
1, 2, 3, 4				2-3 in. GRASS IN FIELD. SOIL NEXT TO RAFFINATE LINE WAS DISTURBED DURING CONSTRUCTION OF BERM BUILT AROUND LINE. NO RUBBLE FOUND.				SOIL MONITORED AS IT WAS STOCK-PILED, READINGS ARE BELOW BKG.
5, 6, 7	Sample # ↓ 56032	Time ↓ @ 1010		MEDIUM DENSE, MOTTLED GRAY-BROWN (10YR 5/2) WITH (10YR 4/3) SILT, TRACE OF CLAY, MOIST.	ML	N/A		Hnu = 0.0 ppm; α = 0 cpm; βγ = 150-200 cpm; SPA 3 = 61,000 cpm
8, 9, 10, 11, 12, 13	56033	@ 1030		MEDIUM DENSE, BROWN (10YR 4/3) POORLY GRADED SAND, MOIST TO WET.	SP	N/A		Hnu = 0.0 ppm; α = 0 cpm; βγ = 120 cpm; SPA-3 = 40,000 cpm
14	56034	@ 1100		FIRM, GRAY (10YR 5/2) SILTY CLAY, TRACE OF GRAVEL (.5-2.0 in), LOW PLASTICITY, MOIST.	CL	1.5		Hnu = 0.0 ppm; α = 0 cpm; βγ = 100-120 cpm; SPA3 = 23,000 cpm

NOTES. BOTTOM OF TRENCH @ 14.0 FT AT THIS LOCATION.

Drilling Contractor: IT/ASI

Drilling Equipment: CAT 225 B LC

Driller: Davin Oesley

Archive #'s { 6.5' = 56040; 10.0' = 56041; 14.0' = 56042 } HSL Sample #56039 @ 14.0 FT.

INSTRUMENT BACKGROUND

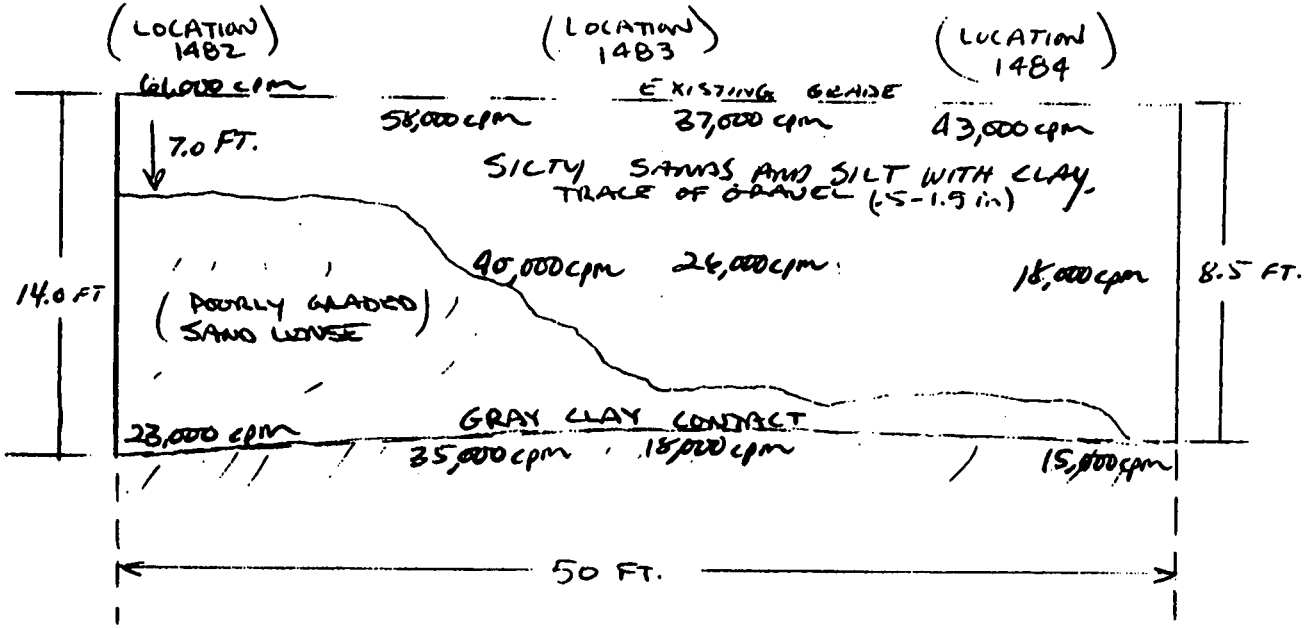
Hnu = 0.0 ppm
α = 0 cpm
βγ = 200-220 cpm
SPA-3 = 45,000 cpm

000666

REVIEWED BY DA: gm 1/24/92

TRENCH #10 PROFILE (K-65 RAFFINATE LINE)

SPA-3 READINGS IN CPM
BACKGROUND higher THAN READING DUE TO
K-65 SILOS
Bkg. = 95,000 cpm



SOILS ENCOUNTERED FROM SURFACE ARE SILTY SANDS AND SILTS, TRACE OF GRAVEL. EAST END OF TRENCH HAD CONSIDERABLE POORLY GRADED SAND FROM @ 7.0 FT. TO GRAY CLAY CONTACT AT 14.0 FT. SAND LENSE TAPERED GOING FROM EAST TO WEST. NO Rubble OR CONTAMINATED MATERIAL ENCOUNTERED.

W

Dimensions:
WIDTH: 24 inches
DEPTH: 14.0 FT EAST, 8.5 WEST
LENGTH: 50 FT.

4/4

499000

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1483	COORDINATES: N 480,434 / E 1379022	DATE: 12-5-89	
ELEVATION: 574.6	GWL: Depth none Date/Time	DATE STARTED: 12-5-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 12-5-89	
DRILLING METHODS: CAT 225 B LC BACKHOE		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (IN/A)	DESCRIPTION (TRENCH #10 Mid Point)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1				2-3 in. GRASS IN FIELD				
2				SOIL IS DISTURBED BACKFILL FROM AREA AROUND RAFFINATE LINE BERM. NO RUBBLE FOUND.				SOIL SURVEYED DURING EXCAVATION — READINGS BACKGROUND LEVELS OR LESS.
3								
4	Sample # ↓	Time ↓						
5	56035	@ 1105		MEDIUM DENSE, MOTTLED GRAY-BROWN (10YR 5/2 / 10YR 4/3) CLAYEY SILT, SOME SAND, MOIST.	ML	N/A		HNu = 0.0 ppm α = 0 cpm βγ = 200 cpm SPA 3 = 37,000 cpm
6								
7								
8	56036	@ 1400		FIRM, GRAY, (10YR 5/1) SILTY CLAY TRACE OF SAND AND GRAVEL (.5-1.5 in), LOW PLASTICITY, MOIST.	CL	1.5		HNu = 0.0 ppm α = 0 cpm βγ = 150 cpm SPA 3 = 18,000 cpm
9				BOTTOM OF TRENCHING @ 8.0 FT. SAMPLING ENDED @ 8.0 FT (AT GRAY CLAY CONTACT)				
10								
11								
12								

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: DAVID ORPHEY

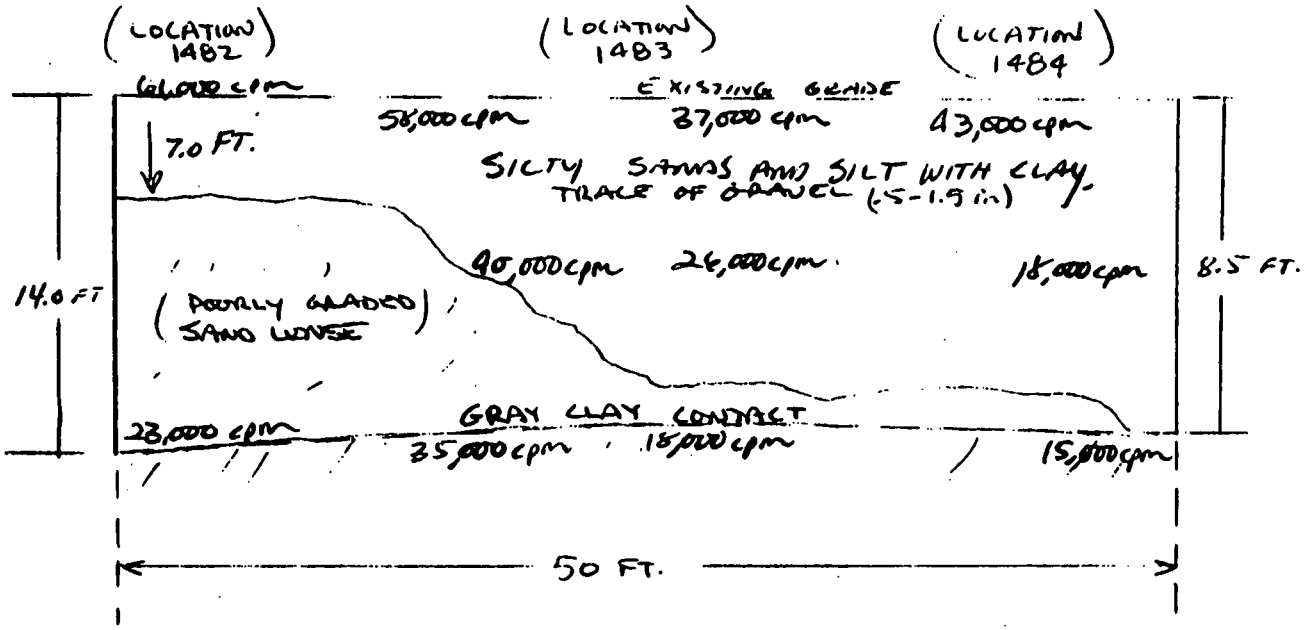
Archive #5 { 5' = 56043, 8' = 56044 }

INSTRUMENT BACKGROUND

HNu = 0.0 ppm
α = 0 cpm
βγ = 200-220 cpm
SPA 2 = 95,000 cpm

TRENCH #10 PROFILE (K-65 RAFFINATE LINE)

SPA-3 READINGS IN CPM
BACKGROUND higher THAN READING DUE TO
K-65 SILOS
BKG. = 95,000 CPM



SOILS ENCOUNTERED FROM SURFACE ARE SILTY SANDS AND SILTS, TRACE OF GRAVEL. EAST END OF TRENCH HAD CONSIDERABLE POORLY GRADED SAND FROM @ 7.0 FT. TO GRAY CLAY CONTACT AT 14.0 FT. SAND LENSE TAPERED GOING FROM EAST TO WEST. NO Rubble OR CONTAMINATED MATERIAL ENCOUNTERED.

W

Dimensions:
WIDTH: 24 in
DEPTH: 14.0 FT
[illegible], 8.5 WEST

699000

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1484	COORDINATES: ~N480435/~E1378997	DATE: 12-5-89	
ELEVATION: 574.0	GWL: Depth none	Date/Time	DATE STARTED: 12-5-89
ENGINEER/GEOLOGIST E. Trollinger	Depth	Date/Time	DATE COMPLETED: 12-5-89
DRILLING METHODS: CAT 225B LC BACKHOE			PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION (TRENCH #10) west end RAFFINATE LINE AREA	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
				3-5in GRASS OVERGROWTH.				
1				DISTURBED BACKFILL AROUND BERM AREA OF LINE, SILTY SAND. NO Rubble FOUND.				SOIL SURVEYED DURING EXCAVATION AND READINGS BELOW BACKGROUND
2								
3	Sample #	Time						
4								
5	56037	@1407		MEDIUM DENSE, YELLOWISH BROWN (10YR 4/3) WELL GRADED SAND, TRACE OF GRAVEL (.5-1.5in), MOIST.	SW	N/A		Hnu = 0.0 ppm α = 0 CPM βγ = 150-200 CPM SPA3 = 37,000 CPM
6								
7								
8								
9	56038	@1410		FIRM, GRAY (10YR5/1) SILTY CLAY, TRACE OF SAND AND GRAVEL, LOW PLASTICITY, MOIST.	CL	1.5		Hnu = 0.0 ppm α = 0 CPM βγ = 150 CPM SPA3 = 18,000 CPM
10								

NOTES.

Drilling Contractor ASI/IT

Drilling Equipment CAT 225B LC

Driller: DAVID ORPEY

56045 } ARCHIVE NUMBERS
56046 }

INSTRUMENT BACKGROUND

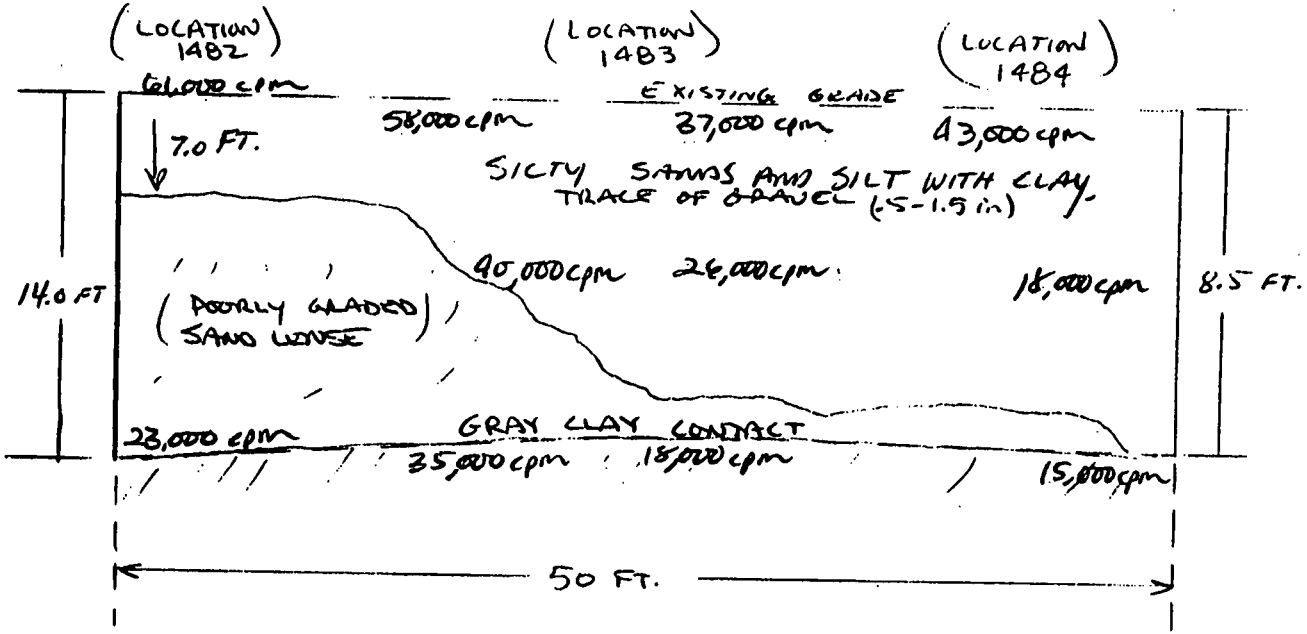
Hnu = 0.0 ppm
α = 0 CPM
βγ = 200-220 CPM
SPA3 = 95,000 CPM

REVIEWED BY GA GM 1/2/92

4/4

TRENCH #10 PROFILE (K-65 RAFFINATE LINE)

SPA-3 READINGS IN CPM
BACKGROUND higher THAN READING DUE TO K-65 SILOS
BKG. = 95,000 CPM



SOILS ENCOUNTERED FROM SURFACE ARE SILTY SANDS AND SILTS, TRACE OF GRAVEL. EAST END OF TRENCH HAD CONSIDERABLE POORLY GRADED SAND FROM @ 7.0 FT. TO GRAY CLAY CONTACT AT 14.0 FT. SAND LENSE TAPERED GOING FROM EAST TO WEST. NO Rubble OR CONTAMINATED MATERIAL ENCOUNTERED.

W

Dimensions:
WIDTH: 24 inches.
DEPTH: 14.0 FT EAS 10, 8.5 WEST
LENGTH: 50 FT.

0009000

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 1/21/92

(TRENCH No. 11 West End)

5711

VISUAL CLASSIFICATION OF SOILS

	Initial	Date
Field Check	WAH	12-28-89
1st Key In	[illegible]	3-27-90
2nd Key In	[illegible]	1-30-91
Hard Copy Verification		

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1485	COORDINATES: N. 481,920, E. 1,379,767	DATE: 12-7-89	
ELEVATION: 593.4	GWL: Depth none	Date/Time	DATE STARTED: 12-7-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 12-7-89
DRILLING METHODS: CAT 225B LC			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1–4	Sample # ↓	Time ↓		FILL MATERIAL CONTAINED ≈30% RUBBLE FROM FMPC CONSTRUCTION, CONCRETE SLABS 2 FT. x 4 FT., ASPHALT 1 FT. x 1 FT., REBAR, PLASTIC CONTAINERS, WOOD SCRAP, PIPES-CONDUIT, ALUMINUM. SOIL IS SILTY SAND WITH GRAVEL AND CLAY, MOIST.				FILL MATERIAL SURVEYED DURING STOCKPILING, BACKGROUND LEVELS DETECTED.
5	56047	0850		LOOSE, GRAYISH BROWN (10YR4/2) SILTY SAND, SOME CLAY, GRAVEL (.5-2.0 in) Rubble mixed INTO SOIL, concrete, Asphalt, CINDER BLOCKS	SM	N/A		Hnu = 0.0 ppm; α = 0 cpm; βγ = 180 cpm; SPA 3 = 24,000 cpm
9				FILL/NAT. GROUND CONTACT				
10	56048	0910		FIRM, MOTTLED GRAYISH BROWN TO GRAY (10YR 5/2/4/3) CLAYEY SILT, TRACE OF SAND, GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	ML ET	1.0		Hnu = 0.0 ppm; α = 0 cpm; βγ = 120-180 cpm; SPA 3 = 19,000 cpm
14–15	56049	0925		FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	1.5		Hnu = 0.0 ppm; βγ = 150 cpm; α = 0 cpm; SPA 3 = 16,000 cpm

* 15

NOTES. * BOTTOM OF LOCATION 1485 @ 15.0 FT.

Drilling Contractor: ASI/FT

Drilling Equipment: CAT 225 B LC

Driller: David Cathey (FT)

Archive Sample #'s: 56056 (5'), 56057 (10'), 56058 (15')

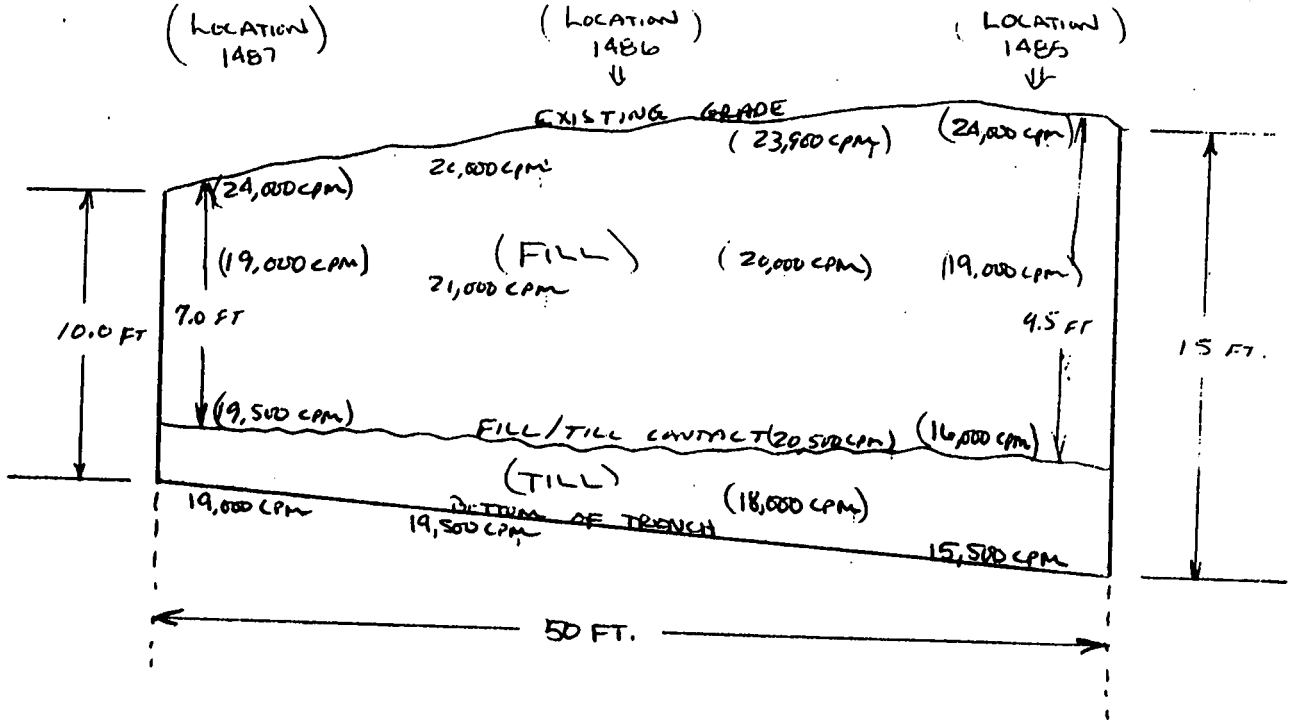
INSTRUMENT BACKGROUND

Hnu = 0.0–0.2 ppm
α = 0 cpm
βγ = 180–280 cpm
SPA 3 = 27,500 cpm

Page 44

TRENCH No. 11 - PROFILE

SPA 3 READINGS ARE IN CPM
BACKGROUND ≈ 27,500-30,000 CPM



FILL MATERIAL COMPOSED OF A SILTY SAND WITH GRAVEL (.5-2.5 in), SOME SILT THROUGHOUT, RUBBLE FOUND; CONCRETE SLABS AND PIECES 2FT x 4FT, REBAR, ALUMINUM CONDUIT, CINDER BLOCKS AND ASPHALT MAKING UP APPROXIMATELY 30% OF FILL. SOIL SURVEYED DURING EXCAVATION, READINGS DETECTED WERE BELOW BACKGROUND.

→ W

Dimensions:
WIDTH: 24 inches
LENGTH: 50 FT
DEPTH: 15 FT. [illegible] AND AND MIDPOINT

REVIEWED BY QA DATE 1/21/92

000673

	Initial	Date
First Check	WAH	12-28-89
1st Key In	[illegible]	[illegible]
2nd Key In	[illegible]	[illegible]
Hard Copy Verification		

FERNALD RI/FS

REVIEWED BY QA [signature] DATE 1/21/92

(TRENCH No. 11 Mid Point)

5711

VISUAL CLASSIFICATION OF SOILS

	Initial	Date
Field Check	WAH	12-28-89
1st Key In	[signature]	3-23-90
2nd Key In	[signature]	3-30-90
Hard Copy Verification		

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1486	COORDINATES: N. 481,902, E. 1,379,785	DATE: 12-7-89	
ELEVATION: 592.4	GWL: Depth none Date/Time	DATE STARTED: 12-7-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 12-7-89	
DRILLING METHODS: CAT 225 LC BACKHOE		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1' (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1–4				FILL MATERIAL COMPOSED OF SILTY SAND WITH GRAVEL, RUBBLE FOUND; CONCRETE SLABS AND PIECES 2FT x 4FT., ALUMINUM CONDUIT 2-3 FT LONG, METAL AND PLASTIC SCRAP, SEVERAL PIECES OF ASPHALT 2in - 1 FT. ≈35% Rubble				FILL SURVEYED AND READINGS DETECTED ARE BACKGROUND OR LESS.
5–9	560500 (Sample #)	0940 (Time)		→ LOOSE, BROWN (7.5YR 4/2) SILTY SAND, RUBBLE - CONCRETE, CINDER BLOCKS, GRAVEL (.5-1.5in), MOIST.	SM	N/A		→ Hnu = 0.0 ppm; α = 0 cpm; βγ = 150 cpm; SPA3 = 20,000 cpm
				FILL/NAT. GROUND CONTACT.				
10–14	560051	0945		→ FIRM, MOTTLED GRAY-BROWN (10YR 5/2 / 4/4) CLAYEY SILT, TRACE OF GRAVEL (.5-1.0in), LOW PLASTICITY, MOIST.	ML	1.0		→ Hnu = 0.0 ppm; α = 0 cpm; βγ = 120-150 cpm; SPA3 = 21,000 cpm
15	560052	0950		→ FIRM, MOTTLED GRAY (BROWN 10YR 5/2 & 4/3) SILTY CLAY, LOW TO MED. PLASTICITY, MOIST.	CL	1.5		→ Hnu = 0.0 ppm; βγ = 120 cpm; α = 0 cpm; SPA3 = 20,000 cpm

NOTES: *BOTTOM OF LOCATION 1486 @ 15.0 FT.

Drilling Contractor: ASC/IT

Drilling Equipment: CAT 225B LC

Driller: David Ripley (IT)

Archive #s: 560059 (5'), 560060 (10'), 560061 (15')

INSTRUMENT BACKGROUND

Hnu = 0.0-0.2 ppm
α = 0 cpm
βγ = 180-210 cpm
SPA3 = 23,000 cpm

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 1/26/92

(TRENCH No. 11)
East End

VISUAL CLASSIFICATION OF SOILS

	Initial	Date
Field Check	WAH	12-28-89
1st Key In	[illegible]	[illegible]
2nd Key In	[illegible]	1-30-91
Hard Copy Verification		

PROJECT NUMBER: 602 3.7.4	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1487	COORDINATES: N.481,884 E.1,379,802	DATE: 12-7-89	
ELEVATION: 591.4	GWL: Depth none Date/Time	DATE STARTED: 12-7-89	
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 12-7-89	
DRILLING METHODS: CAT 225 B LC		PAGE 3 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1, 2, 3, 4				FILL MATERIAL IS A SILTY SAND WITH GRAVEL (.5-2.0 in) TRACE OF SILT; Rubble ~30%, COMPOSED OF CONCRETE SLABS AND PIECES 2FT x 2FT., ASPHALT (2in-6in), ALUMINUM CONDUIT PLASTIC AND METAL SCRAP.				FILL MATERIAL SURVEYED AS IT WAS STOCKPILED, READINGS BELOW BACKGROUND.
5, 6, 7	56053	@1000		→ FIRM, MOTTLED GRAY-BROWN (10YR 5/2/4/3) SANDY SILT, TRACE OF CLAY, GRAVEL (.5-1.6in) NON TO LOW COHESIVENESS, MOIST. FILL/NAT GROUND CONTACT.	ML	1.0		Hnu = 0.0 ppm α = 0 CPM βγ = 180 CPM SPA3 = 17,960 CPM
8, 9, 10, 11, 12, 13, 14, 15	56054	@1015		→ FIRM, GRAY (10YR 5/2) SILTY CLAY, TRACE OF FINE GRAVEL (.5-.75in) LOW TO MEDIUM PLASTICITY, MOIST. * BOTTOM OF LOCATION 1487 @ 10.0 FT.	CL	1.5	→	Hnu = 0.0 ppm α = 0 CPM βγ = 120-150 CPM SPA3 = 16,000 CPM

NOTES.

Drilling Contractor: ASI/IT

Drilling Equipment: CAT 225 B LC

Driller: DAVID DRPHEY (IT)

ARCHIVE #'S 56052 } 5'
56063 } 10'

INSTRUMENT BACKGROUND

Hnu = 0.0 - 0.2 ppm
α = 0 CPM
βγ = 180-240 CPM
SPA3 = 20,000 CPM

000675

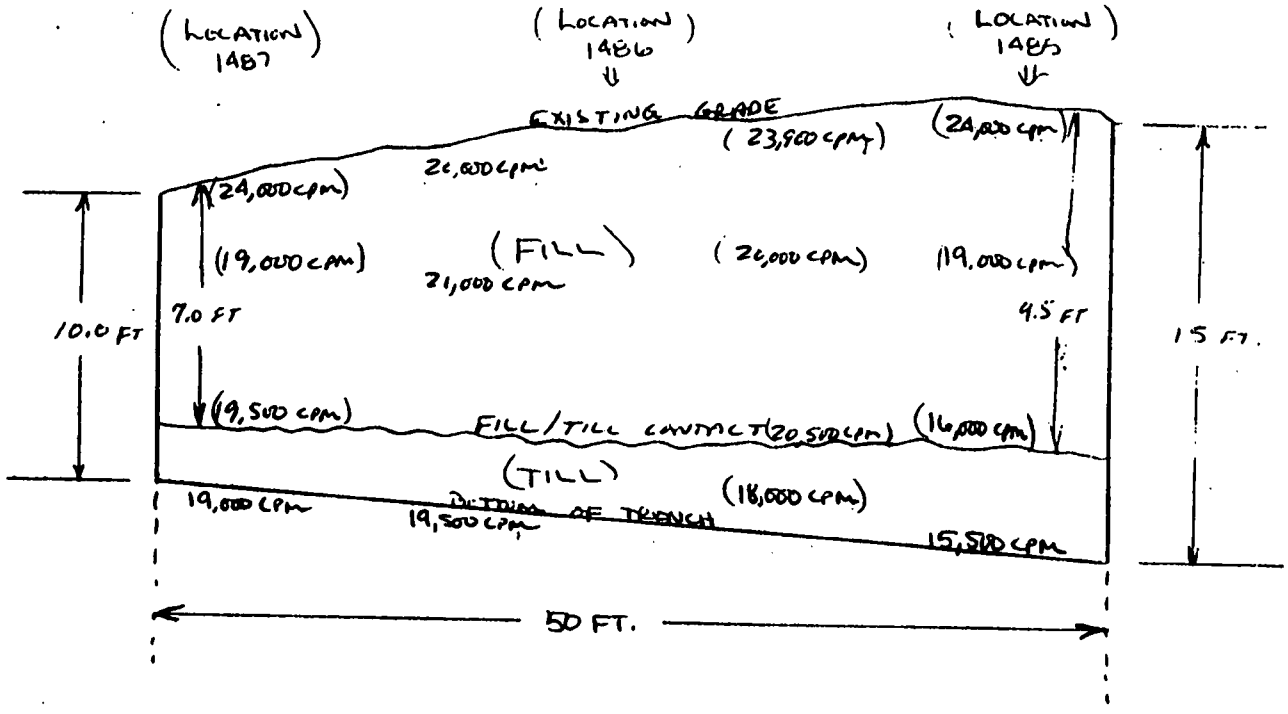
000000

5711 Page 4b

REVIEWED BY QA DATE 1/21/92

TRENCH No. 11 - PROFILE

SPA3 READINGS ARE IN CPM
BACKGROUND ≈ 27,500-30,000 CPM



FILL MATERIAL COMPOSED OF A SILTY SAND WITH GRAVEL (.5-2.5 in), SOME SILT THROUGHOUT, RUBBLE FOUND; CONCRETE SLABS AND PIECES 2FT X 4FT, REBAR, ALUMINUM CONDUIT, CINDER BLOCKS AND ASPHALT MAKING UP APPROXIMATELY 30% OF FILL. SOIL SURVEYED DURING EXCAVATION, READINGS DETECTED WERE BELOW BACKGROUND.

	Initial	Date
First Entry	WAH	12-18-89
1st Key In		
2nd Key In		
Hard Copy Verification		

→ W

Dimensions:
WIDTH: 24 inches
LENGTH: 50 FT
DEPTH: 15 FT

1' and mid point

000679

RECORD OF BORING NO. PWT-1

1490

Client: NLO

Page 1 of 1

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Recovery (in)
573.49	0						
		Gray to brown medium sand with gravel; moist, loose to medium dense	1	0.0-1.5	SS	6-18-16	18
571.49	2.0						
		Mottled brown and gray silty clay; moist, medium stiff to stiff	2	2.5-4.0	SS	5-7-13	18
		(Grades to a silty, fine sandy clay at 5.0')	3	5.0-6.5	SS	4-5-7	18
		(Grades to a silty clay at 7.0')					
565.49	8.0						
		Light gray to brown, medium sand with gravel; wet, medium dense	4	7.5-9.0	SS	5-17-9	18
		(Wet zone at 8.0')					
562.84	10.65						
		Gray to brown silty, sandy clay with gravel; moist, loose	5	10.0-11.5	SS	6-6-10	18
561.99	11.5						
		Boring terminated at 11.5'					
		2.0" PVC casing set to 11.5', screened between 6.5-11.5'					

Dates Drilled: 7/2/85

Driller: W. Moore

Water Depth: Initial: _____

_____ Days after Completion: _____

2 Days after Completion: 3.37'

Drilling Method: Hollow Stem Augers

Boring Location: S. 3811
E. 4036

000677

SOIL & MATERIAL ENGINEERS, INC
Cincinnati, Ohio

RECORD OF BORING NO. PWT-2

1491

5711

Client: NLO

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Reco ery (i
575.29	0						
		Mottled brown gray silty clay; slightly moist, soft	1	0.0-1.5	SS	4-8-14	16
			2	2.5-4.0	SS	6-9-10	18
		(Becomes stiff at 1.5')					
		(Grades to a light brown at 1.5')					
		(Grades to a brown clayey silt at 5.0')	3	5.0-6.5	SS	8-11-13	18
			4	7.5-9.0	SS	10-9-11	16
		(Grades to a gray silty clay at 10.0')	5	10.0-11.5	SS	3-4-18	16
		(Becomes very stiff at 11.0')					
562.29	13.0						
		Brown fine sand; wet, very loose to loose	6	12.5-14.0	SS	4-6-9	17
		(Wet zone at 13.0')					
562.14	13.15						
		Gray silty clay; wet, soft to medium stiff					
559.39	15.9						
		Gray fine to medium sand; wet, loose to medium dense	7	15.0-16.5	SS	7-8-11	16
558.99	16.3						
		Gray silty sandy clay; very moist, medium stiff to stiff					
		(Becomes soft at 17.5')	8	17.5-19.0	SS	3-3-4	17
556.29	19.0						
		Boring terminated at 19.0'					
		2.0" PVC casing set to 18.0', screened between 13.0-18.0'					

Dates Drilled: 7/2/85

Driller: W. Moore

Water Depth: Initial: _____

_____ Days after Completion: _____

2 Days after Completion: 8.28'

Drilling Method: Hollow Stem Auger

Boring Location: S. 4056
E. 3734

SOIL & MATERIAL ENGINEERS, IN
Cincinnati, Ohio

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1492	COORDINATES N. 480112 / E. 1,382,930	DATE 1-4-90	
ELEVATION	GWL: Depth none Date/Time	DATE STARTED: 1-4-90	
ENGINEER/GEOLOGIST E. Tolinger / M. Swanson	Depth Date/Time	DATE COMPLETED 1-04-90	
DRILLING METHODS Auger 8 in HS		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (/6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED GAMMA-RAY (cpm)	WELL CONSTRUCTION	REMARKS
1	15297 0930 1-04	3	6	2-3 in GRASS OVERGROWTH, FIRM, DARK BROWN (7.5YR 3/2) SILTY CLAY TRACE OF SAND, LOW PLASTICITY, MOIST.	ML	2.0		Hnu = 0.4 ppm; α = 0 cpm; βγ = 90-100 cpm
	15298 0930 1-04	6	6					
	15299 0930 1-04	4	6					
2	15300 0930 1-04	5	4		ML	2.0		Hnu = 0.2 ppm; α = 0 cpm; βγ = 90 cpm
	15301 0938 1-04	6	6	HARD, BROWNISH GRAY MOTTLED, 10YR 4/2, 10YR 4/4, SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	3.0		
3	15302 0938 1-04	8	6					
	15303 0938 1-04	12	0	NO RECOVERY				Hnu = 0.2 ppm; α = 0 cpm; βγ = 70-90 cpm
4	15304 0938 1-04	14	6	HARD, GRAYISH BROWN (10YR 4/2) CLAY, LOW TO MEDIUM PLASTICITY MOIST TO WET.	CL	2.5		
	15305 0944 1-04	6	6					
5	15306 0944 1-04	8	6	FIRM, GRAYISH BROWN (10YR 4/3) CLAY, TRACE OF SAND, LOW TO MED. PLASTICITY, MOIST TO WET.	CL	2.0		Hnu = 0.2 ppm; α = 0 cpm; βγ = 60-90 cpm
	15307 0944 1-04	15	2					
6	15308 0950 1-04	8	6					
7	15309 0950 1-04	12	0	NO RECOVERY 6-6.5 FT 6.5-7.0 FT.				Hnu = 0.4 ppm; α = 0 cpm; βγ = 60-90 cpm
	15310 0950 1-04	17	0					
	15311 1040 1-04	6	6	FIRM, GRAYISH BROWN, (10YR ~~3/2~~ 5/2) CLAY, TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	2.0		

NOTES.

Drilling Contractor Penn Drill

Drilling Equipment Mobile B0

Driller: Robert Yost, Brian Strapheson

MATERIALS FOR COMPLETION:
7-5 GAL BUCKETS BENTONITE PELLETS.
20 GALS WATER, 1/2 BAG CEMENT.

INSTRUMENT BKG.
Hnu = 0.0-0.4 ppm
α = 0 cpm
βγ = 60-90 cpm

Hnu S/N 901694

000679

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	W02 3.7.5	PROJECT NAME	FMPC RI/FS		
BORING NUMBER	1492	COORDINATES		DATE	1-4-90
ELEVATION		GWL: Depth	Date/Time	DATE STARTED	1-04-90
ENGINEER/GEOLOGIST	E. Tollinger/M Swanson	Depth	Date/Time	DATE COMPLETED	1-04-90
DRILLING METHODS	8 in HSA			PAGE 2	OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (PER 6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED GRADIENT (PSI)	WELL CONSTRUCTION	REMARKS
15312 ET 1-4-90	~~15297~~ 1040 1-04	6	0	NO RECOVERY				Hnu = 0.4 ppm α = 0 cpm βγ = 60-80 cpm
15313 1-04-90	ET ~~15298~~ 1040 1-04	8	0					
15314 1-4-90	ET ~~15299~~ 1045 1-04	3	2	FIRM, GRAYISH BROWN (10YR 5/2) CLAY, TRACE OF FINE GRAVEL (.5 in), LOW PLASTICITY, MOIST.	CL	2.0		
9	15315 1045 1-04	3	0	NO RECOVERY 9-9.5 FT				Hnu = 0.4 ppm α = 0 cpm βγ = 60 cpm
	15316 1045 1-04	3	0	NO RECOVERY 9.5-10.0 FT.				
10	15317 1055 1-04	10	6	HARD, LIGHT BROWN (2.5Y 6/3) GRAVELLY CLAY (.5-.75 in) angular gravel, LOW PLASTICITY, MOIST.	CL	2.5		
	15318 1055 1-04	15	2		CL	2.5		Hnu = 0.4 ppm α = 0 cpm βγ = 60 cpm
11	50935 1055 1-04	20	0	NO RECOVERY 11.0-11.5 FT				
	50936 1115 1-04	8	6	FIRM, LIGHT BROWN (2.5Y 6/3) CLAYEY SILT, TRACE OF SAND, Slightly cohesive, MOIST.	ML	1.5		
12	50937 1115 1-04	10	6		ML	1.5		Hnu = 0.4 ppm α = 0 cpm βγ = 60 cpm
	50938 1115 1-04	15	4					
13	50939 1122 1-04	17	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, LOW PLASTICITY, MOIST.	CL	2.0		
	50940 1122 1-04	19	0	NO RECOVERY 13.5-14.0 FT.				Hnu = 0.4 ppm α = 0 cpm βγ = 60 cpm
14	50941 1122 1-04	20	0	NO RECOVERY 14.0-14.5 FT				
	50942 1130 1-04	15	6	FIRM, GRAYISH BROWN (10YR 5/2) CLAY, TRACE OF SAND (FINE TO MEDIUM) LOW PLASTICITY, MOIST.	CL	2.0		
15								

NOTES.

Drilling Contractor: Fran Drill Co.

Drilling Equipment:

Driller: Robert Yost
Brian Stramazzam

INSTRUMENT BKG.

Hnu = 0.4 ppm
α = 0 cpm
βγ = 60-90 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 1602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1492	COORDINATES		DATE 1-04-90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 1-04-90
ENGINEER/GEOLOGIST Trollinger, Swanson	Depth	Date/Time	DATE COMPLETED 1-04-90
DRILLING METHODS 8 in HS Mobile 80			PAGE 3 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANCY (PPM)	WELL CONSTRUCTION	REMARKS
16	50943 1130 1-04	15	6	FIRM, GRAY, (10YR 5/1) CLAY, TRACE OF FINE GRAVEL, LOW PLASTICITY, MOIST. ↓	CL	2.0		Hnu = 0.4 ppm, α = 0 cpm, βγ = 80 cpm
	50944 1130 1-04	16	6					
	50945 1140 1-04	10	6					
17	50946 1140 1-04	6	0	NO RECOVERY				Hnu = 0.4 ppm, α = 0 cpm, βγ = 60-80 cpm
	50947 1140 1-04	6	0					
18	50948 1345 1-04	12	6	FIRM, GRAY, (10YR 5/2) GRAVELLY CLAY, TRACE OF COARSE SAND, LOW TO MEDIUM PLASTICITY, MOIST. ↓	CL	2.0		
	50949 1345 1-04	28	6					Hnu = 0.4 ppm, α = 0 cpm, βγ = 60-80 cpm
19	50950 1345 1-04	17	3		CL	2.0		
	50951 1352 1-04	17	6					
20	50952 1352 1-04	18	6					
				BOTTOM OF BORING @ 20.0 FT SAMPLING ENDED @ 20.0 FT. P/A - VOLCLAY GROUT CAPPED W/CEMENT PLUG TO SURFACE.				

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost

Brian Strapazzon

INSTRUMENT BACKGROUND

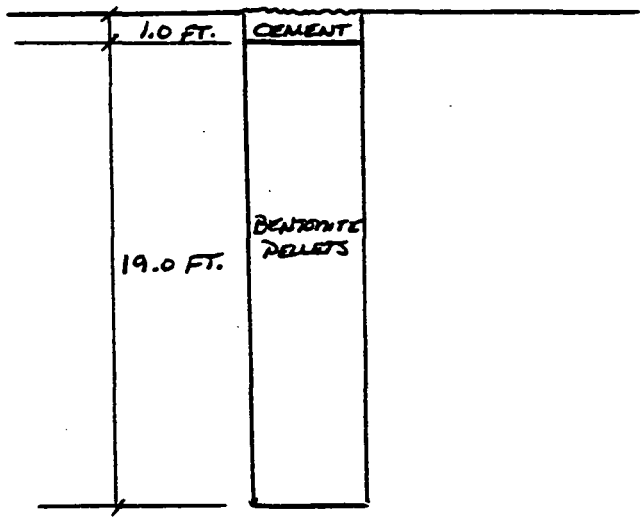
Hnu = 0.4 ppm

α = 0 cpm

βγ = 60-100 cpm

000681

BORING 1492 WAS COMPLETED ON 1-04-90. TOTAL DEPTH DRILLED WAS 20.0 FT, SAMPLING ENDED AT 20.0 FT. THIS BORING WAS BACKFILLED USING BENTONITE PELLETS TO WITHIN 1 FT. OF SURFACE, A CEMENT PLUG WAS USED TO CAP TO SURFACE ELEVATION.



★ NOTE:

VOLCLAY GROUT MIXED WITH WATER WAS USED ON ALL OTHER BORINGS AFTER THIS ~~WELL~~ G.T. 1-4-90 ONE; BEING A MORE COST EFFECTIVE METHOD.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1493	COORDINATES: N, 480,215 / E, 1,383,040	DATE: 1-05-90	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 1-05-90	
ENGINEER/GEOLOGIST: Trollinger / Swanson	Depth / Date/Time	DATE COMPLETED: 1-05-90	
DRILLING METHODS: Mobile 80 8in HSA		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	WELL CONSTRUCTION	REMARKS
1	15319 0915 1-05	4	6	FIRM, BROWN 7.5YR 3/2 TO GRAYISH BROWN (10YR 4/2) CLAYEY SILT, TRACE OF ORGANIC MATTER, LOW PLASTICITY, MOIST.	ML	1.5		Hnu = 1.0 ppm α = 0 cpm βγ = 100 cpm
	15320 0915 1-05	4	6					
	15321 0915 1-05	6	4					
2	15322 0920 1-05	6	6	FIRM, YELLOWISH BROWN (10YR 4/4) SILTY CLAY, TRACE OF MEDIUM SAND, LOW PLASTICITY, DAMP TO MOIST.	CL	2.5		Hnu = 0.8 ppm α = 0 cpm βγ = 90-100 cpm
	15323 0920 1-05	9	6					
3	15324 0920 1-05	11	3					
	15325 0925 1-05	15	6		CL	2.5		Hnu = 1.0 ppm α = 0 cpm βγ = 80-90 cpm
4	15326 0925 1-05	19	4					
	15327 0925 1-05	19	0	NO RECOVERY 4-4.5 FT.				
5	15328 0930 1-05	28	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, COBBLE OF QUARTZITE IN TIP OF SPOON (1.5 in) ROUNDED, LOW PLASTICITY, MOIST.	CL	2.5		Hnu = 1.0 ppm α = 0 cpm βγ = 60-80 cpm
	15329 0930 1-05	32	5					
6	15330 0930 1-05	35	0	NO RECOVERY 5.5-6.0				
7	15331 1015 1-05	9	6	HARD, YELLOWISH BROWN (10YR 4/2) SILTY CLAY, COARSE GRAVEL (1.5 in) ROUNDED QUARTZITE, LOW PLASTICITY, MOIST.	CL	3.5		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
	15332 1015 1-05	10	4					
	15333 1015 1-05	13	0	NO RECOVERY 7-7.5 FT.				

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost
Brian Strnadzen

INSTRU. BKG.
Hnu = 0.2-0.8 ppm
α = 0 cpm
βγ = 60-100 cpm

MATERIALS USED:
2 BAGS VOLCLAY GROUT
25 GALS. WATER. 1/2 BAG CEMENT.

000683

Hnu S/N = 901674

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1493	COORDINATES:		DATE: 1-05-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-05-90
ENGINEER/GEOLOGIST: Trollinger/Swanson	Depth	Date/Time	DATE COMPLETED: 1-05-90
DRILLING METHODS: Mobile 80 8 in HSA			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED LANDFILL GAS (PPM)	WELL CONSTRUCTION	REMARKS
8	15334 1020 1-05	11	6	FIRM, GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF COARSE GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 60-80 cpm
	15335 1020 1-05	17	6					
9	15336 1020 1-05	20	6					
	15337 1025 1-05	19	6		CL	2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 60 cpm
10	15338 1025 1-05	25	6					
	15339 1025 1-05	28	6					
11	15340 1040 1-05	5	6		CL	2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 20-40 cpm
	50955 1040 1-05	10	6					
12	50956 1040 1-05	14	3					
	50957 1054 1-05	7	6	FIRM, GRAY, (10YR 5/2) CLAY, TRACE OF GRAVEL (.5-1.5 in) Rounded, LOW TO MEDIUM PLASTICITY, MOIST TO WET.	CL	2.0		Hnu = 0.8 ppm α = 0 cpm βγ = 40 cpm
13	50958 1054 1-05	11	6					
	50959 1054 1-05	13	3					
14	50960 1056 1-05	11	6		CL	2.0		Hnu = 0.8 ppm α = 0 cpm βγ = 40 cpm
	50961 1056 1-05	15	6					
	50962 1056 1-05	17	6					
15								

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost

Brian Strapazzon

INSTRUMENT BKG.

Hnu = 0.4-1.0 ppm

α = 0 cpm

βγ = 60-80 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1493	COORDINATES:		DATE: 1-05-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-05-90
ENGINEER/GEOLOGIST: Trulliger/Swanson	Depth	Date/Time	DATE COMPLETED: 1-05-90
DRILLING METHODS: Mobile 80 8 in HSA			PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS
15	50963 1115 1-05	3	6 ET	FIRM, GRAY (10YR 5/2), CLAY, TRACE OF FINE GRAVEL (.5 in)	CL	2.0		Hnu = 0.6 ppm
	50964 1115 1-05	5	0	NO RECOVERY 15.5-16.5 FT.				α = 0 cpm
16	50965 1115 1-05	7	0					βγ = 40 cpm
	50966 1122 1-05	6	6	FIRM, GRAY, (10YR 5/2 TO 10YR 5/1) CLAY, TRACE OF ORGANIC WOOD MATERIAL DECOMPOSED, TRACE OF GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.8 ppm
17	50967 1122 1-05	8	6					α = 0 cpm
	50968 1122 1-05	15	4					βγ = 40-60 cpm
18	50969 1130 1-05	14	6					Hnu = 0.6 ppm
	50970 1130 1-05	18	6		CL	1.5		α = 0 cpm
19	50971 1130 1-05	22	4					βγ = 60-90 cpm
	50972 1130 1-05	24	0	NO RECOVERY 19.5-20.0 FT				
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED AT 20.0 FT. LAST SAMPLE 19.0-19.5 FT. P/A BOLAY GROUT, CAPPED W/ CEMENT PLUG TO SURFACE				

NOTES.

Drilling Contractor: Penn Drill

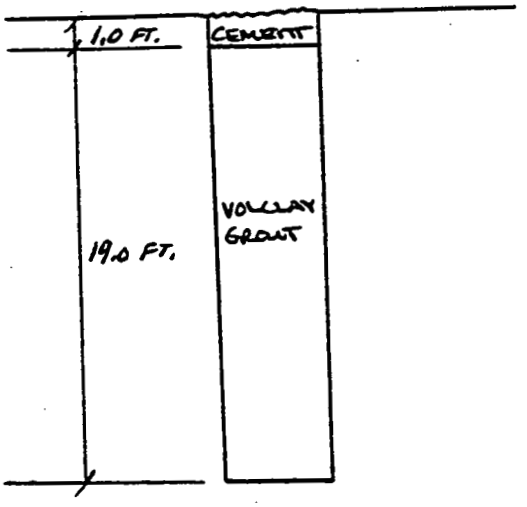
Drilling Equipment: Mobile 80

Driller: Rob. Yost.
Brian Strabenzon

INSTRUMENT BKG.
Hnu = 0.4 ppm
α = 0 cpm
βγ = 60-90 cpm

BORING 1493 COMPLETED ON 1-05-90 TO A DEPTH OF 20.0 FT. BORING 1493 BACKFILLED WITH VOLCLAY GROUT TO WITHIN 1 FT. OF SURFACE, CEMENT PLUG FROM 1.0 FT. TO SURFACE.

5711



FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1494	COORDINATES: N.450 415 / E1383,105		DATE: 1-06-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-06-90
ENGINEER/GEOLOGIST: Trainger/Swanson	Depth	Date/Time	DATE COMPLETED: 1-06-90
DRILLING METHODS: Mobile 60 8in HSA			PAGE 1 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED LIQUIDITY INDEX (TSF)	WELL CONSTRUCTION	REMARKS
1	15341 0924 1-06	3	6	FIRM, DARK BROWN (7.5 YR 3/2) SILT, ORGANICS (GRASS SURFACE GROWTH) ROOTS, ROOTLETS.	ML	1.0		Hnu = 0.0 ppm α = 0 cpm βγ = 60 cpm
	15342 0924 1-06	6	6					
	15343 0924 1-06	10	3					
2	15344 0930 1-06	6	6	FIRM, GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	1.5		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
	15345 0930 1-06	12	5					
3	15346 0930 1-06	22	Ø	— NO RECOVERY 2.5 TO 3.0 FT				
4	15347 0931 1-06	17	6	FIRM, YELLOWISH BROWN (10YR 5/3) SILTY CLAY, TRACE OF FRAGMENTED FOSSILIFEROUS LIMESTONE AND MEDIUM SAND, LOW PLASTICITY, MOIST. ↓	CL	1.5		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
	15348 0931 1-06	21	6					
	15349 0931 1-06	16	2					
5	15350 0937 1-06	15	6		CL	1.5		Hnu = 0.8 ppm α = 0 cpm βγ = 60-80 cpm
6	15351 0937 1-06	17	Ø	NO RECOVERY 5.0-6.0 FT.				
	15352 0937 1-06	13	Ø					
7	15353 1005 1-06	5	6	FIRM, MOTTLED GREY-BROWN (10YR 5/2) (10YR 4/3) SILTY CLAY, TRACE OF SAND, MOIST.	CL	2.0		Hnu = 0.8 ppm α = 0 cpm βγ = 60-80 cpm
	15354 1005 1-06	10	6					
	15355 1005 1-06	15	4					

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 60 8in HSA

Driller: Rob. Yost

Brian Strapazzon Assis.

MATERIALS USED:
1 BAG BENTONITE GROUT
20 GALLONS WATER 1/2 BAG CEMENT

Hnu = 0.8 ppm SN 7000 25
α = 0 cpm
βγ = 60 cpm - 80 cpm

000687

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1994	COORDINATES		DATE 1-06-90
ELEVATION	GWL Depth	Date/Time	DATE STARTED 1-06-90
ENGINEER/GEOLOGIST Trollinger / Swanson	Depth	Date/Time	DATE COMPLETED 1-06-90
DRILLING METHODS Mobile 80 HSA 8 in			PAGE 2 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (Lbs.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	15356 1007 1-06	12	6	FIRM, GRAYISH BROWN, (10YR 4/2) SILTY CLAY, LOW PLASTICITY, MOIST, TRACE OF COARSE SAND, TRACE OF FINE GRAVEL (.5-1.0 in) ROUNDED.	CL	2.0		Hnu = 0.8 ppm α = 0 cpm βγ = 60-80 cpm
	15357 1007 1-06	17	6					
9	15358 1007 1-06	22	5					
	15359 1015 1-06	20	6		CL	2.0		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
10	15360 1015 1-06	25	6					
	15361 1015 1-06	29	6					
11	15362 1025 1-06	10	6	HARD, GRAY (10YR 5/1) SILTY CLAY TRACE OF GRAVEL (.5-1.0 in) ROUNDED, LOW PLASTICITY, DRY TO DAMP.	CL	4.0		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
	50975 1025 1-06	13	6					
12	50976 1025 1-06	16	0	NO RECOVERY 11.5-12.0 FT.				
	50977 1040 1-06	24	6	DENSE, BROWN (10YR 4/3) POORLY GRADED SAND, WET.	SP	N/A		Hnu = 0.8 ppm α = 0 cpm βγ = 40-60 cpm
PERCHED WATER ZONE	50978 1040 1-06	41	6					
13	50979 1040 1-06	30	0	NO RECOVERY 13-13.5 FT.				
	50980 1045 1-06	5	6	MEDIUM DENSE (10YR 4/3) POORLY GRADED SAND, TRACE OF COARSE SAND, WET.	SP	N/A		Hnu = 0.8 ppm α = 0 cpm βγ = 60 cpm
14	50981 1045 1-06	16	6	FIRM, GRAY (10YR 5/2) CLAY, TRACE OF GRAVEL (.5 in) ROUNDED, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.5		
	50982 1045 1-06	11	3					
15								

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80 8 in HSA

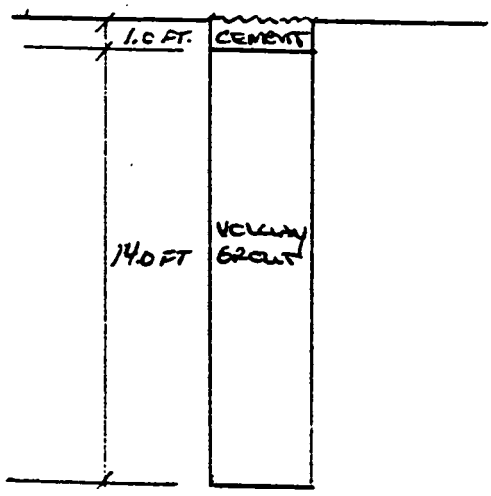
Driller: Robert Yost
Brian Strapazzon

BOTTOM OF BORING @ 15.0 FT
SAMPLING LOADED AT 15.0 FT.

P/A-VOLCLAY GROUT, CAPPED WITH CEMENT PLUG TO SURFACE.

INSTRUMENT BACKGROUND
Hnu = 0.0-0.8 ppm
α = 0 cpm
βγ = 60-80 cpm

BORING 1494 WAS COMPLETED ON 1-06-90. TOTAL DEPTH DRILLED WAS 15.0 FT. DUE TO PERCHED WATER ZONE ENCOUNTERED AT 12.0 TO 14.0 FT.; CRITERIA BEING FACILITY TESTING BORING PROCEDURES. SAMPLING ENDED AT 15.0 FT.
BORING WAS BACKFILLED WITH VOLCLAY GROUT TO WITHIN 1 FT. OF SURFACE AND CAPPED WITH A CEMENT PLUG.



FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 607 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1495	COORDINATES N. 480,715 / E. 1383,105	DATE 1-07-90	
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 1-07-90
ENGINEER/GEOLOGIST Trollinger, Swanson	Depth	Date/Time	DATE COMPLETED 1-07-90
DRILLING METHODS Mobile 80			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (ppm)	WELL CONSTRUCTION	REMARKS
15363	~~15363~~ 0930 1-07	3	6	FIRM, DARK BROWN (7.5YR 3/2) CLAYEY SILT, ORGANIC MATTER AT SURFACE (GRASS, ROOTLETS), TRACE OF SAND, MOIST.	ML	1.5		Hnu = 0.4 ppm α = 0 cpm βγ = 40-60 cpm
1	15364 0930 1-07	4	1-7-90 6 ET					
	15365 0930 1-07	7	3					
2	15366 0937 1-07	8	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF COARSE SAND (.25in), LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.9 ppm α = 0 cpm βγ = 40 cpm
	15367 0937 1-07	12	3					
3	15368 0937 1-07	16	0	NO RECOVERY				
4	15369 0939 1-07	12	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.9 ppm α = 0 cpm βγ = 40-60 cpm
	15370 0939 1-07	13	6					
	15371 0939 1-07	15	0	NO RECOVERY				
5	15372 0945 1-07	14	6	~~FIRM~~ BAKED 1-7-90 ET, MOTTLED GREYISH BROWN AND GREY (10YR 4/2), (10YR 5/1) SILTY CLAY, TRACE OF COARSE SAND (.25in), LOW PLASTICITY, MOIST.	CL	2.5		Hnu = 0.4 ppm α = 0 cpm βγ = 40 cpm
	15373 0945 1-07	29	6					
6	15374 0945 1-07	19	4					
	15375 1015 1-07	11	6	↓	CL	2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40-50 cpm
7	15376 1015 1-07	15	0	NO RECOVERY				
	15377 1015 1-07	19	0					

NOTES.

Drilling Contractor: Demo Drill

Drilling Equipment: Mobile 80

Driller: Rob. Yost, Brian Stepanizon

MATERIALS USED:
1 BAG VOLCLAY GROUT
25 gal water, 1/2 bag cement

INSTRU. BKG.
Hnu = 0.4-0.8 ppm
α = 0 cpm
βγ = 40-80 cpm

000690

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WEF 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1495	COORDINATES:		DATE: 1-07-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-07-90
ENGINEER/GEOLOGIST: Tullinger / Swanson	Depth	Date/Time	DATE COMPLETED: 1-07-90
DRILLING METHODS: Mobile 50 4 1/4 HSA			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	WELL CONSTRUCTION	REMARKS
8	15378 1025 1-07	20	6	1-7-90 ~~FIRM~~ HARD, GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF COARSE SAND, LOW PLASTICITY, GRAVEL (.5-1.0 in) ROUNDED, MOIST	CL	3.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	15379 1025 1-07	22	6					
9	15380 1025 1-07	24	4					
	15381 1034 1-07	17	6		CL	3.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
10	15382 1034 1-07	22	6					
	15383 1034 1-07	27	6					
11	15384 1045 1-07	17	6	1-7-90 ~~FIRM~~ HARD, LIGHT OLIVE BROWN (2.5Y 5/4) GRAVELLY CLAY, GRAVEL (.5-1.5 in), LOW PLASTICITY, DRY TO DAMP	CL	3.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	50995 1045 1-07	19	0	NO RECOVERY				
12	50996 1045 1-07	20	0					
	50997 1053 1-07	16	6	HARD GRAY (10YR 5/1) CLAY, TRACE OF MANGANESE STAINING IN FIRST 6 in, GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	3.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
13	50998 1053 1-07	19	6					
	50999 1053 1-07	25	6					
14	51000 1057 1-07	23	6		CL	3.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51001 1057 1-07	24	6					
	51002 1057 1-07	19	6					

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 50

Driller: Rob. Yost

Binam Strabazzon

INSTRU. BKG.

Hnu = 0.4-0.6 ppm

α = 0 cpm

βγ = 40-50 cpm

000691

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1495	COORDINATES:		DATE: 1-07-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-07-90
ENGINEER/GEOLOGIST: Tialinger/Swanson	Depth	Date/Time	DATE COMPLETED: 1-07-90
DRILLING METHODS: Mobile 80 8 in HSA			PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (/6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (ppm)	WELL CONSTRUCTION	REMARKS
	51003 1115 1-07	3	5	HARD, GRAY (10YR5/1) GRAVELLY CLAY, LIMESTONE GRAVEL SIZE (.5-1.0 in),	CL	3.0		Hnu = 0.6 ppm α = 0 CPM βγ = 40 CPM
	51004 1115 1-07	6	0	NO RECOVERY				
16	51005 1115 1-07	12	0					
	51006 1120 1-07	7	6	FIRM, GRAY (10YR 4/1) CLAY, TRACE OF COARSE SAND (.25 in), LOW TO MEDIUM PLASTICITY, MOIST.				Hnu = 0.6 ppm α = 0 CPM βγ = 40 CPM
17	51007 1120 1-07	14	6		CL	2.0		
	51008 1120 1-07	14	4					
18	51009 1125 1-07	14	6					Hnu = 0.6 ppm α = 0 CPM βγ = 40-100 CPM
	51010 1125 1-07	12	6		CL	2.0		
19	51011 1125 1-07	20	6					
	51012 1125 1-07	19	6					
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT. P/A-VOLCLAY GROUT CAPPED W/CEMENT PLUG TO SURFACE.				

NOTES.

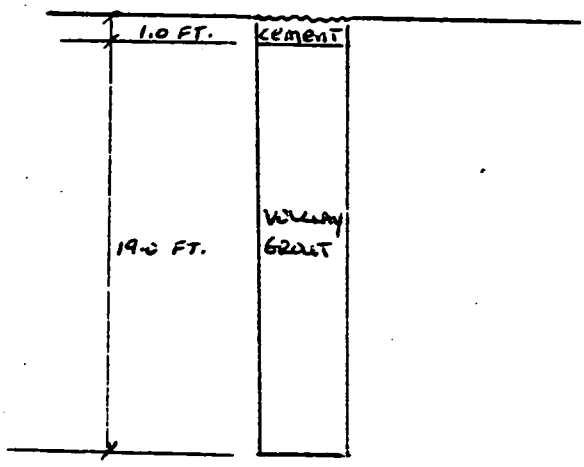
Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Rob Yost
Brian Strapazzoni

INSTRU. BKG.
Hnu = 0.4-0.8 ppm
α = 0 CPM
βγ = 40-80 CPM

BORING 1495 WAS COMPLETED ON 1-07-90. BOTTOM OF BORING AT 20.0 FT, SAMPLING ENDED AT 20.0 FT. BOREHOLE WAS BACKFILLED WITH VOLCLAY GROUT TO WITHIN 1 FT. OF SURFACE, A CEMENT PLUG WAS USED FROM 1.0 FT TO SURFACE.



5711

Date	2-6-90			
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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: GEOCHEM #1496	COORDINATES: N. 481,015 / E. 1,383,105	DATE: 1-08-90	
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-08-90
ENGINEER/GEOLOGIST: E. TROLLINGER/SWANSON	Depth	Date/Time	DATE COMPLETED: 1-08-90
DRILLING METHODS: 8" HSA			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (ppm)	WELL CONSTRUCTION	REMARKS
1	15385 0955 1-08	3	6	2-3 in GRASS AND ROOTLETS FIRM, DARK BROWN (7.5YR 3/2) CLAYEY SILT, TRACE OF FINE GRAVEL (.5-.75 in), ROUNDED AND ANGULAR, SLIGHTLY COHESIVE, MOIST.	ML	1.5		Hnu = 0.6 ppm; α = 0 cpm; βγ = 110 cpm
	15386 0955 1-08	8	6					
	15387 0955 1-08	10	2					
2	15388 1000 1-08	7	6	FIRM, GRAYISH BROWN (10YR 4/3) CLAY, TRACE OF COARSE SAND (.25 in) LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm; α = 0 cpm; βγ = 60-80 cpm
	15389 1000 1-08	16	4					
3	15390 1000 1-08	16	0	NO RECOVERY				
4	15391 1005 1-08	15	6	FIRM, GRAYISH BROWN (10YR 4/3) GRAVELLY CLAY, TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm; α = 0 cpm; βγ = 40-60
	15392 1005 1-08	17	6					
	15393 1005 1-08	19	0	NO RECOVERY				
5	15394 1010 1-08	17	6	FIRM, GRAYISH BROWN (10YR 4/3) CLAY, TRACE OF COARSE SAND (.25 in), LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm; α = 0 cpm; βγ = 40-60 cpm
	15395 1010 1-08	15	6					
6	15396 1010 1-08	20	6					
	15397 1047 1-08	6	6		CL	2.0		Hnu = 0.6 ppm; α = 0 cpm; βγ = 40-60 cpm
7	15398 1047 1-08	10	6					
	15399 1047 1-08	19	0	NO RECOVERY				

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBILE 80

Driller: BOB VOST

ASST. BRIAN STRAPPAZON

MATERIALS USED:

1 BAG VOLCLAY GROUT

20 GALS WATER, 1/2 BAG CEMENT.

INSTRUMENT BKG.

Hnu = 0.6 ppm

α = 0 CPM

βγ = 40-80 cpm

000694

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: GEOCHEM. #1496	COORDINATES:		DATE: 1-08-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-08-90
ENGINEER/GEOLOGIST TROLLINGER/SWANSON	Depth	Date/Time	DATE COMPLETED: 1-08-90
DRILLING METHODS: 8.11 HSA			PAGE ~~1~~ 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	15400 0955 1-08	15	6	HARD, ~~YELLOWISH BROWN~~ YELLOWISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5-1.0 in), LOW TO MEDIUM PLASTICITY, MOIST.	CL	3.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	15401 1055 1-08	50+	6					
9	15402 1055 1-08	—	0	NO RECOVERY - SPLITSPOON REFUSED DUE TO LARGE GRAVEL OR COBBLE				
	15403 1115 1-08	11	6	FIRM, GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF GRAVEL (.5-1.0 in) ROUNDED, LIMESTONE QUARTZITE, LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-50 cpm
10	15404 1115 1-08	14	6					
	15405 1115 1-08	14	3					
11	15406 1125 1-08	12	6	FIRM-HARD, GRAY (10YR 5/1) TO GRAYISH BROWN (10YR 4/2) SANDY CLAY, TRACE OF GRAVEL (.5-1.0) in ROUNDED, LOW PLASTICITY, MOIST TO WET.	CL	2.0-2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51015 1125 1-08	18	6					
12	51016 1125 1-08	24	3					
	51017 1140 1-08	19	6		CL	2.0-2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
13	~~51018~~ 1140 1-08	21	6	HARD, GRAY (10YR 5/1) CLAY, TRACE TO SOME GRAVEL (.5-1.0 in), LOW TO MEDIUM PLASTICITY, MOIST	CL	2.5		
51019 1-8-90	~~51018~~ 1140 1-08	24	5					
51020 1-8-90	~~51019~~ ET 1150 1-08	19	6					Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
14 51021 1-8-90	~~51018~~ ET 1150 1-08	20	6		CL	2.5		
51022 1-8-90	~~51019~~ ET 1150 1-08	22	3					

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBILE 80

Driller: DOUG YOST

ASST. BRIAN STRAPPAZON

INSTRUMENT BKG.

Hnu = 0.6 ppm
α = 0 cpm
βγ = 40-60 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FNPC RI/FS		
BORING NUMBER: GEOCHEM, # 1496	COORDINATES:		DATE: 1-08-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-08-90
ENGINEER/GEOLOGIST: TROLLINGER / SWANSON	Depth	Date/Time	DATE COMPLETED: 1-08-90
DRILLING METHODS: 8" HSA			PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (ppm)	WELL CONSTRUCTION	REMARKS
15	51023 1400 1-08	6	4	FIRM, GRAY (10YR 4/1) CLAY TRACE OF FINE GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51024 1400 1-08	13	0	NO RECOVERY				
16	51025 1400 1-08	7	0					
	51026 1425 1-08	4	6	FIRM, GRAY (10YR 4/1) CLAY, TRACE OF ROUNDED FINE GRAVEL, LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
17	51027 1425 1-08	8	6					
	51028 1425 1-08	14	0	NO RECOVERY				
18	51029 1435 1-08	4	6	FIRM, GRAY (10YR 4/1) CLAY, TRACE OF FINE GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST.	CL	1.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51030 1435 1-08	8	6					
19	51031 1435 1-08	12	6					
	51032 1435 1-08	17	2					
20				BOTTOM OF BORING @ 26.0 FT. SAMPLING ENDED @ 20.0 FT. P/A WITH VOLCLAY GROUT CAPPED WITH CEMENT PLUG TO SURFACE				

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBILE 80

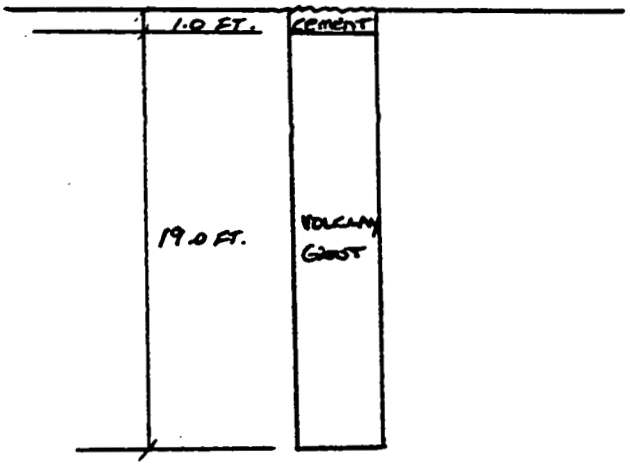
Driller: BOB YOST

ASST. BRIAN STRAPPAZON

INSTRU. BKG.

Hnu = 0.6 ppm
α = 0 cpm
βγ = 40-50 cpm

BORING 1496 WAS COMPLETED ON 1-08-90 TO A DEPTH OF 20.0 FT. GROUT USED TO BACKFILL BORING TO A DEPTH OF 1.0 FT FROM SURFACE. A CEMENT PLUG WAS PLACED TO SURFACE TO CAP THE BORING.



5711

Date	2-6-90			
Initial	[illegible]			
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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1497	COORDINATES N 481,315 / E 1,383,105	DATE 1-09-90	
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-09-90
ENGINEER/GEOLOGIST Trollinger	Depth	Date/Time	DATE COMPLETED 1-09-90
DRILLING METHODS Mobile 80			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1	15407 0835 1-09	6	6	FIRM, BROWN (7.5YR 3/2) CLAYEY SILT, ORGANIC-ROOTS, GRASS TOP 6 in, LOW PLASTICITY, MOIST	ML	2.0		Hnu = 0.2 ppm α = 0 cpm βγ = 40-50 cpm
	15408 0835 1-09	5	6					
	15409 0835 1-09	4	3					
2	15410 0840 1-09	6	6		ML	1.5		Hnu = 0.2 ppm α = 0 cpm βγ = 40 cpm
	15411 0840 1-09	8	6	FIRM GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF FINE TO MEDIUM SAND, LOW PLASTICITY, MOIST.	CL	2.0		
3	15412 0840 1-09	12	0	NO RECOVERY				
4	15413 0845 1-09	17	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY SAND, TRACE OF COARSE SAND (.25 in), LOW PLASTICITY, MOIST.	CL	2.0		Hnu = 0.4 ppm α = 0 cpm βγ = 40 cpm
	15414 0845 1-09	24	6					
	15415 0845 1-09	27	3					
5	15416 0850 1-09	20	6		CL	2.0		Hnu = 0.4 ppm α = 0 cpm βγ = 40 cpm
	15417 0850 1-09	22	6					
6	15418 0850 1-09	30	4					
	15419 0930 1-09	5	6		CL	2.0		Hnu = 0.2 ppm α = 0 cpm βγ = 60 cpm
15420 1-9-90 7	15419E 0930 1-09	15	2					
15421 1-9-90	15420E 0930 1-09	20	0	NO RECOVERY.				

NOTES

Drilling Contractor: Penn Drilling.

Drilling Equipment: Mobile 80

Driller: Robert Yost

Brian Strapazzon

S/N 901681

INSTRU. BKG.

Hnu = 0.2-0.6 ppm

α = 0 cpm

βγ = 40-60 cpm

MATERIALS USED:

1 BAG POLLY GROUT

25 GALS WATER, 1/2 BAG CEMENT

000698

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1497	COORDINATES:		DATE: 1-09-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-09-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-09-90
DRILLING METHODS: Mobile 80			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED (TSF)	WELL CONSTRUCTION	REMARKS
8	15422 ET 0935 1-09	30	6	FIRM, GRAYISH BROWN TO BROWN (10YR 4/2, 3/4) SILTY CLAY, TRACE OF FINE GRAVEL, ROUNDED, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0		Hmu = 0.6 ppm, α = 0 cpm, βγ = 40 cpm
	15423 ET 0935 1-09	22	6					
9	15424 ET 0935 1-09	24	6					
	15425 ET 0940 1-09	15	6		CL	2.0		Hmu = 0.6 ppm, α = 0 cpm, βγ = 40-50 cpm
10	15426 ET 0940 1-09	23	6					
	15427 14426 ET 0940 1-09	30	8					
11	15428 0955 1-09	19	6	HARD, BROWN TO GRAYISH BROWN (10YR 3/4, 5/2) SILTY CLAY, TRACE TO SOME FINE TO MEDIUM GRAVEL, ANGULAR (LIMESTONE, QUARTZITE) LOW PLASTICITY, MOIST.	CL	2.5		Hmu = 0.6 ppm, α = 0 cpm, βγ = 40 cpm
	51035 0955 1-09	15	6					
12	51036 0955 1-09	12	6					
	51037 1005 1-09	19	6		CL	2.5		Hmu = 0.6 ppm, α = 0 cpm, βγ = 40 cpm
13	51038 1005 1-09	26	4					
	51039 1005 1-09	50+	0	NO RECOVERY				
14	51040 1010 1-09	19	6	HARD, GRAY (10YR 4/1) CLAY, TRACE TO SOME GRAVEL, ROUNDED, LOW PLASTICITY, MOIST TO DAMP.	CL	3.0		Hmu = 0.6 ppm, α = 0 cpm, βγ = 40 cpm
	51041 1010 1-09	21	6					
	51042 1010 1-09	24	4					
15								

NOTES:

Drilling Contractor: Penn Drilling.

Drilling Equipment: Mobile 80

Driller: Robert Yost

Brian Stephanson

INSTRU. BKG.

Hmu = 0.4 ppm
α = 0 cpm
βγ = 40-60 cpm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1497	COORDINATES:		DATE: 1-09-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-09-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-09-90
DRILLING METHODS: Mobile 80			PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (PER 6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (ft)	WELL CONSTRUCTION	REMARKS
	51043 1020 1-09	4	6	FIRM GRAY (10YR4/1) CLAY, MEDIUM PLASTICITY, MOIST.	CL	1.5		Hnu = 0.6 ppm α = 0 cpm βγ = 60 cpm
	51044 1020 1-09	10	Ø	NO RECOVERY				
16	51045 1020 1-09	11	Ø					
	51046 1030 1-09	16	6	MEDIUM DENSE, GRAY (2.5Y4/0) POORLY GRADED SAND, TRACE OF FINE GRAVEL (.5in) ROUNDED, MOIST TO WET.	SP	N/A		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
17	51047 1030 1-09	13	6					
	51048 1030 1-09	16	4					
18	51049 1040 1-09	19	6		SP	N/A		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51050 1040 1-09	26	6	DENSE, GRAY (2.5Y 4/0) WELL GRADED GRAVEL, WET.	GW	N/A		
19	51051 1040 1-09	43	6					
	51052 1040 1-09	11	4	HARD, GRAY (10YR 5/1) SILTY CLAY TRACE OF SAND, LOW TO MEDIUM PLASTICITY.	CL	2.5		
20				BOTTOM OF BORING @ 20.0 FT SAMPLING ENDED @ 20.0 FT. P/A - VOLCLAY GROUT CAPPED W/CEMENT PLUG TO SURFACE.				

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost

Brian Stykarczyk

INSTRU. BKGD.

Hnu = 0.4 ppm

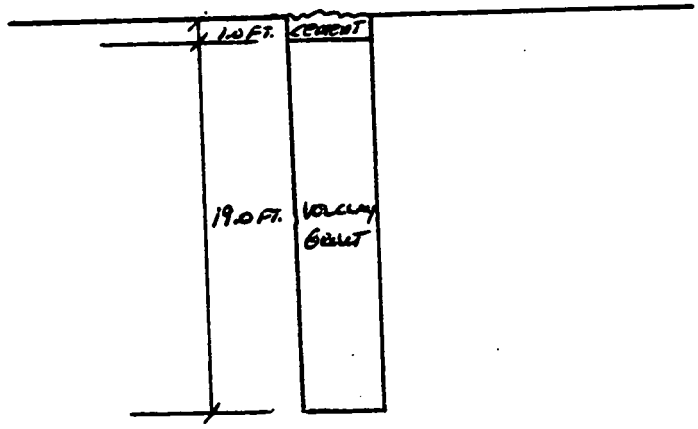
α = 0 cpm

βγ = 40-60 cpm

000700

BORING 1497 COMPLETED TO A DEPTH OF 20.0 FT. SAMPLING ENDED AT 20.0 FT. BORING BACKFILLED WITH VOLCLAY GROUT TO WITHIN 1.0 FT. OF SURFACE. A CEMENT PLUG WAS PLACED IN FROM 1.0 FT. TO SURFACE ELEVATION.

BORING 1497



5711

Date	2/6/90			
Initial	ET			
	Field Check	1st Key In	2nd Key In	Hard Copy Submittal

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1498	COORDINATES N.480,575/E.1,382,125	DATE 1-09-90	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 1-09-90	
ENGINEER/GEOLOGIST SWANSON/GARMAN	Depth / Date/Time	DATE COMPLETED 1-09-90	
DRILLING METHODS 8" HSA		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED BACKGROUND (cpm)	WELL CONSTRUCTION	REMARKS
	15429 1242 1-9-90	4	6	FIRM (10YR, 4/3) BROWN SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		Hnu = 0 α = 0 βγ = 120 cpm
2	15430 1242 1-9-90	6	6					
1	15431 1242 1-9-90	6	6					
	15432 1242 1-9-90	7	3	FIRM (10YR, 5/2) GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5		Hnu = α = βγ = 140 cpm
2	15433 1246 1-9-90	7	0	NO RECOVERY	NA	NA		
	15434 1246 1-9-90	7	0	NO RECOVERY	NA	NA		
3	15435 1250 1-9-90	13	6	VERY HARD (10YR, 5/2) GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	>4.0		Hnu = 0 α = 0 βγ = 140 cpm
	15436 1250 1-9-90	23	6					
4	15437 1250 1-9-90	23	0	NO RECOVERY	N/A	NA		
	15438 1304 1-9-90	5	6	~~2.5~~ AL 1-9-90 FIRM (2.5Y, 6/4) LIGHT YELLOWISH BROWN SILTY CLAY. TRACE OF GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		Hnu = 4 α = 0 βγ = 140 cpm
5	15439 1304 1-9-90	7	6					
	15440 1304 1-9-90	8	0	NO RECOVERY	NA	NA		
6	15441 1306 1-9-90	8	6	FIRM (2.5Y, 6/4) LIGHT YELLOWISH BROWN SILTY CLAY. TRACE OF GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		Hnu = 3. α = 0 βγ = 140 cpm
	15442 1306 1-9-90	10	6					
7	15443 1306 1-9-90	10	4					

NOTES

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBILE 53

Driller: JIM SACCANI

CHRIS COULTER

BKG. READINGS

Hnu = 0-4 cpm

ALPHA (α) = 0 cpm

GAMMA-BETA (βγ) = 120 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 602CHEM. # 1498	COORDINATES:		DATE: 1-09-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-09-90
ENGINEER/GEOLOGIST: SWANSON / GARMAN	Depth	Date/Time	DATE COMPLETED: 1-09-90
DRILLING METHODS: 8" HSA			PAGE 2 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (PER 6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	15444 1310 1-9-90	21	6	FIRM (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 3 α = 0 βγ = 140 cpm
	15445 1310 1-9-90	23	6					
	15446 1310 1-9-90	12	3					
9	15447 1319 1-9-90	4	6		CL	2.0-2.5		HNU = 4 α = 0 βγ = 180 cpm
	15448 1319 1-9-90	9	6					
10	15449 1319 1-9-90	10	0	NO RECOVERY	NA	NA		
11	15450 1356 1-9-90	6	6	FIRM (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. MEDIUM PLASTICITY. TRACE OF SAND AND GRAVEL. MOIST.	CL	2.0		HNU = 3 α = 0 βγ = 180 cpm
	51055 1356 1-9-90	7	6					
12	51056 1356 1-9-90	9	6	FIRM (5Y, 5/1) GRAY SANDY CLAY. MEDIUM PLASTICITY. MOIST.	CL	1.0		
	51057 1358 1-9-90	8	6	VERY SOFT (5Y, 5/1) GRAY SANDY CLAY MEDIUM PLASTICITY. WET.	CL	<.25		HNU = 2.5 α = 0 βγ = 160 cpm
13	51058 1358 1-9-90	9	0	NO RECOVERY	NA	NA		
	51059 1358 1-9-90	12	0	NO RECOVERY	NA	NA		
14	51060 1404 1-9-90	3	6	MEDIUM DENSE (2.5Y, 5/6) LIGHT OLIVE BROWN CLAYEY SAND. WET.	SC	NA		HNU = 0 α = 0 βγ = 120 cpm
	51061 1404 1-9-90	5	6					
7	51062 1404 1-9-90	7	6	FIRM (5Y, 5/2) OLIVE GRAY SANDY CLAY. MEDIUM PLASTICITY. MOIST.	CL	1.0		

NOTES:

Drilling Contractor: PENN-DRILLING

Drilling Equipment: MOBILE 53

Driller: JIM SALCANI
CHRIS COULTER

000703

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: GEOCHEM # 1498	COORDINATES:		DATE: 1-09-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-09-90
ENGINEER/GEOLOGIST: SWANSON/GARMAN	Depth	Date/Time	DATE COMPLETED: 1-09-90
DRILLING METHODS: 8" HSA			PAGE 3 OF 3

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15	51063 1412 1-09-90	MG' 48	6	FIRM (5Y, 5/2) OLIVE GRAY SILTY CLAY. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5		Hnu = 0 α = 0 βγ = 120 cpm
	51064 1412 1-9-90	MG' 4 13	5	↓				
16	51065 1412 1-9-90	MG' 6 10	0	NO RECOVERY.	NA	NA		
	51066 1416 1-9-90	12	6	FIRM (5Y, 5/2) OLIVE GRAY SILTY CLAY. TRACE OF SAND. MEDIUM PLASTICITY SLIGHTLY MOIST.	CL	1.5		Hnu = 0 α = 0 βγ = 160 cpm
17	51067 1416 1-9-90	13	6	↓				
	51068 1416 1-9-90	14	0	NO RECOVERY	NA	NA		
18	51069 1442 1-9-90	14	6	FIRM (5Y, 5/2) OLIVE GRAY SILTY CLAY. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.0		Hnu = 0 α = 0 βγ = 140 cpm
	51070 1442 1-9-90	14	6					
19	51071 1442 1-9-90	16	6					
	51072 1442 1-9-90	17	6					
20				BOTTOM OF BORING P/A GROUTED TO 1.5 FT. OF SURFACE. BENTONITE PELLETS ADDED TO 0.5 FT. OF SURFACE. CEMENT PLUG FROM 0.5 FT TO 0.0 FT. 2 BAGS GROUT 50 GALS. H_2O				

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBILE 53

Driller: JIM SACCANI
CHRIS COULTER

FERNALD RI/FS

	Initial	Date
		5/6/9
Field Check	1st Keyin	2nd Keyin

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1499	COORDINATES: N.480,875/E.1,382,130	DATE: 1-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-10-90	
ENGINEER/GEOLOGIST: SWANSON/GARMAN	Depth Date/Time	DATE COMPLETED: 1-10-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6-inches	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	15451 1-10 1256	2	6	LOOSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. SLIGHTLY MOIST.	ML	NA	Hnu = 0 α = 0 γB = 800 cpm
1.0	15452 1-10 1256	2	6	↓			
1.5	15453 1-10 1256	4	6	LOOSE (2.5Y, 5/2) GRAYISH BROWN CLAYEY SILT. TRACE OF SAND AND GRAVEL. SLIGHTLY MOIST.	ML	N/A	
2.0	15454 1-10 1256	6	3	↓		N/A	Hnu = 0 α = 0 γB = 800 cpm.
2.5	15455 1-10 1258	6	0	NO RECOVERY	NA	NA	
3.0	15456 1-10 1258	12	0	NO RECOVERY	NA	NA	
3.5	15457 1-10 1301	10	6	FIRM (2.5Y, 5/2) GRAYISH BROWN CLAYEY SILT. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0	Hnu = 0 α = 0 γB = 700 cpm
4.0	15458 1-10 1301	14	2	↓			
4.5	15459 1-10 1301	16	0	NO RECOVERY	NA	NA	
5.0	15460 1-10 1305	14	6	HARD (2.5Y, 3/2) DARK GRAYISH BROWN SILTY CLAY. TRACE OF SAND LOW PLASTICITY. SLIGHTLY MOIST.	CL	3.0	Hnu = 0 α = 0 γB = 800 cpm
5.5	15461 1-10 1305	11	5	↓			
6.0	15462 1-10 1305	13	0	NO RECOVERY	NA	NA	
6.5	15463 1-10 1315	4	6	FIRM (2.5Y, 3/2) DARK GRAYISH BROWN SILTY CLAY, LOW PLASTICITY. SLIGHTLY MOIST.	CL	1.5	Hnu = 0 α = 0 γB = 800 cpm.
7.0	15464 1-10 1315	6	6	↓			
7.5	15465 1-10 1315	9	2	FIRM (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. MEDIUM PLASTICITY MOIST. PIECE OF RED BRICK HERE.	CL	2.0	

NOTES: Contractor : Pennsylvania Drilling
Driller : J. SACCANI
Driller's Assistant: C. COULTER
All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

Background Readings:
Hnu = 0 ppm.
Alpha (α) = 0 dpm
Gamma - Beta = 800-1000 dpm

000705

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1499	COORDINATES:	DATE: 1-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-10-90	
ENGINEER/GEOLOGIST: SWANSON/GARMAN	Depth Date/Time	DATE COMPLETED: 1-10-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	15466 1-10 1318	5	6	FIRM (2.5Y, 4/4) OLIVE BROWN ~~CLAY~~ SILTY CLAY. HIGH PLASTICITY. VERY MOIST. MG. 1-10-90	CL	1.5	Hnu = 0 α = 0 ⁵⁹β = 800 cpm
8.5	15467 1-10 1318	5	4	↓			
9.0	15468 1-10 1318	9	0	NO RECOVERY.	NA	NA	
9.5	15469 1-10 1354	5	6	FIRM (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY. MEDIUM PLASTICITY. VERY MOIST.	CL	1.5	Hnu = 0 α = 0 ⁵⁹β = 800 cpm
10.0	15470 1-10 1354	6	5	↓			
10.5	15471 1-10 1354	5	0	NO RECOVERY	NA	NA	
11.0	15472 1-10 1317	3	6	HARD (2.5Y, 6/6) YELLOWISH BROWN SILTY CLAY. TRACE OF PEBBLES. MEDIUM PLASTICITY. MOIST	CL	2.5	Hnu = 0 α = 0 ⁵⁹β = 800 cpm
11.5	51075 1-10 1317	5	6	↓			
12.0	51076 1-10 1317	7	0	NO RECOVERY	NA	NA	
12.5	51077 1-10 1520	7	0	NO RECOVERY	NA	NA	Hnu = NA α = NA ⁵⁹β = NA
13.0	51078 1-10 1520	9	0	NO RECOVERY	NA	NA	
13.5	51079 1-10 1520	6	0	NO RECOVERY	NA	NA	
14.0	51080 1-10 1524	17	6	HARD (2.5Y, 6/6) YELLOWISH BROWN SILTY CLAY. TRACE OF COARSE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	3.0	Hnu = 0 α = 0 ⁵⁹β = 800 cpm
14.5	51081 1-10 1524	13	6	VERY HARD (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. TRACE OF GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	>4.0	
15.0	51082 1-10 1524	19	6	↓			

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1499	COORDINATES:	DATE: 1-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-10-90	
ENGINEER/GEOLOGIST: SWANSON/GARMAN	Depth Date/Time	DATE COMPLETED: 1-10-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	51083 1-10 1532	7	6	VERY HARD (10YR, 5/2) GRAYISH BROWN SILTY CLAY. TRACE OF SAND. MEDIUM PLASTICITY. MOIST. ↓	CL	74.0	Hum = 0 α = 0 βB = 800 cpm
16.0	51084 1-10 1532	12	3				
16.5	51085 1-10 1532	12	0	NO RECOVERY	NA	~~<.25~~ NA	1-10-91
17.0	51086 1-10 1536	12	6	VERY SOFT (10YR, 5/2) GRAYISH BROWN SANDY CLAY. LOW PLASTICITY. WET.	CL	<.25	Hum = 0 α = 0 βB = 800 cpm
17.5	51087 1-10 1536	13	2	FIRM (2.5Y, 6/0) LIGHT GRAY CLAY. MEDIUM PLASTICITY. MOIST.	CL.	.15	
18.0	51088 1-10 1536	17	0	NO RECOVERY	NA	NA	
18.5	51089 1-10 1545	17	6	FIRM (5Y, 5/1) GRAY CLAY. TRACE OF GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST. ↓	CL	1.5	Hum = 0 α = 0 βB = 800 cpm
19.0	51090 1-10 1545	25	6				
19.5	51091 1-10 1545	32	6				
20	51092 1-10 1545	27	6				Hum = 0 α = 0 βB = 800 cpm
				BOTTOM OF BORING @ 20.0 FT. P/A - VOLCLAY GROUT CAPPED W/CEMENT PLUG TO SURFACE.			

NOTES:
2 BAGS GROUT
50 GALLONS H_2O

SEE PAGE 1

5711

Date	7-6-90			
Initial	MJM			
	Field Check	1st Key In	2nd Key In	Field Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1500	COORDINATES N.483,000/E.1,379,000	DATE 1-10-90	
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-10-90
ENGINEER/GEOLOGIST E. Troilinger	Depth	Date/Time	DATE COMPLETED 1-10-90
DRILLING METHODS Mobile 80 8 in HSA			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	WELL CONSTRUCTION	REMARKS
1	15473 0945 1-10	3	6	TOPSOIL COMPOSED MAINLY OF DARK BROWN, SOFT TO FIRM (10YR 3/1) TO (7.5YR 3/2) CLAYEY SILT, ROOTLETS AND COMPOST MATERIAL, MOIST.	ML	1.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	15474 0945 1-10	6	6					
	15475 0945 1-10	9	2					
2	15476 0950 1-10	7	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	15477 0950 1-10	10	Ø	NO RECOVERY				
3	15478 0950 1-10	16	Ø					
4	15479 0955 1-10	11	6	FIRM, GRAYISH BROWN (10YR 4/3) SILTY CLAY, TRACE OF FINE GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0		Hnu = 0.6 ppm α = 0 cpm βγ = 40-50 cpm
	15480 0955 1-10	17	6					
	15481 0955 1-10	15	2					
5	15482 1000 1-10	12	6		CL	2.0		Hnu = 0.2 ppm α = 0 cpm βγ = 40-60 cpm
	15483 1000 1-10	14	6					
6	15484 1000 1-10	14	3					
	15485 1010 1-10	8	6		CL	2.0		Hnu = 0.2 ppm α = 0 cpm βγ = 60 cpm
7	15486 1010 1-10	10	6					
	15487 1010 1-10	10	4					

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost
Brian Stradarzon

MATERIALS USED FOR COMPLETION:
1 BAG VOLCLAY GROUT
1/2 BAG CEMENT, 20 GALS WATER.

INSTRUMENT BACKGROUND

Hnu = 0.2-0.6 ppm
α = 0 cpm
βγ = 40-80 cpm

000708

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1500	COORDINATES:		DATE: 1-10-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-10-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-10-90
DRILLING METHODS: Mobile 80			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (/6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER LEVEL	WELL CONSTRUCTION	REMARKS
8	15488 1015 1-10	14	6	HARD, LIGHT GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF GRAVEL (ANGULAR), LOW PLASTICITY, MOIST. GRAVEL (.5-1.5 in)	CL	2.5		Hnu = 0.4 ppm α = 0 cpm βγ = 40 cpm
	15489 1015 1-10	15	6					
9	15490 1015 1-10	15	6					
	15491 1020 1-10	13	6		CL	2.5		Hnu = 0.4 ppm α = 0 cpm βγ = 40-50 cpm
10	15492 1020 1-10	21	6					
	15493 1020 1-10	29	6	HARD, GRAY (10YR 4/1) CLAY, TRACE OF FINE TO MEDIUM GRAVEL (.5-1.5 in), ROUNDED, LOW PLASTICITY, MOIST.	CL	3.5		
11	15494 1400 1-10	9	6		CL	3.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40 cpm
	51095 1400 1-10	18	3					
12	51096 1400 1-10	14	0	NO RECOVERY				
	51097 1410 1-10	26	6	HARD, GRAY (10YR 5/1) GRAVELLY CLAY (.5-1.0 in gravel) - ROUNDED, TRACE OF SILT, LOW PLASTICITY, MOIST.	CL	3.5		Hnu = 0.2 ppm α = 0 cpm βγ = 40 cpm
13	51098 1410 1-10	35	6					
	51099 1410 1-10	38	6					
14	51100 1415 1-10	25	6		CL	3.5		Hnu = 0.4 ppm α = 0 cpm βγ = 40 cpm
	51101 1415 1-10	24	6					
	51102 1415 1-10	23	6					
15								

NOTES.

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost
Brian Sheppherson

INSTRU. BKG.
Hnu = 0.4-0.6 ppm
α = 0 cpm
βγ = 40-60 cpm

000709

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1500	COORDINATES:		DATE: 1-10-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-10-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-10-90
DRILLING METHODS: Mobile 80			PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED DENSITY (g/cc)	WELL CONSTRUCTION	REMARKS
	51103 1435 1-10	4	5	HARD, GRAY (10YR 4/2) CLAY, TRACE OF GRAVEL (.5-1.0 in), LOW PLASTICITY, MOIST.	CL	2.5		Hnu = 0.6 ppm α = 0 cpm βγ = 40-60 cpm
	51104 1435 1-10	8	0	NO RECOVERY				
16	51105 1435 1-10	11	0					
	51106 1440 1-10	19	6	HARD, GRAY (10YR 4/3) CLAY, TRACE OF FINE TO MEDIUM GRAVEL (.5-1.5 in), LOW PLASTICITY, MOIST.	CL	3.5		Hnu = 0.6 ppm α = 0.0 cpm βγ = 40-60 cpm
17	51107 1440 1-10	37	6					
	51108 1440 1-10	39	5					
18	51109 1450 1-10	24	6					Hnu = 0.0 ppm-0.2 ppm α = 0 cpm βγ = 40-60 cpm
	51110 1450 1-10	29	6		CL	3.0		
19	51111 1450 1-10	33	6					
	51112 1450 1-10	50	4					
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT. P/A WITH VOLCLAY GROUT 1.0 FT. TO 20.0 FT. CEMENT PLUG 1.0 FT. TO SURFACE.				

NOTES.

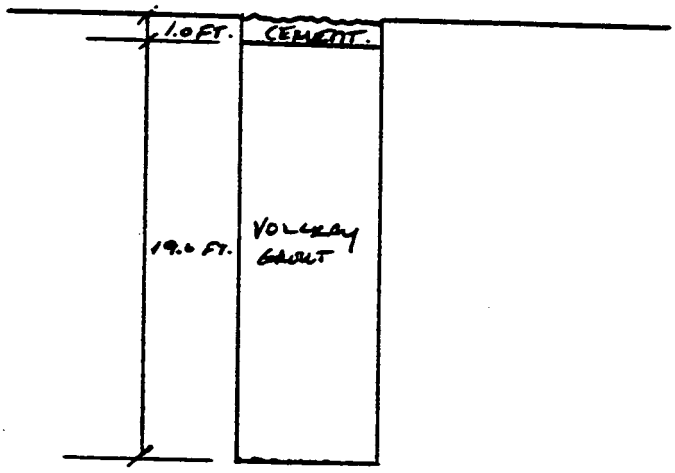
Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Robert Yost
Brian Strohmeyer

INSTRU. BKG.
Hnu = 0.2-0.4 ppm
α = 0 cpm
βγ = 40-80 cpm

BORING 1500 WAS COMPLETED ON 1-10-90 TO A TOTAL DEPTH OF 20.0 FT. SAMPLING ENDED AT 20.0 FT. BORING WAS PLUGGED USING VOLCLAY GROUT TO WITHIN 1.0 FT. OF SURFACE AND CAPPED WITH A 1.0 FT. CEMOTT ~~PLAG~~ PLUG.
1-10-90



Date	2-7-90			
Initial	EWJ			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1501	COORDINATES: N. 482,775 / E. 1,378,000	DATE: 1-11-90	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 1-11-90	
ENGINEER/GEOLOGIST: E. Trollinger	Depth / Date/Time	DATE COMPLETED: 1-16-90	
DRILLING METHODS: Mobile 80		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	DIMENSION SAMPLER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL INSTALLATION	REMARKS
1	15495 0920 1-11	6	6	FIRM, DARK BROWN (7.5YR 3/2) SILT, TRACE OF CLAY, ROOTS & GRASS TOP 6in, SLIGHTLY COHESIVE, MOIST.	ML	1.5		Hnu = 0.0 ppm; α = 0 cpm; βγ = 40 cpm
	15496 0920 1-11	6	6					
	15497 0920 1-11	5	4					
2	15498 0925 1-11	4	6	FIRM, GRAYISH BROWN (10YR 4/2) SILTY CLAY, TRACE OF COARSE SAND (.25in) ROUNDED, LOW PLASTICITY MOIST.	CL	2.0		Hnu = 0.2 ppm; α = 0 cpm; βγ = 60 cpm
	15499 0925 1-11	11	6					
3	15500 0925 1-11	13	0	NO RECOVERY				
4	15501 0928 1-11	12	6	FIRM, GRAYISH BROWN (10YR 4/3) CLAYEY SILT, TRACE OF GRAVEL (.5in), LOW PLASTICITY, DAMP.	ML	2.0		Hnu = 0.2 ppm; α = 0 cpm; βγ = 40-60 cpm
	15502 0928 1-11	17	6					
	15503 0928 1-11	12	3	MEDIUM DENSE, BROWN (10YR 4/2) SILTY SAND, TRACE OF GRAVEL (.5-1.0in), DRY TO DAMP. (Rounded)	SM	N/A		
5	15504 0935 1-11	22	6	↓	SM	N/A		Hnu = 0.2 ppm; α = 0 cpm; βγ = 40-50 cpm
	15505 0935 1-11	24	6					
6	15506 0935 1-11	16	0	NO RECOVERY				
7	15507 0945 1-11	15	6	HARD, GRAYISH BROWN (10YR 4/3) SILTY CLAY WITH FINE GRAVEL, LOW PLASTICITY, MOIST.	CL	3.5		Hnu = 0.2 ppm; α = 0 cpm; βγ = 40-60 cpm
	15508 0945 1-11	22	6					
	15509 0945 1-11	25	5	↓				

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Rob Yost

Brian Stephanzon

MATERIALS USED FOR COMPLETION:
1 BAG VOLCLAY GROUT
1/2 BAG CEMENT, 20 GALS. WATER.

INSTRUMENT BACKGROUND
Hnu = 0.2-0.4 ppm
α = 0 cpm
βγ = 40-60 cpm

000712

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1501	COORDINATES:		DATE: 1-11-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-11-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-16-90
DRILLING METHODS: Mobile 80			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED GRAVITY (pcf)	WELL CONSTRUCTION	REMARKS
8	15510 0950 1-11	19	6	VERY DENSE, INORGANIC SILT AND VERY FINE SAND, TRACE OF GRAVEL (.5-1.0 in) ROUNDED, DRY TO DAMP.	ML	N/A		Hnu = 0.2 ppm, α = 0 cpm, βγ = 40-50 cpm
	15511 0950 1-11	23	6					
9	15512 0950 1-11	30	3					
	15513 1000 1-11	17	6	HARD, GRAYISH BROWN (10YR 5/2) SILTY CLAY, TRACE OF FINE GRAVEL (.5-.75 in), LOW PLASTICITY, DAMP TO MOIST.	CL	3.5		Hnu = 0.2 ppm, α = 0 cpm, βγ = 60 cpm
10	15514 1000 1-11	28	6					
	15515 1000 1-11	23	6					
11	15516 1015 1-11	8	6		CL	3.5		Hnu = 0.2 ppm, α = 0 cpm, βγ = 40 cpm
	51115 1015 1-11	10	6					
12	51116 1015 1-11	16	0	NO RECOVERY				
	51117 1025 1-11	22	6	HARD, GRAY (10YR 5/1) CLAY, TRACE OF GRAVEL (.5-1.5 in), ROUNDED AND ANGULAR, LOW TO MEDIUM PLASTICITY, MOIST.	CL	3.5		Hnu = 0.2 ppm, α = 0 cpm, βγ = 40 cpm
13	51118 1025 1-11	20	6					
	51119 1025 1-11	23	6					
14	51120 1035 1-11	23	6		CL	2.5		Hnu = 0.2 ppm, α = 0 cpm, βγ = 40 cpm
	51121 1035 1-11	20	6					
15	51122 1035 1-11	17	6					

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile 80

Driller: Rick Yost, Brian Sampatten

INSTRUMENT BACKGROUND

Hnu = 0.0-0.4 ppm
α = 0 cpm
βγ = 40-60 cpm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.5	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1501	COORDINATES:		DATE: 1-11-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-11-90
ENGINEER/GEOLOGIST: E. Trollinger	Depth	Date/Time	DATE COMPLETED: 1-16-90
DRILLING METHODS: Mobile B80			PAGE 3 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (/6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	51123 1055 1-11	4	6	FIRM, GRAY (10YR 5/1) CLAY, TRACE OF MEDIUM SAND AND FINE GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST.	CL	2.0		Hnu = 0.2 ppm α = 0 cpm βγ = 40 cpm
	51124 1055 1-11	7	0	NO RECOVERY				
16	51125 1055 1-11	3	0					
	51126 1100 1-11	23	6	MEDIUM DENSE, GRAY (10YR 4/1) POORLY GRADED SAND, TRACE OF GRAVEL (.5-1.0 in), ROUNDED, WET.	SP	N/A		Hnu = 0.2 ppm α = 0 cpm βγ = 40 cpm
17	51127 1100 1-11	17	6					
	51128 1100 1-11	20	6	HARD, GRAY, (10YR 4/1) SILTY CLAY, TRACE OF FINE GRAVEL; LOW-PLASTICITY, MOIST.	CL	3.0		
18	51129 1105 1-11	33	6	↓				Hnu = 0.2 ppm α = 0 cpm βγ = 40 cpm
	51130 1105 1-11	37	6		CL	3.0		
19	51131 1105 1-11	35	4					
	51132 1105 1-11	32	0	NO RECOVERY				
20								
				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT. P/A NOCLAY GROUT CAPPED W/ CEMENT PLUG.				

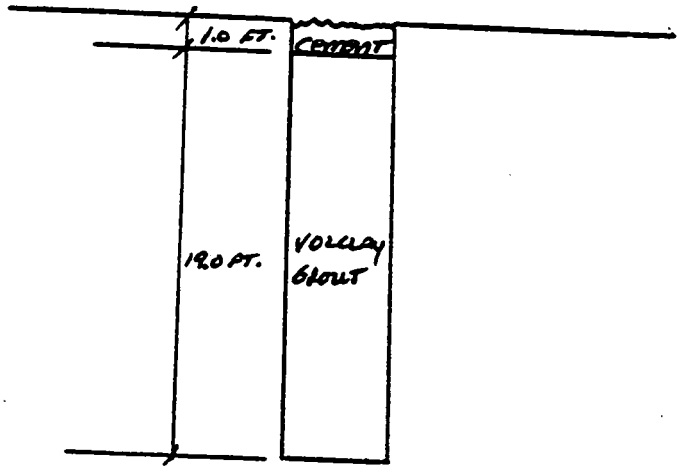
NOTES

Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B80
Driller: Rob. Yost
Brian Straphazan

INSTRUMENT BACKGROUND
Hnu = 0.2-0.4 ppm
α = 0 cpm
βγ = 40-60 cpm

000714

BORING 1501 WAS COMPLETED ON 1-16-90. DRILLING AND SAMPLING WAS COMPLETED ON 1-11-90 TO A DEPTH OF 20.0 FT. BORING 1501 WAS PLUGGED ON 1-16-90 WITH VOLCLAY GROUT TO A DEPTH OF 1.0 FT. FROM SURFACE. A CEMENT PLUG WAS USED TO CAP THE BORING TO SURFACE.



FERNALD RI/FS

GEOCHEMICAL BORING

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1502	COORDINATES	DATE 7-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/10/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 7/10/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	00728 7-10-90 1355	6	6	Loose 10yr 5/1 gray clayey silt, some gravel	ML	NA	Hnu = 20 ppm, α = 0 cpm, βγ = 600 cpm
	00729 7-10-90 1355	4	0	NR			
	00730 7-10-90 1355	5	0	NR			
2	00731 7-10-90 1400	8	6	SAA (↑), except some organic matl.	ML	NA	Hnu = .5 ppm, α = 0 cpm, βγ = 600 cpm
	00732 7-10-90 1400	8	2	SAA	ML	NA	
3	00733 7-10-90 1400	7	0	NR			
4	00734 7-10-90 1404	10	6	Loose 10yr 4/1 dark gray clayey silt, trace gravel, organic matter	ML	NA	Hnu = 0, α = 0, βγ = 600 cpm
	00735 7-10-90 1404	13	4	SAA	ML	NA	
	00736 7-10-90 1404	15	0	NR			
5	00737 7-10-90 1406	12	6	medium dense 10yr 5/1 gray clayey silt	ML	NA	Hnu = 0, α = 0, βγ = 500 cpm
	00738 7-10-90 1406	10	6	SAA	ML	NA	
6	00739 7-10-90 1406	11	0	NR			
7	00740 7-10-90 1427	4	6	SAA	ML	NA	Hnu = 0, α = 0, βγ = 500 cpm
	00741 7-10-90 1427	5	4	very stiff 10yr 5/6 yellowish brown silty clay	CL	2.0	
	00742 7-10-90 1427	6	0	NR			

NOTES: CONTRACTOR: DENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: B221
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 1 ppm
α: 0 cpm
βγ: 1400-1500 cpm

* (BACKGROUND LEVELS TAKEN ON PLASTIC SURFACE UPON WHICH SAMPLE SPOONS WILL LIE)

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1502	COORDINATES	DATE 7-10-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/10/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 7/10/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	00743 7-10-90 1432	7	6	loose 10yr 5/1 gray gravelly clayey silt, moist.	ML	NA	Hnu = 0
	00744 7-10-90 1432	8	6	SAA	ML	NA	α = 0
9	00745 7-10-90 1432	9	5	very stiff 10yr 5/6 yellowish brown silty clay	CL ~~ML~~	2.5	βγ = 600 cpm
	00746 7-10-90 1438	7	6	stiff 10yr 6/6 brownish yellow silty clay, slightly wet	CL	1.75	Hnu = 0
10	00747 7-10-90 1438	9	0	NR			α = 0
	00748 7-10-90 1438	7	0	NR			βγ = 200 cpm
11	00749 7-10-90 1546	4	6	stiff 2.5Y 5/2 grayish brown silty clay, slightly moist	CL	1.5	Hnu = 0
	00750 7-10-90 1546	4	6	SAA	CL	1.5	α = 0
12	00751 7-10-90 1546	4	6	very stiff 10yr 6/8 brownish yellow silty clay, moist, trace sand	CL	2.5	βγ = 600 cpm
	00752 7-10-90 1552	5	6	SAA	CL	2.5	Hnu = 0
13	00753 7-10-90 1552	9	6	medium dense 10yr 6/8 brownish yellow sand, poorly graded, wet	SP	NA	α = 0
	00754 7-10-90 1552	7	0	NR			βγ = 600 cpm
14	00755 7-10-90 1555	5	6	SAA	SP	NA	Hnu = 0
	00756 7-10-90 1555	7	6	SAA	SP	NA	α = 0
	00757 7-10-90 1555	4	6	medium dense 10yr 6/8 brownish yellow silt, some clay, some sand	ML	NA	βγ = 550 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: B 221
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 1 ppm
α: 0 cpm
βγ: 1400 cpm

SEE * ON PAGE 1 OF 3

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1502	COORDINATES.	DATE 7-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/10/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED: 7/10/90	
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	00758 7-10-90 1600	3	6	Loose 10yr 6/8 brownish yellow sand poorly graded, some silt, trace gravel wet	SP	NA	Hnu = 0 ∝ = 0 βγ = 400 cpm
	00759 7-10-90 1600	3	6	SAA	SP		
16	00760 7-10-90 1600	7	6	loose 10yr 5/1 gray silt, some sand and gravel, some clay, moist	ML		
	00761 7-10-90 1605	10	6	medium dense 10yr 6/8 brownish yellow sand, some silt; graded somewhat, wet	SP	NA	Hnu = 0 ∝ = 0 βγ = 500 cpm
17	00762 7-10-90 1605	11	6	SAA	SP		
	00763 7-10-90 1605	9	6	med. dense 10yr 5/1 gray sandy silt, trace clay, wet	ML		
18	00764 7-10-90 1612	5	6	med dense 10yr 6/8 brownish yellow sand, some silt; graded slightly, wet	SP	NA	Hnu = 0 ∝ = 0 βγ = 400 cpm
	00765 7-10-90 1612	6	6	SAA	SP		
19	00766 7-10-90 1612	7	4	very soft ~~medium dense~~ 10yr 5/1 gray sandy silty clay, trace gravel	CL	25	
	00808 7-10-90 1612	0 0	0	NR		JCM 7-10-90	Hnu = ∝ = βγ =
20				BORING/SAMPLING STOPPED @ 20 FEET - CONCRETED AFTER FILLING WITH BENTONITE			
				* NO PIEZOMETER SET FOR GEOCHEM. ET 7-15-90 LOCATIONS, ONLY SAMPLING OF SOIL.			Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 1 ppm
∝: 0 cpm
βγ: 1400 cpm

Hnu: B 221
∝: ASI #6
βγ: ASI #11

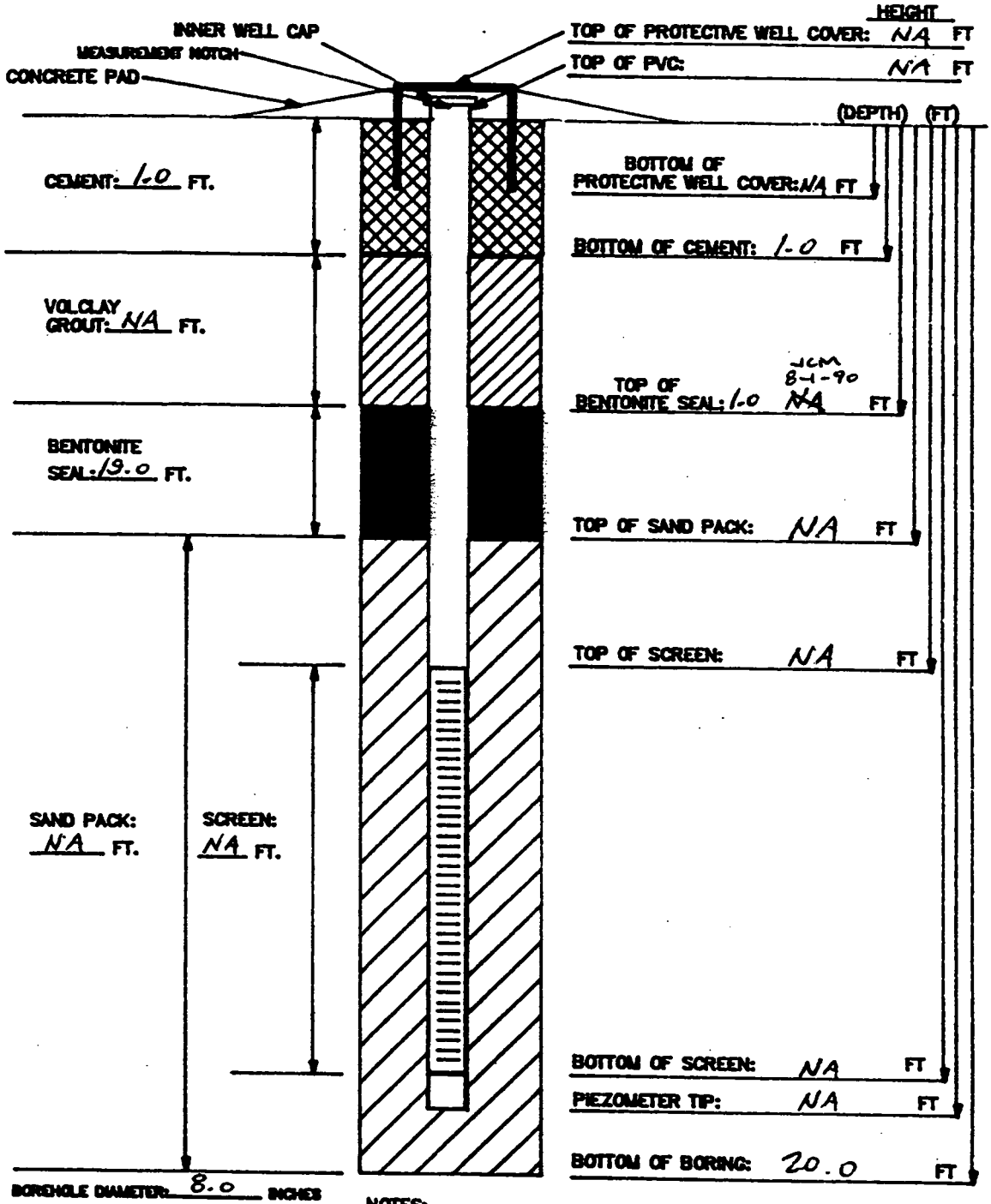
000718

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1502

PLUGGING INSTALLATION DATE: 7-11-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GAL
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

5711 5/5

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME EMPC RI/FS
FIELD ENG./GEO. J MASON DATE 7-11-90
PROJECT NO. 60Z 3.7
CHECKED BY E.T. DATE 7-31-90
BORING NO. 1502
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 7-11-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA
NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 20.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRY HOLE - PLUGGED ON 7-11-90 WITH BENTONITE AND CAPPED WITH CEMENT.

FERNALD RI/FS

GEOCHEM BORING
VISUAL CLASSIFICATION OF SOILS

Date	7/28/90			
Initial	E.T.			

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1503	COORDINATES	DATE 7-1-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/1/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 7/1/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	00688 9-1-90 1115	6	3	medium stiff 10yr 5/6 yellowish brown to brown gravelly clay	CL	1.0	Hnu = 0
	00689 7-1-90 1115	11	0	NR			α = 40 cpm
	00690 7-1-90 1115	8	0	NR			βγ = 250 cpm
2	00691 7-1-90 1120	6	4	SAA	CL	1.0	Hnu = 4 ppm
	00692 7-1-90 1120	5	0	NR			α = 40 cpm
3	00693 7-1-90 1120	7	0	NR			βγ = 200 cpm
	00694 7-1-90 1123	5	6	stiff 10yr 5/6 yellowish brown gravelly silty clay, slightly moist	CL	1.5	Hnu = 0
4	00695 7-1-90 1123	4					α = 100 cpm
	00696 7-1-90 1123	6					βγ = 250 cpm
5	00697 7-1-90 1125	5	6	loose 10yr 5/6 yellowish brown to brown sandy silty gravel NR-1, poorly graded sand & gravel	GM	NA	Hnu = 4
	00698 7-1-90 1125	2	0	NR			α = 40-60 cpm
6	00699 7-1-90 1125	4	0	NR			βγ = 250 cpm
	00700 7-1-90 1144	3	6	SAA	GM	NA	Hnu = 0
7	00701 7-1-90 1144	3	2	SAA	GM	NA	α = 0
	00702 7-1-90 1144	2		NR			βγ = 150

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: B 221
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 4.5 ppm
(READINGS IN SPOON EXAMINATION AREA) α: 0
βγ: 250 cpm

402-11-86

FERNALD RI/FS

Date			
Initial			
	Field Check	1st Key In	2nd Key In	3rd Key Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1503	COORDINATES	DATE 7-1-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/1/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 7/1/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	00703 7-1-90 1147	2	0	NR			Hnu = 4 ppm
	00704 7-1-90 1147	1	0	NR			α = 0
	00705 7-1-90 1147	1	0	NR			βγ = 200 cpm
9	00706 7-1-90 1150	2	6	very loose 10yr 4/3 brown medium graded gravel w poorly graded sand, some silt; wet	GM	NA	Hnu = 4 ppm
	00707 7-1-90 1150	1	2	SAA	GM	NA	α = 0 cpm
10	00708 7-1-90 1150	1	0	NR			βγ = 400 cpm
11	00709 7-1-90 1200	2	6	medium dense 10yr 5/6 yellowish brown well graded sandy silty gravel, wet	GM	NA	Hnu = 0 ppm
	00710 7-1-90 1200	7	3	medium dense 10yr 5/6 yellowish brown poorly graded silty sand, wet	SP	NA	α = 0 cpm
	00711 7-1-90 1200	8	0	NR			βγ = 200 cpm
12	00712 7-1-90 1207	12	6	10yr 5/6 yellowish brown (DENSE) poorly graded sand, some gravel, some silt, wet	SP	NA	Hnu = 4 ppm
	00713 7-1-90 1207	21	6	SAA			α = 0
13	00714 7-1-90 1207	25	6	SAA			βγ = 250 cpm
14	00715 7-1-90 1212	21	6	dense 10yr 5/6 yellowish brown gravelly sand (poorly graded), wet	SP	NA	Hnu = 4 ppm
	00716 7-1-90 1212	23	6	SAA			α = 0 cpm
	00717 7-1-90 1212	23	6	dense 10yr 5/6 yellowish brown gravelly sandy silt, wet	ML	NA	βγ = 200 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAFAZZIN

Hnu: B 221
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 4 ppm
α: 0 cpm
βγ: 400 cpm

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1503	COORDINATES	DATE 7-1-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/1/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED: 7/1/90
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	00718 7-1-90 1230	5	6	medium dense 10yr 4/3 brown to 10yr 5/6 yellowish brown poorly graded sand, some silt, wet	SP	NA	Hnu = 4 ∝ = 0 βγ = 200 cpm
	00719 7-1-90 1230	6	2	SAA			
16	00720 7-1-90 1230	9	0	NR			
	00730 7-1-90 1240	12	6	SAA except trace silt, some gravel	SP		Hnu = 4 ∝ = 0 βγ = 200 cpm
17	00731 7-1-90 1240	24	6	SAA except trace of silt, some gravel	SP		
	00732 7-1-90 1240	25	0	NR			
18	00733 7-1-90 1250	9	6	dense 10 yr 3/3 dark brown poorly graded sand; some gravel, and in some sections gravelly. Wet.	SP	NA	Hnu = 4 ppm ∝ = 0 cpm βγ = 100 cpm
	00734 7-1-90 1250	12	6	SAA			
19	00735 7-1-90 1250	18	6	SAA			
	00736 7-1-90 1250	20	6	SAA			Hnu = ∝ = βγ =
20				BORING/SAMPLING STOPPED @ 20 FT. HOLE PLUGGED WITH BENTONITE CLAY AND CAPPED WITH CEMENT.			
				~~NO WATER ENCOUNTERED~~ E.T. 7-2-90			Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB LOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: B 221
∝: ASI #6
βγ: ASI #11

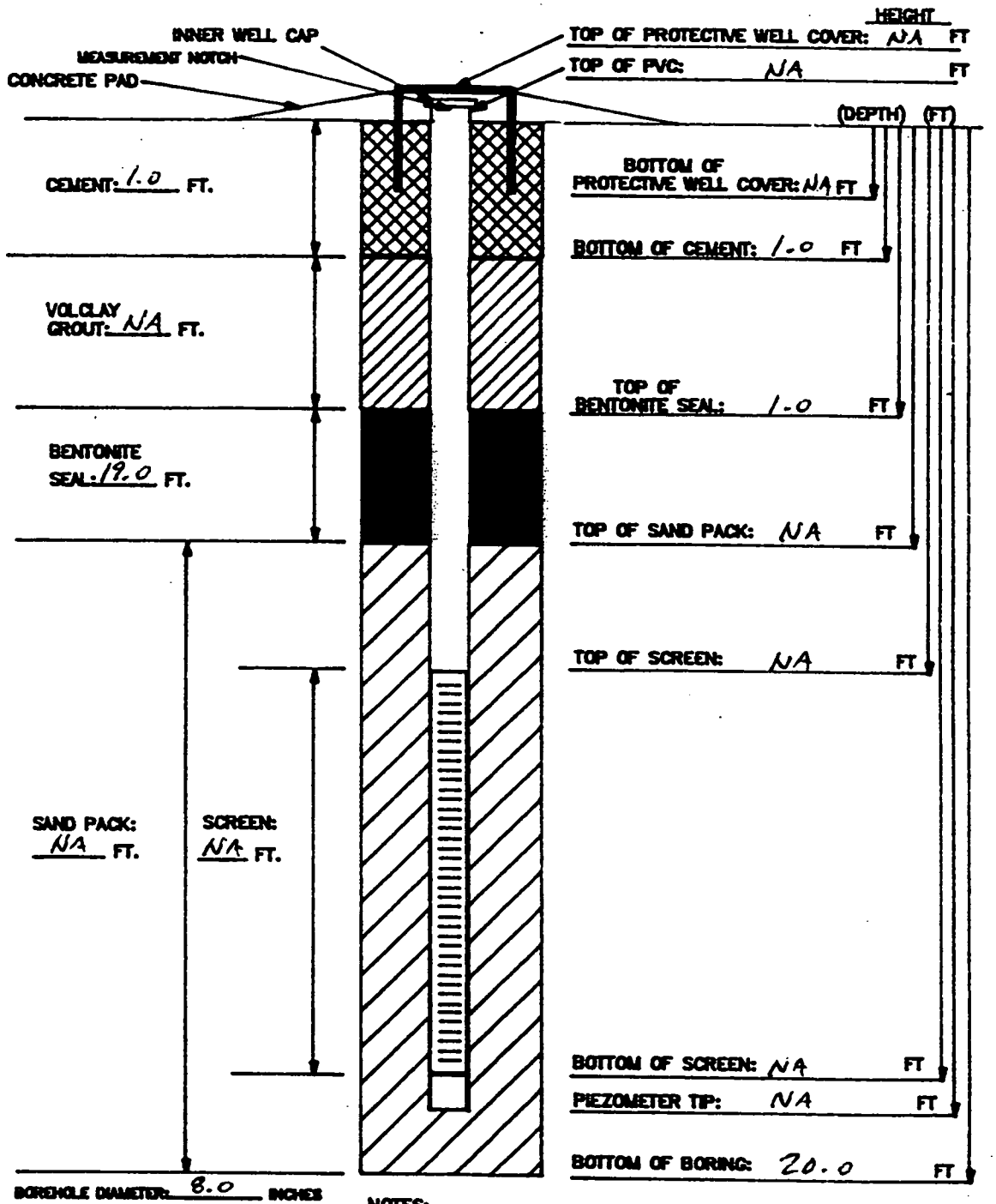
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 4 ppm
∝: 5 cpm
βγ: 300 cpm

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1503

INSTALLATION DATE: 7-2-90



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GAL
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602 3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J MASON
DATE 7-2-90
PROJECT NO. 600 3.7
CHECKED BY S.T.
DATE 7-31-90
BORING NO. 1503
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 7-2-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 20.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS DRY HOLE - HOLE PLUGGED ON 7-2-90 WITH BENTONITE AND CAPPED WITH CEMENT

FERNALD RI/FS

GEOCHEMICAL BORING

Date	9/20/90			
Initial	KZ			
	Field Check	1st Rev'n	2nd Rev'n	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1504	COORDINATES	DATE 9-13-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/12/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/12/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	00768 9-12-90 1613	4	6	medium dense 10yr 6/2 light brownish gray clayey silt, slightly moist			Hnu = 0
	00769 9-12-90 1613	5	0	NR	NA	NA	α = 100 cpm
	00770 9-12-90 1613	7	0	NA	↓	↓	βγ = 1200 cpm
2	00771 9-12-90 1616	4	6	medium dense 7/3 very pale brown clayey silt, trace gravel, slightly moist			Hnu = 0
	00772 9-12-90 1616	5	0	NR	NA	NA	α = 100 cpm
3	00773 9-12-90 1616	9	8	↓	↓	↓	βγ = 1200 cpm
	00774 9-12-90 1618	8	6	stiff 10yr 4/1 dark gray clay, medium plasticity, slightly moist	CL	1.0	Hnu = 40 ppm
4	00775 9-12-90 1618	9	0	NR	NA	NA	α = 20 cpm
	00776 9-12-90 1618	10	0	↓	↓	↓	βγ = 800 cpm
5	00777 9-12-90 1621	10	6	medium dense 2.5y 6/6 olive yellow clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 2 ppm
	00778 9-12-90 1621	10	6	medium dense 2.5y 6/2 light brownish gray clayey silt, trace gravel, slightly moist	ML	NA	α = 20 cpm
6	00779 9-12-90 1621	9	6	medium dense 10yr 4/1 dark gray clayey silt, slightly moist	ML	NA	βγ = 700 cpm
	00780 9-12-90 1624	10	6	stiff 2.5y 4/0 gray silty clay, medium plasticity, slightly moist some trace of organic material	CL	1.75	Hnu = 0
7	00781 9-12-90 1624	10	6	SAA	CL	1.5	α = 0
	00782 9-12-90 1624	13	0	NR	NA	NA	βγ = 600 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #3
βγ: ASI #8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 1000 cpm

000726

402-11-66

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1504	COORDINATES.	DATE 9 - 13 - 90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/12/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/12/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	00783 9-12-90 1628	7	6	medium dense 2.5y 6/4 light yellowish brown clayey silt, trace sand, slightly moist, some 10yr 5/1 gray intermixed	ML	NA	Hnu = 0 ∝ = 10 cpm βγ = 600 cpm
	00784 9-12-90 1628	9	6	medium dense 2.5y 6/6 olive yellow clayey silt, trace sand, slightly moist			
	00785 9-12-90 1628	10	6	SAA			
9	00786 9-12-90 1633	4	6	medium dense 10yr 7/8 yellow poorly graded clayey sand, trace silt wet	SC	NA	Hnu = 0 ∝ = 6 βγ = 600 cpm
	00787 9-12-90 1633	6	6	SAA	SC	NA	
10	00788 9-12-90 1633	8 8	6	medium dense 10yr 7/8 yellow to 10yr 5/1 gray silty sand, some clay, wet	SM	NA	
App. water elevation @ 10.0 ft							
11	00789 9-12-90 1638	1	6	very loose 10yr 7/8 yellow sandy gravel, trace silt, wet	GP	NA	Hnu = 50 ppm ∝ = 0 βγ = 600 cpm
	00790 9-12-90 1638	1	6	very loose 10yr 5/1 gray sandy gravel, trace silt, wet	GP	NA	
	00791 9-12-90 1638	2	0	NR	NA	NA	
12	00792 9-12-90 1652	11	6	medium dense 10yr 5/1 gray sandy silt, wet	ML	NA	Hnu = 1 ppm ∝ = 0 cpm βγ = 600 cpm
	00793 9-12-90 1652	14	6	medium dense 10yr 5/1 gray silt, wet	ML	NA	
13	00794 9-12-90 1652	12	0	NR	NA	NA	
	00795 9-12-90 1656	10	6	dense 10yr 5/1 gray clayey silt, wet	ML	NA	Hnu = 0 ∝ = 0 βγ = 600 cpm
14	00796 9-12-90 1656	12	4	SAA	ML	NA	
	00797 9-12-90 1656	20	0	NR			

NOTES: CONTRACTOR: PERNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 1000 cpm

Hnu: SN 1185
∝: ASI #3
βγ: ASI #8

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7.5	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1504	COORDINATES	DATE 9-13-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/12/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/12/90
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	00798 9-12-90 1702	12	6	medium dense 10yr 5/1 clayey silt, wet			Hnu = 0
	00799 9-12-90 1702	12	6	SAA			α = 0
16	00800 9-12-90 1702	13	0	NR	NA	NA	βγ = 600 cpm
	00801 9-12-90 1708	4	6	medium dense 10yr 6/6 olive yellow poorly graded silty sand, wet	SM	NA	Hnu = 40 ppm
17	00802 9-12-90 1708	10	6	~~medium dense~~ very soft 10yr 5/1 gray silty clay, moist	CL	<.25	α = 0 cpm
	00803 9-12-90 1708	11	0	NR	NA	NA	βγ = 800 cpm
18	00804 9-12-90 1717	16	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, moist	ML	NA	Hnu = 4 ppm
	00805 9-12-90 1717	14	6	SAA	ML	NA	α = 10 cpm
19	00806 9-12-90 1717	10	0	NR	NA	NA	βγ = 800 cpm
	00807 9-12-90 1717	8	0	NR			Hnu =
20							α =
				DRILLING STOPPED AT 20.0 FT. (GEO-CHEMICAL BORING). HOLE FILLED WITH 3 BUCKETS BENTONITE, CAPPED WITH 1/2 BAG CEMENT & 2.5 GALLONS WATER. NO PIEZOMETER SET.			βγ =
				SAMPLE #'S TCLP ⇒ 00769 TOTAL U WMCO 00770 " U FT 00772			Hnu =
							α =
							βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 1000 cpm

Hnu: ASI 1185
α: ASI # 3
βγ: ASI # 8

000728

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. MASON DATE 9-12-90
PROJECT NO. 602.3.7.5
CHECKED BY E. Trollinger DATE 9-12-90
BORING NO. 1504
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 9-12-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM ____ TO ____
FLUID NA FROM ____ TO ____

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA FROM ____ TO ____
SIZE NA FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

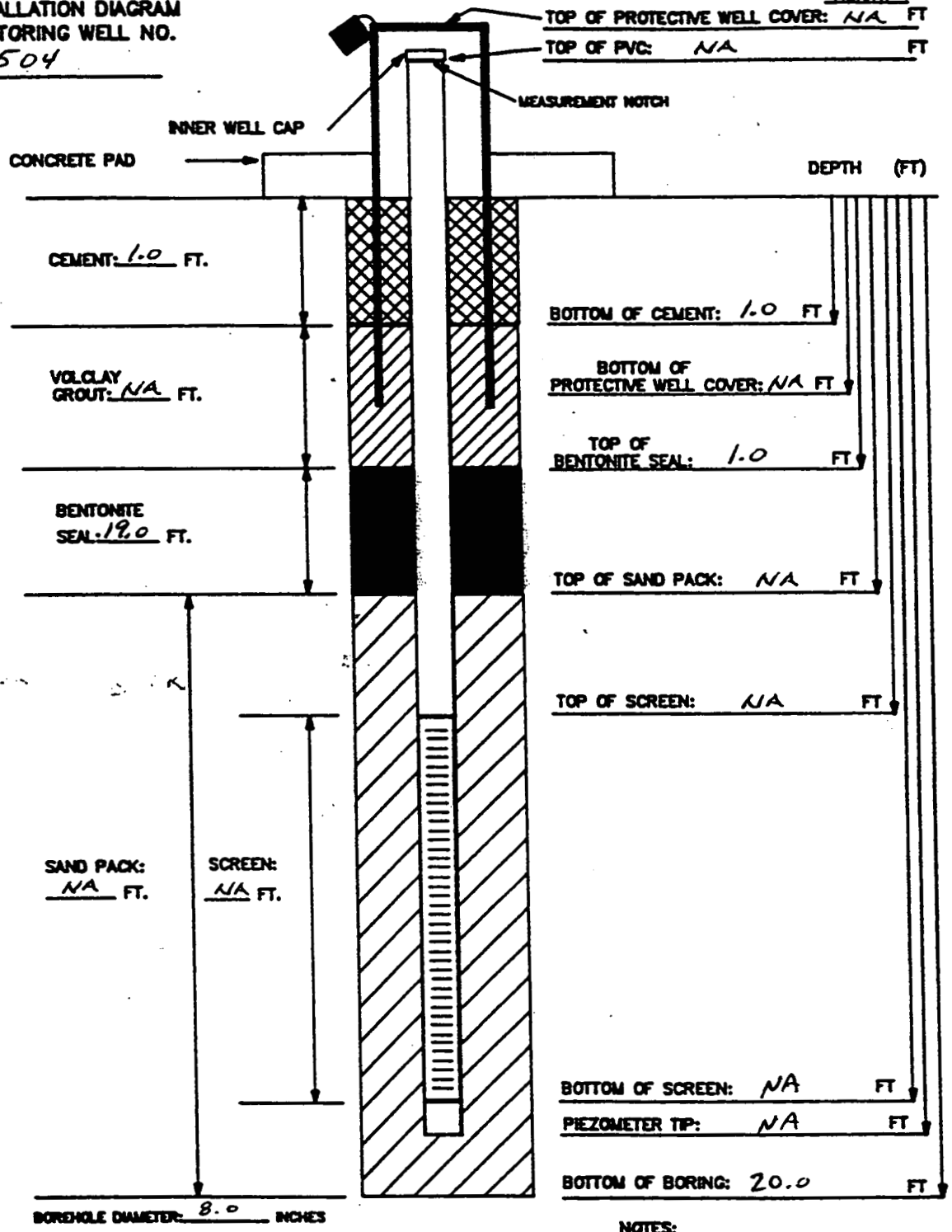
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0 FT			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING STOPPED AT 20.0 FT. (GEOCHEMICAL BORING). HOLE FILLED WITH 3 BUCKETS OF BENTONITE, CAPPED WITH 1/2 BAG CEMENT & 2.5 GALLONS WATER

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1504

INSTALLATION DATE: 9-12-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing		
BORING NUMBER: 1505	COORDINATES: NA	DATE: 02-20-90	
ELEVATION: NA	GWL: Depth NR Date/Time	DATE STARTED: 2-20-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NR Date/Time	DATE COMPLETED: 2-21-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 Inch	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	00583 1630 02-20-90	1	6	VERY LOOSE (10YR 4/6) DARK YELLOWISH BROWN SILTY SAND, CLAYEY, WET, (FINE GRAIN SAND)	SM	NA	Hnu = 0 ppm
8.5	00584 1630 02-20-90	0	6	SAA	SM	NA	α = 0 cpm SB = 160 cpm
9.0	00585 1630 02-20-90	0	2	SAA	Sm	NA	
9.5	00586 1632 02-20-90	2	0	NR	NA	NA	Hnu = 0 ppm
10.0	00587 1632 02-20-90	2	0	NR	NA	NA	α = 0 cpm SB = 200 cpm
10.5	00588 1632 02-20-90	1	0	NR	NA	NA	
11.0	00589 1634 02-20-90	3	6	Loose, (10YR 4/6) DARK YELLOWISH BROWN, SILTY SAND, MOIST TO WET	SM	NA	Hnu = 0 cpm
11.5	00590 1634 02-20-90	5	6	Loose, (10YR 5/1) GREY, CLAYEY SILT, TRACE OF SAND AND GRAVEL LOW PLASTICITY, MOIST	CL	1.5	α = 0 cpm SB = 160 cpm
12.0	00591 1634 02-20-90	5	0	NR	NA	NA	
12.5	00592 1646 02-20-90	5	6	Loose, (10YR 5/1) GREY (2.5Y 4/0) DARK GREY, FINE TO MED GRAIN SAND, WET.	SW	NA	Hnu = 0 ppm α = 0 cpm
13.0	00593 1640 02-20-90	6	6	(2.5Y 4/0) DARK GREY FINE TO MED GRAIN SAND, WET, SILT WITH CLAY	SW	NA	SB = 200 cpm
13.5	00594 1640 02-20-90	7	0	NR	NA	NA	First distinct sand layer.
14.0	00595 1650 02-20-90	4	6	loose (2.5Y 4/0) DARK GREY Fine to med. Grain sand, wet,	SW	NA	Hnu = 0 ppm α = 0 cpm
14.5	00596 1650 02-20-90	5	6	Stiff, (2.5Y 4/0) DARK GREY, SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST TRACE OF SAND.	CL	2.0	SB = 160 cpm
15.0	00597 1650 02-20-90	6	4	SAA	CL	2.0	

NOTES:

SEE Page 1

FERNALD RI/FS

5711

Suspect Geochem. Boring Program (inside production)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.05	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1505	COORDINATES: NA		
ELEVATION: NA	GWL: Depth NA Date/Time	DATE: 02-20-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NA Date/Time	DATE STARTED: 02-20-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		DATE COMPLETED: 2-21-90	
		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6" (Tubes)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							Start Drilling @ 1510
0.5	00568 1510 02-20-90	6	6	MEDDENSE (7.5 YR 3/2) DARK BROWN CLAYEY GRAVEL, DRY TO MOIST.	GC	NA	Hnu = 0 ppm, α = 0 cpm, γB = 350 cpm
1.0	00569 1510 02-20-90	5	2	SAA	GC	NA	
1.5	00570 1510 02-20-90	7	0	NR	NA	NA	
2.0	00571 1512 02-20-90	4	6	STIFF (10YR 3/1) VERY DARK GREY, CLAY MEDIUM PLASTIC, DRY TO SLIGHTLY MOIST	CL	2.0	Hnu = 0 ppm, α = 0 cpm, γB = 180 cpm
2.5	00572 1512 02-20-90	6	6	SAA.	CL	2.0	
3.0	00573 1512 02-20-90	5	0	NR	NA	NA	
3.5	00574 1515 02-20-90	9	16 3	STIFF (3") (10YR 4/1) DARK GREY MOTTED ORANGE, (10YR 2/1) VERY DARK GREY, CLAY MED. PLASTIC, DRY TO SLIGHTLY MOIST	CL	1.0 1.25	Hnu = 0 ppm, α = 0 cpm, γB = 220 cpm
4.0	00575 1515 02-20-90	6	36	(3") STIFF (10YR 4/1) DARK GREY MOTTED ORANGE; SILTY CLAY, MEDIUM PLASTIC MOIST, TRACE OF GRAVEL	CL	1.25	
4.5	00576 1515 02-20-90	4	0	NR	NA	NA	
5.0	00577 1517 02-20-90	5	6	STIFF (10YR 4/1) DARK GREY, SILTY, SLIGHTLY MOIST, MED. PLASTIC	CL	1.0	Hnu = 0 ppm, α = 0 cpm, γB = 160 cpm
5.5	00578 1517 02-20-90	4	6	STIFF (10YR 5/1) GREY, SILTY CLAY, MOIST, LOW PLASTICITY	CL	1.0	
6.0	00579 1517 02-20-90	4	4	STIFF (10YR 4/1) DARK GREY, SILTY CLAY, MOTTED ORANGE, MED. PLASTIC, SLIGHTLY MOIST.	CL	1.25	
6.5	00580 1518 02-20-90	2	6	LOOSE (10YR 4/1) DARK GREY, CLAYEY SAND. FINE GRAIN, WET	SC	NA	Hnu = 0 ppm, α = 0 cpm, γB = 300 cpm
7.0	00581 1518 02-20-90	2	4	STIFF (10YR 4/1) DARK GREY, ORANGE MOTTLING, SILTY CLAY, TRACE OF SAND. MOIST	CL	1.0	
7.5	00582 1518 02-20-90	2	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : JIM SACCANI
Driller's Assistant : CHRIS COULTER

All Samples collected according to ASTM Standards. Soil Colors, described by Munsell Soil Color Charts.

Serial # #00199 #13 000732 #5

Background Readings/Levels
Hnu = 0 ppm
Alpha (α) = 0 dpm
Gamma-Beta = 200 dpm

FERNALD RI/FS

Suspect Geochem. Boring Program (Inside Production)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.05	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1505	COORDINATES: NA		
ELEVATION: NA	GWL: Depth NR Date/Time	DATE: 02-20-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NA Date/Time	DATE STARTED: 02-20-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		DATE COMPLETED: 2-21-90	
		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							Start Drilling @ 1510
0.5	00568 1510 02-20-90	6	6	MEDDENSE (7.5 YR 3/2) DARK BROWN CLAYEY GRAVEL, DRY TO MOIST.	GC	NA	Hnu = 0 ppm, α = 0 cpm, γβ = 350 cpm
1.0	00569 1510 02-20-90	5	2	SAA	GC	NA	
1.5	00570 1510 02-20-90	7	0	NR	NA	NA	
2.0	00571 1512 02-20-90	4	6	STIFF (10YR 3/1) VERY DARK GREY, CLAY MEDIUM PLASTIC, DRY TO SLIGHTLY MOIST	CL	2.0	Hnu = 0 ppm, α = 0 cpm, γβ = 180 cpm
2.5	00572 1512 02-20-90	6	6	SAA.	CL	2.0	
3.0	00573 1512 02-20-90	5	0	NR	NA	NA	
3.5	00574 1515 02-20-90	9	1/2 3	STIFF (3") (10YR 4/1) DARK GREY MOTTED ORANGE, (10YR 3/1) VERY DARK GREY, CLAY MED. PLASTIC, DRY TO SLIGHTLY MOIST	CL	1.25 1.0	Hnu = 0 ppm, α = 0 cpm, γβ = 220 cpm
4.0	00575 1515 02-20-90	6	36	(3") STIFF (10YR 4/1) DARK GREY MOTTED ORANGE SILTY CLAY, MEDIUM PLASTIC MOIST, TRACE OF GRAVEL	CL	1.25	
4.5	00576 1515 02-20-90	4	0	NR	NA	NA	
5.0	00577 1517 02-20-90	5	6	STIFF (10YR 4/1) DARK GREY, CLAY, SILTY, SLIGHTLY MOIST, MED. PLASTIC	CL	1.0	Hnu = 0 ppm, α = 0 cpm, γβ = 160 cpm
5.5	00578 1517 02-20-90	4	6	STIFF (10YR 5/1) GREY, SILTY CLAY, MOIST, LOW PLASTICITY	CL	1.0	
6.0	00579 1517 02-20-90	4	4	STIFF (10YR 4/1) DARK GREY, SILTY CLAY, MOTTED ORANGE, MED. PLASTIC, SLIGHTLY MOIST.	CL	1.25	
6.5	00580 1518 02-20-90	2	6	LOOSE (10YR 4/1) DARK GREY, CLAYEY SAND. FINE GRAIN, WET	SC ~~CL~~	NA ~~1.0~~	Hnu = 0 ppm, α = 0 cpm, γβ = 300 cpm
7.0	00581 1518 02-20-90	2	4	STIFF (10YR 4/1) DARK GREY, ORANGE MOTTLING, SILTY CLAY, TRACE OF SAND, MOIST	CL	1.0	
7.5	00582 1518 02-20-90	2	0	NR	NA	NA	

NOTES: Contractor: Pennsylvania Drilling
Driller: JIM SACCANI
Driller's Assistant: CHRIS COULTER

All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

Serial #	Background Readings
#00199	Hnu = 0 ppm
#13	Alpha (α) = 0 dpm
#5	Gamma - Beta = 200 dpm

571

FERNALD RI/FS

SUSPECT GEOCHEM. BORING (INSIDE PRODUCTION AREA)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 37.05	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1506	COORDINATES:		DATE: 2/28/90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 2/28/90
ENGINEER/GEOLOGIST: D. EVANS	Depth	Date/Time	DATE COMPLETED: 2/28/90
DRILLING METHODS: AUGER (HOLLOW STEM)			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	00648 1425 2/28	3	6	SOFT, YELLOWISH BROWN (10YR 5/4), SILTY CLAY, TRACE SAND, MED. PLASTICITY, MOIST	CL	.5	HNU = 0 PPM
	00649 1425 2/28	3	6	VERY STIFF ~~SOFT~~, YELLOWISH BROWN (10YR 5/4), SILTY CLAY, TRACE SAND AND FINE GRAVEL, LOW PLASTICITY, MOIST	CL	2.75	α = 0 CPM BG = 1000 CPM
1	00650 1425 2/28	3	1	STIFF, VERY ~~DARK~~ GRAYISH BROWN (10YR 4/2), SILTY CLAY, LOW PLASTICITY, MOIST	CL	2.0	
	00651 1428 2/28	3	6	VERY STIFF, VERY DK. GRAYISH BROWN (10YR 3/2), SILTY CLAY, LOW PLASTICITY, MOIST	CL	2.5	HNU = 0 PPM
2	00652 1428 2/28	4	2	STIFF, DK BROWN (10YR 3/3) SILTY CLAY, MED. PLASTICITY, MOIST	CL	2.0	α = 0 CPM BG = 800 CPM
	00653 1428 2/28	7	0	NR	NA	NA	
3	00654 1430 2/28	7	6	MED. STIFF, DK. BROWN, (10YR 3/3), SILTY CLAY, MED. PLASTICITY, MOIST	CL	1.0	HNU = 0 PPM
	00655 1430 2/28	7	6	SAA	CL	1.0	α = 0 CPM BG = 1400 CPM
4	00656 1430 2/28	7	3	LOOSE, YELLOWISH BROWN (10YR 5/4), SILTY SAND SOME CLAY, TRACE GRAVEL, MOIST	SM	NA	
	00657 1435 2/28	7	6	MED. DENSE, DK. YELLOWISH BROWN (10YR 4/6), SILTY SAND, SOME CLAY, WET	SM	NA	HNU = 0 PPM
5	00658 1435 2/28	7	6	SAA	SM	NA	α = 0 CPM BG = 800 CPM
	00659 1435 2/28	7	2	SAA	SM	NA	
6	00660 1439 2/28	18	6	DENSE, DK. YELLOWISH BROWN (10YR 4/4), SILTY SAND, WET	SM	NA	HNU = 0 PPM
	00661 1439 2/28	19	6	DENSE, DK. YELLOWISH BROWN (10YR 4/4) SILTY SAND, SOME GRAVEL, WET	SM	NA	α = 0 CPM BG = 1000 CPM
7	00662 1439 2/28	19	6	VERY STIFF, YELLOWISH BROWN (10YR 5/4), SILTY CLAY, SOME COARSE GRAVEL, LOW PLASTICITY, MOIST	CL	2.5	

NOTES: CONTRACTOR: PENN DRILL
RIG: A-53 MOBILE
DRILLER: JIM SACCANI
ASSISTANT: CHRIS COULTER

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BG = 1400 CPM
LEL = 0 PPM
O_2 = 21.1 %

000734

LELO$_2$:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1506	COORDINATES:	DATE: 2/28/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/28/90	
ENGINEER/GEOLOGIST: B. EVANS	Depth Date/Time	DATE COMPLETED: 2/28/90	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	00663 1525 2/28	7	6	VERY STIFF, YELLOWISH BROWN (10YR 5/4), SILTY CLAY, TRACE SAND, LOW PLASTICITY, MOIST	CL	2.5	HNU = 0 PPM α = 0 CPM Bγ = 1000 CPM
	00664 1525 2/28	15	6	DE 2/28 MED DENSE SAA	CL	2.5	
9	00665 1525 2/28	12	4	~~LOOSE~~, DK. YELLOWISH BROWN (10YR 4/4), SILTY SAND, TRACE GRAVEL, WET	SM	NA	
	00666 1527 2/28	9	6	MED. DENSE, DK. YELLOWISH BROWN (10YR 4/2) SILTY SAND, SOME CLAY, WET	SM	NA	HNU = 0 PPM α = 0 CPM Bγ = 1000 CPM
10	00667 1527 2/28	10	6	HARD, OLIVE GREY (5Y 4/2), CLAY, MEDIUM PLASTICITY, MOIST	CL	4.25	
	00668 1527 2/28	12	4	SAA.	CL	>4.0	
11	00669 1530 2/28	10	6	STIFF, DK. YELLOWISH BROWN (10YR 4/6), SILTY CLAY, TRACE SAND AND GRAVEL, LOW PLASTICITY, WET	CL	1.5	HNU = 0 PPM α = 0 CPM Bγ = 800 CPM
	00670 1530 2/28	10	6	VERY STIFF, OLIVE GREY (5Y 4/2), CLAY, TRACE COARSE GRAVEL, MED. PLASTICITY, MOIST	CL	3.5	
12	00671 1530 2/28	10	0	NR	NA	NA	
	00672 1532 2/28	9	6	MED DENSE, OLIVE GREY (5Y 4/2), SILTY SAND, TRACE GRAVEL, WET	SM	NA	HNU = 0 PPM α = 0 CPM Bγ = 1000 CPM
13	00673 1532 2/28	9	6	VERY STIFF, OLIVE GREY (5Y 4/2), CLAY, TRACE FINE SAND, MED PLASTICITY, MOIST	CL	3.5	
	00674 1532 2/28	10	6	SAA	CL	3.5	
14	00675 1606 2/28	5	6	STIFF, DARK GREY (5Y 4/1), CLAY, SOME SILT, TRACE SAND, LOW PLASTICITY, WET	CL	1.5	HNU = 0 PPM α = 0 CPM Bγ = 800 CPM
	00676 1606 2/28	9	6	STIFF, OLIVE GREY (5Y 4/2), CLAY, MED PLASTICITY, MOIST	CL	1.5	
	00677 1606 2/28	15	2	SAA	CL	1.0	

NOTES:

SAA - SAME AS ABOVE
NR - NO RECOVERY

SEE PAGE 1

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1506	COORDINATES:	DATE: 2/28/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/28/90	
ENGINEER/GEOLOGIST: D. EVANS	Depth Date/Time	DATE COMPLETED: 2/28/90	
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	00678 1609 2/28	6	6	VERY STIFF, OLIVE GREY (5Y 4/2) CLAY, TRACE SILT AND SAND, MED. PLASTICITY, WET	CL	3.5	HNU = 0 PPM α = 0 CPM BG = 1200 CPM
	00679 1609 2/28	5	6	SAA	CL	3.5	
16	00680 1609 2/28	5	4	SAA	CL	3.5	
	00681 1612 2/28	6	6	STIFF, OLIVE (5Y 5/3) MOTTLED YELLOW BROWN (10YR 5/4), CLAY, TRACE SILT, MED. PLASTICITY, WET	CL	1.5	HNU = 0 PPM α = 0 CPM BG = 1000 CPM
17	00682 1612 2/28	6	6	VERY STIFF, OLIVE GREY (5Y 4/2), CLAY, SOME SAND, TRACE SILT, LOW PLASTICITY, WET	CL	2.5	
	00683 1612 2/28	7	6	VERY STIFF, OLIVE (5Y 5/3), CLAY, TRACE SILT AND SAND; MED PLASTICITY, MOIST	CL	2.5	
18	00684 1634 2/28	9	6	VERY SOFT, OLIVE GREY (5Y 4/2), SILTY CLAY, TRACE SAND AND GRAVEL, LOW PLASTICITY, WET	CL	<.25	HNU = 0 PPM α = 0 CPM BG = 1000 CPM
	00685 1634 2/28	10	6	VERY SOFT, OLIVE GREY (5Y 4/2), SILTY CLAY, SOME SAND, LOW PLASTICITY, WET	CL	<.25	
19	00686 1634 2/28	10	6	MED STIFF, OLIVE (5Y 5/3), CLAY, MED. PLASTICITY, MOIST	CL	1.0	
	00687 1634 2/28	9	6	MED STIFF, OLIVE GREY (5Y 4/2), SILTY CLAY, LOW PLASTICITY, MOIST	CL	1.0	HNU = 0 PPM α = 0 CPM BG = 1000 CPM
20				BOTTOM OF BORING @ 20.0 FT *			

NOTES:

* BORING PLUGGED WITH FOUR BUCKETS (5 GAL EA) BENTONITE PELLETS ON 2/28/90

* CEMENT PLUG TO SURFACE 1/4 (94 lb. sack.)

SEE PAGE 1

FERNALD RI/FS

Suspect Geochem. Boring (inside production area)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.05	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1507	COORDINATES: NA	DATE: 2-21-90	
ELEVATION: NA	GWL: Depth NA Date/Time	DATE STARTED: 2-21-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NR Date/Time	DATE COMPLETED: 2-22-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (Inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Loose ~~Stiff~~ 2-21-90 CLAYEY GRAVEL			Start drilling @ 1530
0.5	00608 1531 02-21-90	3	6	~~Stiff~~ (10YR 4/4) DARK YELLOWISH BROWN, SOME BLACK, ~~GRAVELY CLAY~~ DRY, LOW PLASTICITY, ORGANIC MATERIAL	GC ~~CL~~	N/A ~~1.5~~	Hnu = 0 ppm, α = 0 cpm, γB = 210 cpm
1.0	00609 1531 02-21-90	6	4	SAA	GC	1.5	
1.5	00610 1531 02-21-90	6	0	NR	NA	NA	
2.0	00611 1532 02-21-90	6	6	V. Stiff (10YR 4/4) DARK YELLOWISH BROWN SILTY CLAY, TRACE OF GRAVEL, SOME BLACK ORGANIC MATERIAL, LOW PLASTICITY, DRY.	CI	2.75	Hnu = 0 ppm, α = 0 cpm, γB = 210 cpm
2.5	00612 1532 02-21-90	5	3	SAA.	CI	2.0	
3.0	00613 1532 02-21-90	6	0	NR	NA	NA	
3.5	00614 1535 02-21-90	4	6	Stiff BROWN, SILTY CLAY (10YR 4/4) DARK YELLOWISH MATERIAL, TRACE OF SAND AND FINE GRAVEL MEDIUM PLASTICITY, DRY TO SLIGHTLY MOIST	CI	1.5	Hnu = 0 ppm, α = 0 cpm, γB = 260 cpm.
4.0	00615 1535 02-21-90	10	3	SAA	CI	3.5	
4.5	00616 1535 02-21-90	13	0	NR	NA	NA	
5.0	00617 1540 02-21-90	5	6	V. Stiff (10YR 5/6) YELLOWISH BROWN MOTTLED ORANGE CLAYEY SILT, TRACE OF MED. TO COURSE GRAVEL, DRY, LOW PLASTICITY,	MI	2.5	Hnu = 0 ppm, α = 0 cpm, γB = 240 cpm
5.5	00618 1540 02-21-90	4	6	SAA	MI	2.5	
6.0	00619 1540 02-21-90	7	0	NR	NA	NA	
6.5	00620 1545 02-21-90	4	6	V. Stiff (10YR 5/6) YELLOWISH BROWN MOTTLED ORANGE AND GREY, CLAYEY SILT, TRACE OF COURSE GRAVEL COURSE SAND, MED. PLASTICITY, DRY	MI	2.5	Hnu = 0 ppm, α = 0 cpm, γB = 280 cpm
7.0	00621 1545	4	6	SAA	MI	4.0	
7.5	00622 1545 02-21-90	10	4	SAA	MI	3.75	

NOTES: Contractor : Pennsylvania Drilling
Driller : Jim Saccani
Driller's Assistant : Chris Coulter

All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

Background Readings/Levels
Hnu = 0.0 ppm
Alpha (α) = 0 dpm
Gamma - Beta = 200 dpm

000737

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.05	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1507	COORDINATES: NA	DATE: 02-21-90	
ELEVATION: NA	GWL: Depth NA Date/Time	DATE STARTED: 02-21-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NA Date/Time	DATE COMPLETED: 2-22-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 3	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 Inch	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	00623 1632 02-21-90	8	6	V. stiff (10YR 5/4) YELLOWISH BROWN CLAYEY SILT, MEDIUM PLASTICITY, DRY	ml	3.0	Hnu = 0 ppm, α = 0 cpm, 5β = 260 cpm
8.5	00624 1632 02-21-90	10	3	SAA	ml	4.0	
9.0	00625 1632 02-21-90	12	0	NR	NA	NA	
9.5	00626 1633 02-21-90	10	6	V. stiff (10YR 5/6) BROWNISH YELLOW SILTY CLAY, LIME FINE TO MEDIUM GRAVEL, MEDIUM PLASTICITY, DRY TO SLIGHTLY MOIST	cl	2.75	Hnu = 0 ppm, α = 0 cpm, 5β = 260 cpm
10.0	00627 1633 02-21-90	10	6	SAA	cl	2.5	
10.5	00628 1633 02-21-90	10	4	SAA	cl	2.75	
11.0	00629 1635 02-21-90	5	6	V. stiff (10YR 5/6) YELLOWISH BROWN MOTTLED, CLAYEY SILT, LOW PLASTICITY DRY TO SLIGHTLY MOIST,	ml	2.5	Hnu = 0 ppm, α = 0 cpm, 5β = 300 cpm
11.5	00630 1635 02-21-90	9	6	SAA	ml	2.75	
12.0	00631 1635 02-21-90	12	6	SAA	ml	2.25	
12.5	00632 1638 02-21-90	12	6	Med dense (10YR 5/4) YELLOWISH BROWN, SANDY SILT, VERY FINE GRAIN SAND, SOME CLAY, LOW PLASTICITY, MOIST,	SM	NA	Hnu = 0 ppm, α = 0 cpm, 5β = 240 cpm
13.0	00633 1638 02-21-90	10	6	SAA w/ SOME MOTTLED GREY	SM	NA	
13.5	00634 1638 02-21-90	10	6	V. stiff (10YR 4/1) DARK GREY, CLAY, WITH SOME MEDIUM TO COURSE GRAVEL, MOIST, MEDIUM PLASTICITY.	cl	3.25	
14.0	00635 1642 02-21-90	12	6	V. stiff (10YR 4/1) DARK GREY & SOME MED TO COURSE GRAVEL, MOIST, LOW PLASTICITY.	CL	2.25	Hnu = 0 ppm, α = 0 cpm, 5β = 280 cpm
14.5	00636 1642 02-21-90	13	6	SAA	CL	2.50	
15.0	00637 1642 02-21-90	9	6	SAA	CL	2.25	

NOTES:

SEE Page 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07.05	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 150M	COORDINATES: NA	DATE: 2-21-90	
ELEVATION: NA	GWL: Depth NA Date/Time	DATE STARTED: 2-21-90	
ENGINEER/GEOLOGIST: M. HARDNER	Depth NA Date/Time	DATE COMPLETED: 2-22-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 3	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							Started @ 0914
15.5	00638 0915 02-22-90	3	6	V. stiff (10YR4/1) DARK GREY, SILTY CLAY, TRACE OF FINE SAND, MEDIUM PLASTICITY, WET	Cl	2.5	Hnu = 0 ppm, α = 0 cpm, γB = 200 cpm
16.0	00639 0915 02-22-90	9	6	SAA	Cl	2.5	
16.5	00640 0915 02-22-90	9	0	W/13 02-22-90 ~~SAA~~ NR	NA	NA	
17.0	00641 0919 02-22-90	9	6	V. soft (2.5Y 5/2) GREYISH BROWN SILTY CLAY, SOME MEDIUM TO COURSE GRAVEL TRACE OF SAND, WET	Cl	NA	Hnu = 0 ppm, α = 0 cpm, γB = 260 cpm
17.5	00642 0919 02-22-90	9	6	V. stiff (10YR4/1) DARK GREY SILTY CLAY, TRACE OF FINE GRAVEL, MOIST TO WET, MEDIUM PLASTICITY.	Cl	2.0	
18.0	00643 0919 02-22-90	9	6	SAA	Cl	2.25	
18.5	00644 0927 02-22-90	8	6	V. stiff (10YR4/1) DARK GREY, SILTY CLAY, WET, HIGH PLASTICITY.	Cl	2.0	Hnu = 0 ppm, α = 0 cpm, γB = 260 cpm
19.0	00645 0927 02-22-90	9	3	SAA	Cl	1.5	
19.5	00646 0927 02-22-90	10	0	NR	NA	NA	
20	00647 0927 02-22-90	9	0	NR	NA	NA	Hnu = NA, α = NA, γB = NA
				BOTTOM OF BORING @ 20.0 FT.			
				* BORING PLUGGED AND ABANDONED WITH BENTONITE PELLETS TO WITHIN 1.0 FT. OF SURFACE, CEMENT PLUG TO SURFACE.			
				MATERIALS USED: 5 buckets bentonite 5 gal ea. 1/2 sack. (94#) cement.			

NA 2-22-90

NOTES:

SEE PAGE 1

Background on 02-22-90
HNU = 0.3
α = 0 cpm
γB = 180 cpm

	Date			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Final Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1508	COORDINATES:	DATE: 2/2/90	
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 2/2/90
ENGINEER/GEOLOGIST: LARRAN/SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	15534 0905 2-2-90	2	6	(3 IN) TOPSOIL W/ ROOTLETS. MEDIUM STIFF (2.5Y 3/6) LIGHT OLIVE BROWN SILTY CLAY. MED PLASTICITY. MOIST.	CL	1.0	Hnu = 5 ppm, α = 0 cpm, βB = 40 cpm
1.0	15540 0905 2-2-90	2	0	NO RECOVERY	N/A	N/A	
1.5	15541 0905 2-2-90	2	0	NO RECOVERY	N/A	N/A	
2.0	15542 0905 2-2-90	7	5	(3 IN) DENSE (5Y 3/1) VERY DARK GRAY WELL GRADED SAND. DRY.	SW	N/A	Hnu = 6 ppm, α = 0 cpm, βB = 40-50 cpm
				(2 IN) VERY STIFF (5Y 3/1) VERY DARK GRAY CLAY. TRACE SILT. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5	
2.5	15543 0905 2-2-90	14	0	NO RECOVERY	N/A	N/A	
3.0	15544 0909 2-2-90	17	0	NO RECOVERY	N/A	N/A	
3.5	15545 0910 2-2-90	12	6	VERY STIFF (5Y 3/1) VERY DARK GRAY CLAY. TRACE SILT. LOW PLASTICITY. SLIGHTLY MOIST. ↓	CL	2.5	Hnu = 9.5 ppm, α = 0, βB = 60-100 cpm
4.0	15546 0910 2-2-90	12	4				
4.5	15547 0910 2-2-90	10	0	NO RECOVERY	N/A	N/A	
5.0	15548 0924 2-2-90	4	6	VERY STIFF (5Y 5/1) GRAY CLAY TO SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5	Hnu = 11.5 ppm, α = 0, βB = 50 cpm
5.5	15549 0924 2-2-90	5	0	NO RECOVERY	N/A	N/A	
6.0	15550 0924 2-2-90	5	0	NO RECOVERY	N/A	N/A	
6.5	15551 0925 2-2-90	5	6	STIFF (5Y 5/1) GRAY SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0	Hnu = 0, α = 0, βB = 40-140 cpm
7.0	15552 0925 2-2-90	5	0	NO RECOVERY	N/A	N/A	
7.5	15553 0925 2-2-90	5	0	NO RECOVERY	N/A	N/A	

NOTES: Contractor: Pennsylvania Drilling
Driller: J. SACCANI
Drillers Assistant: C. COULTER
All Samples collected according to ASTM Standards. Soil Colors described by Munsell Soil Color Charts.

SAT-same as above
NR-NO RECOVERY

Background Readings/Lev
Hnu = 2.0-9.5 ppm
Alpha (α) = 0 ppm
Gamma - Beta = 40-140

000740

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1508	COORDINATES:	DATE: 2/2/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/2/90	
ENGINEER/GEOLOGIST: BARMAN/SWANSON	Depth Date/Time	DATE COMPLETED: 2-2-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	15554 0928 2-2-90	7	6	STIFF (5Y, 5/1) GRAY SILTY SANDY CLAY. LOW TO MED PLASTICITY. SLIGHTLY MOIST TO MOIST.	CL	2.0	Hnu = 0 α = 0 ⁵⁹β = 120 cpm
8.5	15555 0928 2-2-90	7	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SANDY CLAY. LOW PLASTICITY. SLIGHTLY MOIST TO MOIST.	CL	1.5	
9.0	15556 0928 2-2-90	7	0	NO RECOVERY	N/A	N/A	
9.5	15557 1053 2-2-90	4	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SANDY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	1.5	Hnu = 0 α = 0 ⁵⁹β = 40-80 cpm
10.0	15558 1053 2-2-90	7	6				
10.5	15559 1053 2-2-90	9	2				
11.0	15560 1056 2-2-90	10	6	HARD (2.5Y, 6/4) LIGHT YELLOWISH BROWN SILTY CLAY. TRACE PEBBLES. LOW PLASTICITY. LOW MOISTURE.	CL	4.0	Hnu = 0 α = 0 ⁵⁹β = 80 cpm
11.5	15561 1056 2-2-90	10	6				
12.0	15562 1056 2-2-90	14	3				
12.5	15563 1100 2-2-90	14	6	HARD (5Y, 5/1) GRAY MOTTLED. SILTY CLAY. TRACE GRAVEL. LOW PLASTICITY. LOW MOISTURE.	CL	>4.0	Hnu = 0 α = 0 ⁵⁹β = 40 cpm
BEGIN H2O ZONE 13.0	15564 1100 2-2-90	18	6	WATER SEAM ENCOUNTERED IN 12.5-13.0 SECTION. (SAA)			
END H2O ZONE 13.5	15565 1100 2-2-90	21	5	HARD (5Y, 5/1) GRAY MOTTLED SILTY CLAY. TRACE GRAVEL. LOW PLASTICITY. LOW MOISTURE.			
14.0				BOTTOM OF BORING @ 13.5 FT PIEZOMETER INSTALLED			Hnu = α = ⁵⁹β =
14.5							
15.0							

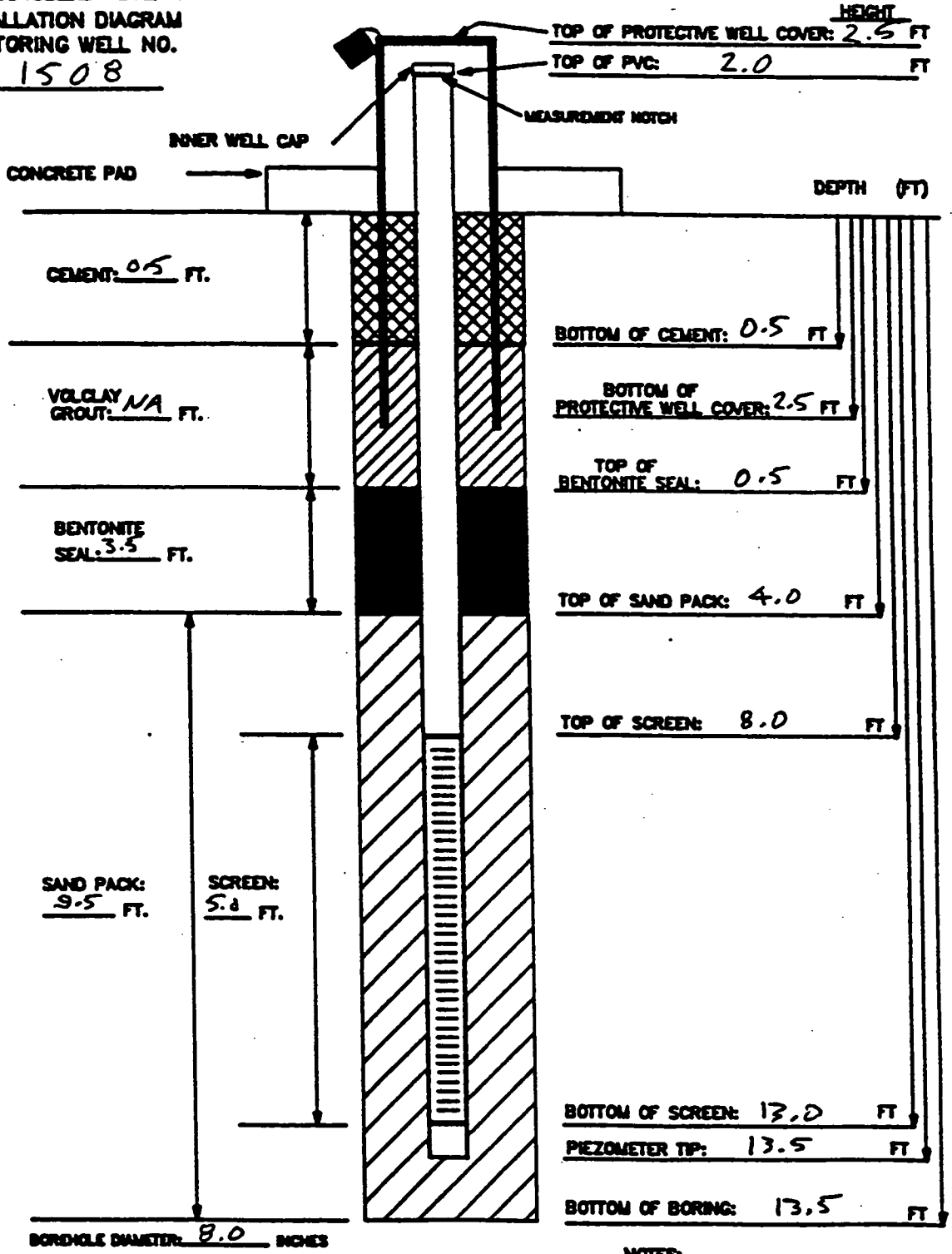
NOTES:

SEE PAGE 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1508

INSTALLATION DATE: 2-2-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: (1020) 4 80 lb. SACKS
BENTONITE PELLETS (5-GALLON BUCKETS): 1.5
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 1/2 ~~bag~~ SAK 94 lb.
AMOUNT OF WATER USED: 2 gallons
OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07.01 GEOLOGIST/ENGINEER: [signature]

4/4

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 2-2-90
PROJECT NO. 602.03.07.31 CHECKED BY S.T. DATE 2-8-90
BORING NO. 1508
PIEZOMETER NO. 1508 DATE OF INSTALLATION 2-2-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~
SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 5.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 10.0 FT, 0.5 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/10 IN

OTHER PROTECTION LOCK \ INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY CEMENT	TOP 0.0	BOTTOM 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 4.0	TOP	BOTTOM
SAND	TOP 4.0	BOTTOM 13.5	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 13.0	TOP	BOTTOM
PIEZOMETER TIP	13.5			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 12.5 FT - BEGIN H_2O ZONE
13.5 FT - END H_2O ZONE
AFTER ALLOWING BORING TO REMAIN OPEN FOR 1 HR., THE WATER LEVEL BEFORE INSTALLATION WAS APPROX 10.0 FT.

000743

Date	2/8/92			
Initial	ET			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1509	COORDINATES:	DATE: 2/2/90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/2/90	
ENGINEER/GEOLOGIST: SWANSON/GRAHAM	Depth Date/Time	DATE COMPLETED: 2-~~4~~-9 AG	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-6-6-6)	RECOVERY (Inc.)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	53095 1428 2-2-90	2	6	(2 IN) TOPSOIL W/ ROOTLETS (4 IN) STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY. LOW PLASTICITY. LOW MOISTURE.	CL	2.0	Hnu = 0 ppm α = 0 cpm β = 100 - 140 cpm
1.0	53096 1428 2-2-90	3	0	NR	N/A	N/A	
1.5	53097 1428 2-2-90	3	0	NR	N/A	N/A	
2.0	53098 1430 2-2-90	10	0	SPOON REFUSAL (HIT COBBLE) NR	N/A	N/A	Hnu = NA α = NA β = ~~120 cpm~~ AG 2-2-90 NA
2.5	53099 1430 2-2-90	15	0	NR			
3.0	53100 1430 2-2-90	15	0	NR			
3.5	53101 1433 2-2-90	10	6	(4 IN) STIFF (10YR, 4/2) DARK GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. LOW MOISTURE.	CL	2.0	Hnu = 0 ppm α = 0 cpm β = 120 cpm
4.0	53102 1433 2-2-90	16	2	(2 IN) STIFF (2.5Y, 5/4) GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. LOW MOISTURE.	CL	2.0	
4.5	53103 1433 2-2-90	17	0	NR	N/A	N/A	
5.0	53104 1441 2-2-90	2	6	STIFF (5Y, 5/2) OLIVE GRAY MOTTLED SILTY CLAY. TRACE SAND. LOW PLASTICITY. LOW MOISTURE.	CL	2.0	Hnu = 0 ppm α = 0 cpm β = 80-140 cpm
5.5	53105 1441 2-2-90	4	4				
6.0	53106 1441 2-2-90	5	0	NR	N/A	N/A	
6.5	53107 1442 2-2-90	5	~~2-2-90 AG~~ ~~5~~ 6	STIFF (5Y, 5/2) OLIVE GRAY MOTTLED SILTY CLAY. TRACE SAND. LOW PLASTICITY. LOW MOISTURE.	CL	2.0	Hnu = 0 ppm α = 0 cpm β = 100 - 140 cpm
7.0	53108 1442 2-2-90	5	~~2-2-90 AG~~ ~~7~~ 6				
7.5	53109 1442 2-2-90	7	4				

NOTES: Contractor : Pennsylvania Drilling
Driller : J. SACCANI
Driller's Assistant: C. COULTER

All Samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Charts.

Background Readings/Le

Hnu = 0 ppm.
Alpha (α) = 0 cpm
Gamma - Beta = 100 - 150

000744

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1509	COORDINATES:	DATE: 2-2-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-2-90	
ENGINEER/GEOLOGIST: SCHMUSOLF/GARMAN	Depth Date/Time	DATE COMPLETED: 2-3-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION (NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	53110 1444 2-2-90	5	6	STIFF (2.5Y, 5/2) MOTTLED GRAY/SW BROWN SILTY CLAY. MED PLASTICITY. LOW MOISTURE.	CL	2.0	Hnu = 0 ppm; α = 0 cpm; β = 90 - 130 cpm
8.5	53111 1444 2-2-90	7	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN CLAY. TRACE SILT. MED PLASTICITY. LOW MOISTURE.	CL	2.0	
9.0	53112 1444 2-2-90	8	3				
9.5	53113 1509 2-2-90	3	6	STIFF (2.5Y, 5/2) LIGHT OLIVE BROWN CLAY. TRACE SILT. MED PLASTICITY. LOW MOISTURE.	CL	1.5 ~~2.0~~	Hnu = 0 ppm; α = 0 cpm; β = 100 - 200 cpm
10.0	53114 1509 2-2-90	6	6				
10.5	53115 1509 2-2-90	9	3	VERY STIFF (2.5Y, 5/2) LIGHT OLIVE BROWN SILTY CLAY. SOME SAND AND GRAVEL. LOW PLASTICITY. LOW MOISTURE.	CL	2.5	
11.0	53116 1512 2-2-90	7	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. TRACE SAND. LOW PLASTICITY. DRY TO LOW MOISTURE.	CL	3.0	Hnu = 0 ppm; α = 0 cpm; β = 60 - 100 cpm
11.5	53117 1512 2-2-90	9	6				
12.0	53118 1512 2-2-90	11	6				
12.5	53119 1514 2-2-90	10	6		CL	3.0	Hnu = 0 ppm; α = 0 cpm; β = 80 - 100 cpm
13.0	53120 1514 2-2-90	15	5				
13.5	53121 1514 2-2-90	12	0	NR	N/A	N/A	
14.0	53122 1519 2-2-90	15	6	HARD (5Y, 4/1) DARK GRAY SILTY CLAY (RUSTY STAINS). TRACE GRAVEL. LOW PLASTICITY. DRY TO LOW MOISTURE.	CL	>4.0	Hnu = 0 ppm; α = 0 cpm; β = 110 cpm
14.5	53123 1519 2-2-90	15	6				
15.0	53124 1519 2-2-90	20	2				

H_2O ZONE

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: ~~1508~~ 1509	COORDINATES:	DATE: 2/2/90	
ELEVATION: TL 4-29-94	GWL: Depth Date/Time	DATE STARTED: 2/2/90	
ENGINEER/GEOLOGIST: GARMAN/SWANSON	Depth Date/Time	DATE COMPLETED: 2-3-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION (NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	53125 1520 2-2-90	8	6	MED STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. MED. PLASTICITY. LOW MOISTURE.	CL	<1.0	Ham = 0 α = 0 βD = 100 cpm
16.0	53126 1528 2-2-90	10	6	MED STIFF (5Y, 4/1) DARK GRAY CLAY. TRACE SILT AND GRAVEL. MED PLASTICITY. LOW MOISTURE.	CL	<1.0	
16.5	53127 1528 2-2-90	13	6				
17.0	53128 1531 2-2-90	12	6		CL	<1.0	Ham = 0 α = 0 βD = 80 cpm
17.5	53129 1531 2-2-90	12	4				
18.0	53130 1531 2-2-90	13	0	NR	N/A	N/A	
18.5	53131 1538 2-2-90	10	6	MED STIFF (5Y, 4/1) DARK GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. LOW TO MED PLASTICITY. LOW MOISTURE.	CL	4.0	Ham = 0 α = 0 βD = 80 - 100 cpm
19.0	53132 1538 2-2-90	18	6				
19.5	53133 1538 2-2-90	20	6				MG 2-2-90
20	53134 1538 2-2-90	24	4			<1.0 ~~4.0~~	Ham = 0 α = 0 βD = 100 cpm
				BOTTOM OF BORING PIEZOMETER INSTALLED AT 20.0 FT			

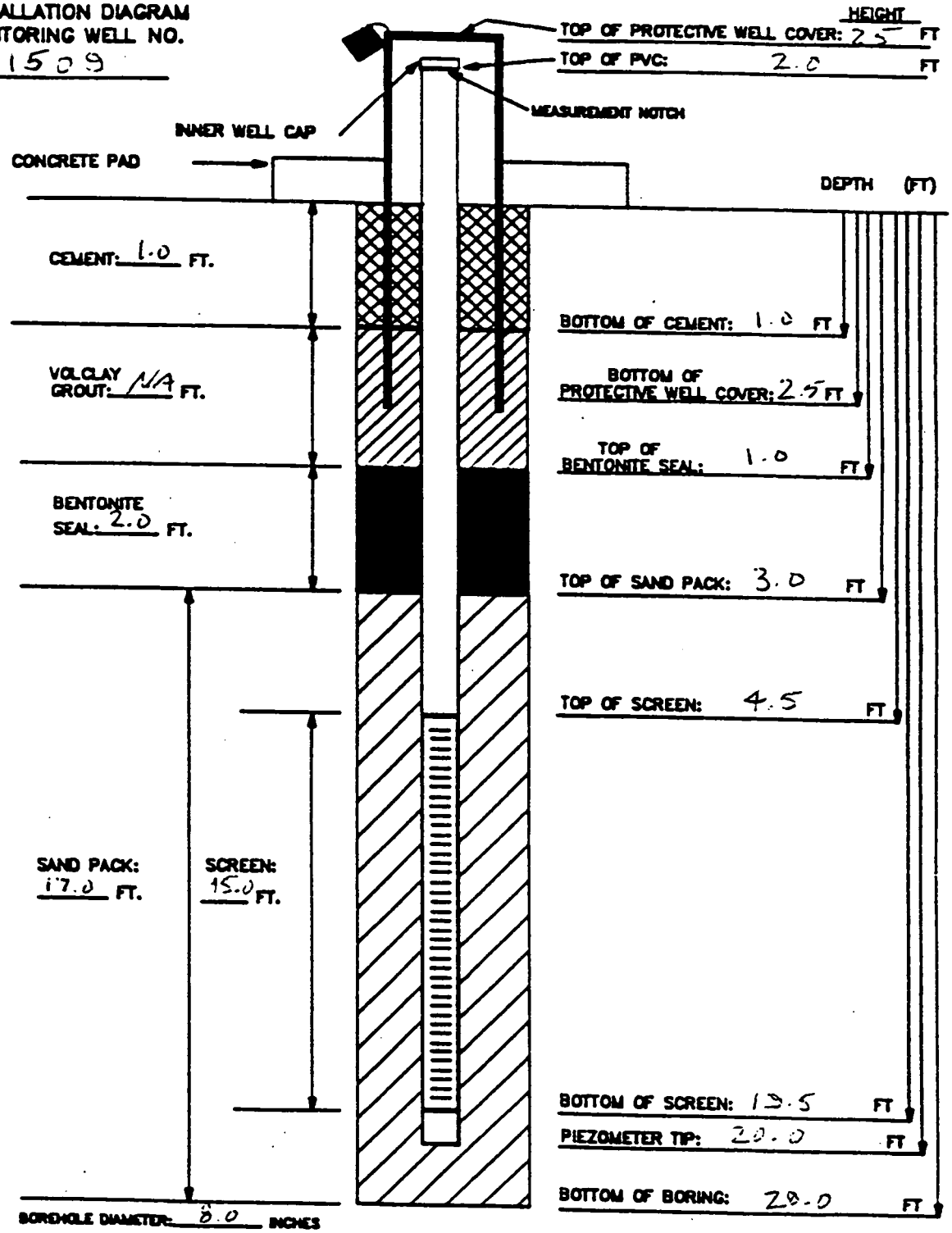
NOTES:

SEE PAGE 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1509

INSTALLATION DATE: 2-3-90



MATERIALS USED:

SAND TYPE AND QUANTITY: (1020) 12-30 lb sks
BENTONITE PELLETS (5-GALLON BUCKETS): ~~6.5~~ 2.0
BAGS OF VOLCLAY GROUT: [illegible]
AMOUNT OF CEMENT: ~~[illegible]~~ 1/2 sack (94 lb)
AMOUNT OF WATER USED: 1.5 gal
OTHER: ~~[illegible]~~ A.G. 2-3-90

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RIVER FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 2-3-90
PROJECT NO. 603.03.07 CHECKED BY [illegible] DATE [illegible]
BORING NO. 1509
PIEZOMETER NO. 1509 DATE OF INSTALLATION 2-3-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ~~TO~~ →
FLUID NONE FROM ~~TO~~ →

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ~~TO~~ →
SIZE NONE FROM ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 2.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 3.0	TOP	BOTTOM
SAND	TOP 3.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 4.5	BOTTOM 19.5	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 9.0 FT - BEGIN H_2O ZONE
8.0 FT - END H_2O ZONE
DRY BORING WAS LEFT OPEN OVERNIGHT, WATER LEVEL WAS APPROX. 3.0 - 4.0 FT. ON MORNING OF 2-3-90

000748

Date	2/6/92			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1510	COORDINATES:	DATE: 2-03-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: ~~2-03-90~~	
ENGINEER/GEOLOGIST: M. Loosmen	Depth Date/Time	DATE COMPLETED: 2-4-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	53255 1514 02-04	8	6	Very stiff (2.5Y, 4/4) olive brown sandy gravelly clay, low plasticity, moist.	CL	3.0	Hnu = .4 ppm, α = 0 cpm, βB = 100 cpm
1.0	53256 1514 02-04	11	6	Very stiff (2.5Y, 4/4) olive brown sandy gravelly clay low plast. moist, Very stiff, 5Y, 2.5/1 black silty clay low plasticity, slightly moist	CL	3.0	
1.5	53257 1514 02-04	12	0	NR	NA	NA	
2.0	53258 1514 02-04	10	0	NR	NA	NA	Hnu = .4 ppm, α = 0 cpm, βB = 100 cpm
2.5	53259 1525 02-04	4	6	Hard (5Y, 2.5/1) black silty clay, low plasticity, slightly moist.	CL	>4	
3.0	53260 1525 02-04	6	2	Hard (2.5Y, 5/4) Lt. olive brown, mottled silty clay, med. plastic, very slightly moist	CL	>4	
3.5	53261 1525 02-04	6	0	NR	NA	NA	Hnu = 0 ppm, α = 0 cpm, βB = 90 cpm
4.0	53262 1530 02-04	54 cpm	6	Stiff (2.5Y 5/4) light olive brown mottled, silty clay, med plasticity, slightly moist	CL	2.0	
4.5	53263 1530 02-04	57	4	Stiff (2.5Y 5/4) Light olive brown mottled silty clay, trace sand & fine gravel, med plasticity, slightly moist	CL	1.5	
5.0	53264 1540 02-04	6	6	SAA	CL	1.5	Hnu = 0 ppm, α = 0 cpm, βB = 120 cpm
5.5	53265 1540 02-04	6	6	Stiff (5Y, 5/3) olive mottled silty clay, trace fine gravel, low to med plasticity, slightly moist	CL	2.5	
6.0	53266 1540 02-04	7	0	NR	NA	NA	
6.5	53267 1615 02-04	7	6	Med. Dense (2.5Y 5/2) grayish brown sandy silt, trace fine gravel, wet	ML	NA	Hnu = 0 ppm, α = 0 cpm, βB = 100 cpm
7.0	53268 1615 02-04	10	6	Very stiff (2.5Y, 5/2) grayish brown silty clay, some gravel, trace sand, low plasticity, slightly moist to moist	CL	2.5	
7.5	53269 1615 02-04	12	4	Very stiff SAA	CL	2.5	

#2

NOTES: Contractor : Pennsylvania Drilling
Driller : Jim Saccani
Drillers Assistant: Chris Coulter

All samples collected according to ASTM standards soil colors described by Munsell Soil Color Charts.

SAA - same as above
NR - No Recovery

000749

Background Readings/Level
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 80-120

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1510	COORDINATES:	DATE: 2-4-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-4-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 2-4-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	S3270 1630 D2-04	10	6	very stiff (2.5y 5/4) lt olive brown, silty clay, trace fine gravel, low to dry plasticity, low moisture	CL	3.0	Hnu = 0 ppm; α = 0 cpm; β = 100 cpm
8.5	S3271 1630 D2-04	15	6	very stiff (2.5y 4/4) lt olive brown SAA	CL	3.0	
9.0	S3272 1630 D2-04	16	0	NR	NA	NA	
9.5	S3273			~~9.0~~ MG End of Boring, Piezometer installed (9.0 FT)			Hnu = ppm; α = cpm; β = cpm
10.0	S3274						
10.5	S3515						
11.0	S3516						Hnu = ppm; α = cpm; β = cpm
11.5	S3517						
12.0	S3518						
12.5							Hnu = α = β =
13.0							
13.5							
14.0							Hnu = α = β =
14.5							
15.0							

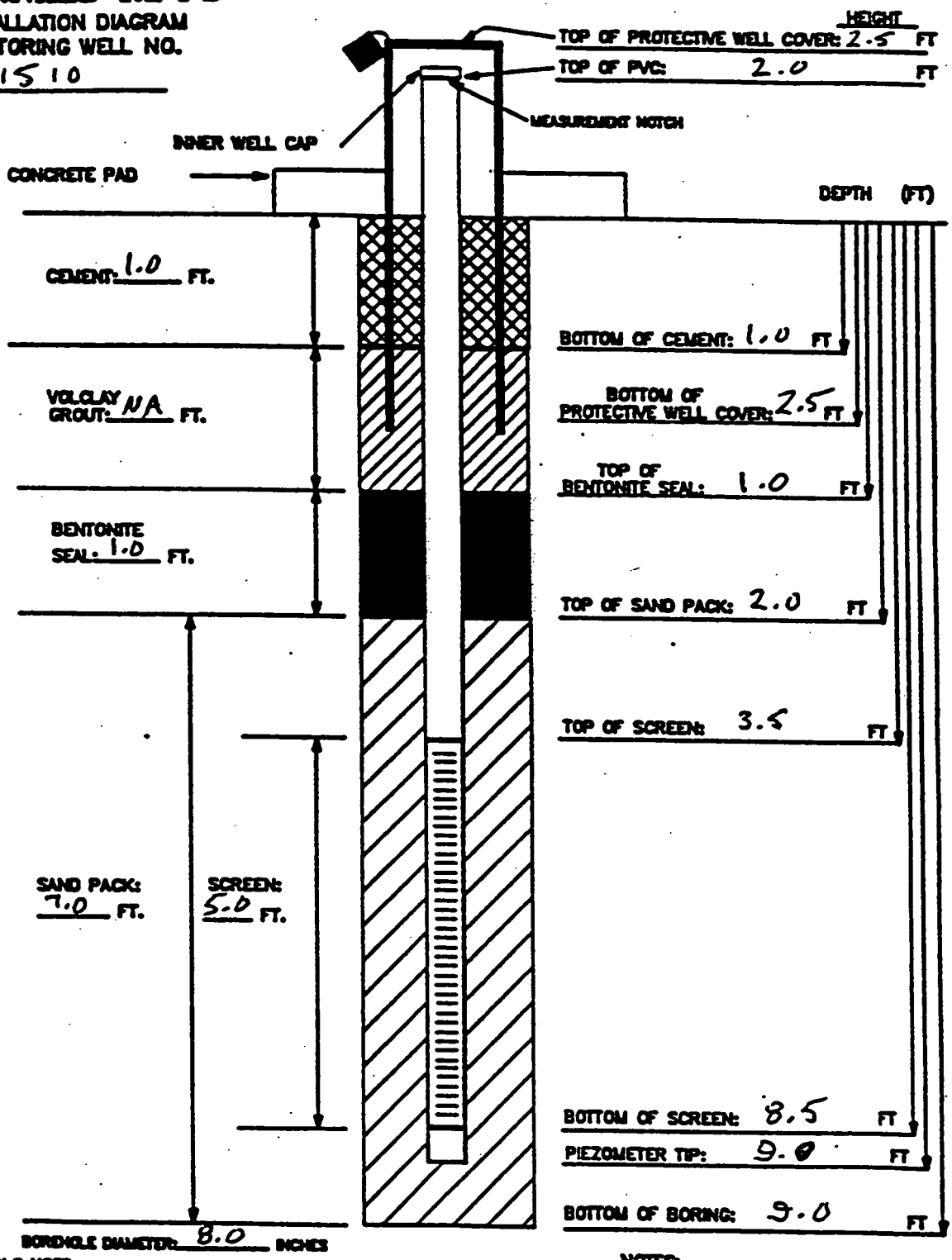
NOTES:

SEE Page 1

INSTALLATION DATE: 2-4-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1510



MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 4 80 lb. sks.
BENTONITE PELLETS (5-GALLON BUCKETS): 1.0
BAGS OF VOLCLAY GROUT: NOT USED
AMOUNT OF CEMENT: ~~2 gal~~ 0.5 sack (94 lb)
AMOUNT OF WATER USED: 3 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 2-4-90
PROJECT NO. 602.3.7.1 CHECKED BY E.T. DATE 2/4/90
BORING NO. 1510
PIEZOMETER NO. 1510 DATE OF INSTALLATION 2-4-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 5.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 1.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK/INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 2.0	TOP	BOTTOM
SAND	TOP 2.0	BOTTOM 9.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 3.5	BOTTOM 8.5	TOP	BOTTOM
PIEZOMETER TIP	9.0			
BOTTOM OF BOREHOLE	9.0			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 6.0 FT – BEGIN H_2O ZONE
6.5 FT – END H_2O ZONE

409-11-86

FERNALD - RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1511	COORDINATES:	DATE: 2-5-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-5-90	
ENGINEER/GEOLOGIST: M GARMAN	Depth Date/Time	DATE COMPLETED: 2-5-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	54450 2-5 1448	17	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. SOME GRAVEL LOW PLASTICITY. LOW MOISTURE.	CL	3.5	Hnu = 0 α = 0 SB = 90 cpm
8.5	54451 2-5 1448	24	6	SAA	CL	3.5	
9.0	54452 2-5 1449	13	0	NR	NA	NA	
9.5	54453 2-5 1452	9	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. TRACE SAND AND GRAVEL. LOW PLASTICITY. LOW MOISTURE.	CL	3.0	Hnu = 0 α = 0 SB = 70-80 cpm
10.0	54454 2-5 1452	8	6	SAA	CL	3.0	
10.5	53775 2-5 1452	13	2	SAA	CL	3.0	
11.0	53776 2-5 1457	18	6	SAA	CL	3.0	Hnu = 0 α = 0 SB = 80 cpm
11.5	53777 2-5 1457	13	4	VERY STIFF (2.5Y, 5/0) DARK GRAY SILTY CLAY. TRACE GRAVEL. LOW TO MED PLASTICITY. LOW MOISTURE.	CL	3.5	
12.0	53778 2-5 1457	17	0	NR	NA	NA	
12.5	53779 2-5 1500	14	6	HARD (2.5Y, 5/0) DARK GRAY CLAY. SOME SILT. TRACE GRAVEL. LOW PLASTICITY. LOW MOISTURE.	CL	>4.0	Hnu = 0 α = 0 SB = 70 cpm
13.0	53780 2-5 1500	17	6	SAA	CL	>4.0	
13.5	53781 2-5 1500	17	6	SAA	CL	>4.0	
14.0				13.5 FT = BOTTOM OF BORING PIEZOMETER INSTALLED			Hnu = α = SB =
14.5							
15.0							

NOTES:

SEE PAGE 1

Date	2/8/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FEPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1511	COORDINATES:	DATE: 2-5-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-5-90	
ENGINEER/GEOLOGIST: M Gorman	Depth Date/Time	DATE COMPLETED: 2-5-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (Inches)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	54435 2-5 1340	2	6	VERY STIFF (2.5Y, 4/4) OLIVE BROWN SILTY CLAY. SOME SAND AND GRAVEL, LOW PLASTICITY. LOW MOISTURE	CL	3.0	Hnu = 0 ppm α = 0 cpm βγ = 80 cpm
1.0	54436 2-5 1348	4	6	HARD (5Y, 2.5/1) BLACK SILTY CLAY LOW PLASTICITY. LOW MOISTURE.	CL	>4.0	
1.5	54437 2-5 1340	7	0	NR	NA	NA	
2.0	54438 2-5 1340	9	0	NR	NA	NA	Hnu = 0 ppm α = 0 cpm βγ = 70 cpm
2.5	54439 2-5 1400	HAND AUGERED N/A	6	HARD (5Y, 2.5/1) BLACK SILTY CLAY LOW PLASTICITY, LOW MOISTURE	CL	>4.0	
3.0	54440 2-5 1437	4	6	STIFF (2.5Y, 4/4) OLIVE BROWN MOTTLED SILTY CLAY. TRACE GRAVEL. MED. PLASTICITY. LOW MOISTURE.	CL	2.0	
3.5	54441 2-5 1437	6	6	SAA	CL	2.0	Hnu = 0 ppm α = 0 cpm βγ = 80 cpm
4.0	54442 2-5 1437	7	6	SAA	CL	2.0	
4.5	54443 2-5 1427	7	2	SAA	CL	2.0	
5.0	54444 2-5 1440	3	0	NR	NA	NA	Hnu = NA α = NA βγ = NA
5.5	54445 2-5 1440	3	0	NR	NA	NA	
6.0	54446 2-5 1440	5	0	NR	NA	NA	
H_2O ZONE 6.5	54447 2-5 1441	4	6	MEDIUM STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY SANDY CLAY. SOME GRAVEL. LOW PLASTICITY. MOIST TO VERY MOIST.	CL	<1.0	Hnu = 0 ppm α = 0 cpm βγ = 70 cpm
7.0	54448 2-5 1441	4	2	SAA	CL	<1.0	
7.5	54449 2-5 1441	5	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : J. SACKA
Drillers Assistant: C. COULTER
All Samples collected according to ASTM Standards. Soil colors described by Munsell Soil Color Charts.

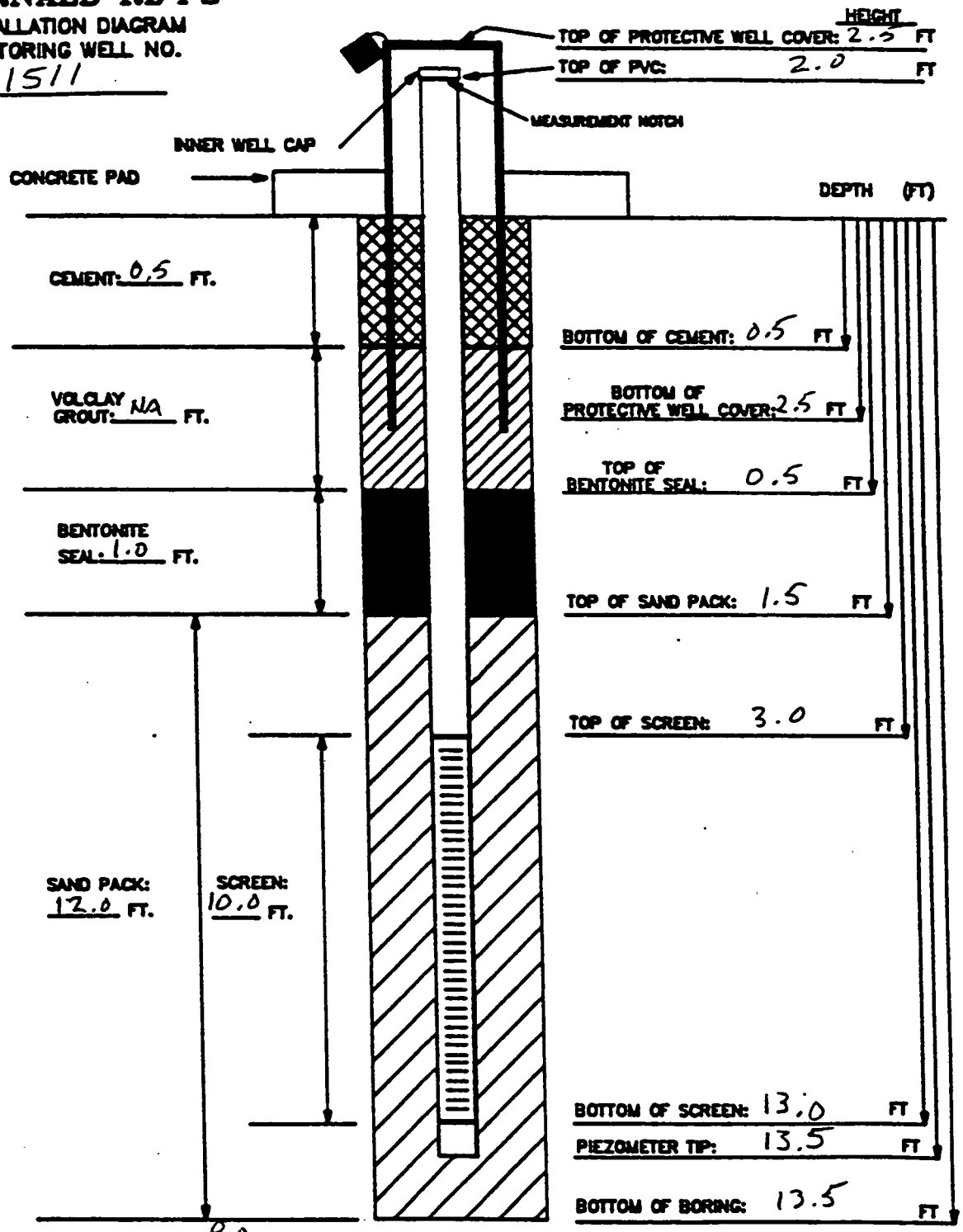
Background Readings/Le
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 60-100

000754

INSTALLATION DATE: 2-5-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1511



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) ~~9.5~~ 6.5 80 lb. SKS
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: ~~[illegible]~~ 0.5 SACK (94 lb)
AMOUNT OF WATER USED: NONE (WATER IN THE HOLE)
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07

GEOLOGIST/ENGINEER: [illegible]

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FACILITIES TESTING FIELD ENG./GEO. M. GARNAN DATE 2-5-90
PROJECT NO. 602.3.7 CHECKED BY E.T. DATE 2/8/90
BORING NO. 1511
PIEZOMETER NO. 1511 DATE OF INSTALLATION 2-5-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 25/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 0.5 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK \ INNER PROTECTIVE CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 1.5	TOP	BOTTOM
SAND	TOP 1.5	BOTTOM 13.5	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 3.0	BOTTOM 13.0	TOP	BOTTOM
PIEZOMETER TIP	13.5			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 6.0 FT – BEGIN H_2O ZONE
7.0 FT – END H_2O ZONE

000756

409-11

FERNALD RI/FS

	Date			
	Initial			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1512	COORDINATES:	DATE: 2-6-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-6-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 2-6-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-Inches)	RECOVERY (Inch)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	51675 0950 2-6	12	6	Med Dense (2.5y 4/4) olive brown silty sand, some gravel, moist.	SM	NA	Hnu = 0 ppm, α = 0 cpm, βB = 80 cpm
1.0	51676 0950 2-6	5	6	Stiff (2.5y 3/2) very dark grayish brown, silty clay, trace gravel, low plasticity low moisture	CL	2.0	
1.5	51677 0950 2-6	4	5	Stiff SAA	CL	2.0	
2.0	51678 0950 2-6	6	0	NR	NA	NA	Hnu = 1 ppm, α = 0 cpm, βB = 100 cpm
2.5	51679 1015 2-6	HAND AUGERED	6	Very stiff (5y, 3/1) Very Dark gray Clayey silt, med to high plastic, moist to wet.	CL	2.5	
3.0	51680 1045 2-6	4	6	Very stiff (5y 4/2) mottled olive gray silty clay, trace gravel, moist, low plasticity	CL	2.5	
3.5	51681 1045 2-6	5	6	SAA	CL	2.5	Hnu = 0 ppm, α = 0 cpm, βB = 80 cpm
4.0	51682 1045 2-6	7	0	NR	NA	NA	
4.5	51683 1045 2-6	8	0	NR	NA	NA	
5.0 (H2O ZONE)	51684 1050 2-6	8	6	Med Dense (2.5y 4/4) olive brown silty sand, some gravel, moist	SM	NA	Hnu = 0.2 ppm, α = 0 cpm, βB = 120 cpm
5.5	51685 1050 2-6	5	6	Stiff (2.5y 3/2) Very Dark grayish brown silty clay, trace gravel, low plasticity, low moisture	CL	2.0	
6.0	51686 1050 2-6	7	4	Very stiff (5y, 5/3) olive silty clay, trace gravel, low to med plasticity low moisture.	CL	2.5	
6.5	51687 1055 2-6	6	6	SAA	CL	2.5	Hnu = 0 ppm, α = 0 cpm, βB = 120 cpm
7.0	51688 1055 2-6	8	5	SAA	CL	2.5	
7.5	51689 1055 2-6	9	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : J. SACCANI
Drillers Assistant: C. COULTER

All samples collected according to ASTM standards for Cores described by Munsell Soil Color Charts.

Background Readings/Cor
Hnu = 0 ppm
Alpha (α) = 0 ppm
Unknown - Beta = 60-100

000757

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1512	COORDINATES:	DATE: 2-6-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-6-90	
ENGINEER/GEOLOGIST: M. Gardman	Depth Date/Time	DATE COMPLETED: 2-6-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
2.0	51690 1058B 2-6	8	6	Very Stiff (2.5y, 5/4) Lt olive brown silty clay, trace fine gravel, low plasticity low moisture.	CL	3.0	Hnu = 0 ppm α = 0 cpm β = 100 cpm
2.5	51691 1058 2-6	10	6	SAA	CL	3.0	
9.0	51692 1059 2-6	11	0	NR	NA	NA	
9.5	51693 1102 2-6	5	6	SAA (7.5-8.0 ft)	CL	3.5	Hnu = 0 ppm α = 0 cpm β = 80 cpm
10.0	51694 1102 2-6	8	6	SAA	CL	3.5	
10.5	51895 1102 2-6	9	2	SAA	CL	3.5	
11.0	51896 1105 2-6	5	6	HARD (2.5y, 5/4) Lt olive brown SILTY CLAY, trace gravel, low plasticity, low moisture.	CL	4.0	Hnu = 0 ppm α = 0 cpm β = 80 cpm
11.5	51897 1105 2-6	7	6	SAA	CL	4.0	
12.0	51898 1105 2-6	13	6	SAA	CL	4.0	
12.5	51899 1120 2-6	20	6	~~Bottom of Boring 2-6-90~~ SAA	CL	4.0	Hnu = 0 ppm α = 0 cpm β = 80 cpm
13.0	51900 1120 2-6	19	6	SAA	CL	4.0	
13.5	51901 1120 2-6	23	6	Very Stiff (5y, 4/1) dark gray silty clay low plasticity, low moisture	CL	3.0	
14.0	51902 1120 2-6	23	5	SAA	CL	3.0	Hnu = 0 ppm α = 0 cpm β = 80 cpm
14.5				Bottom of Boring and Sampling @ 14.0 FT Piezometer installed			
15.0							

NOTES:

See Page 1

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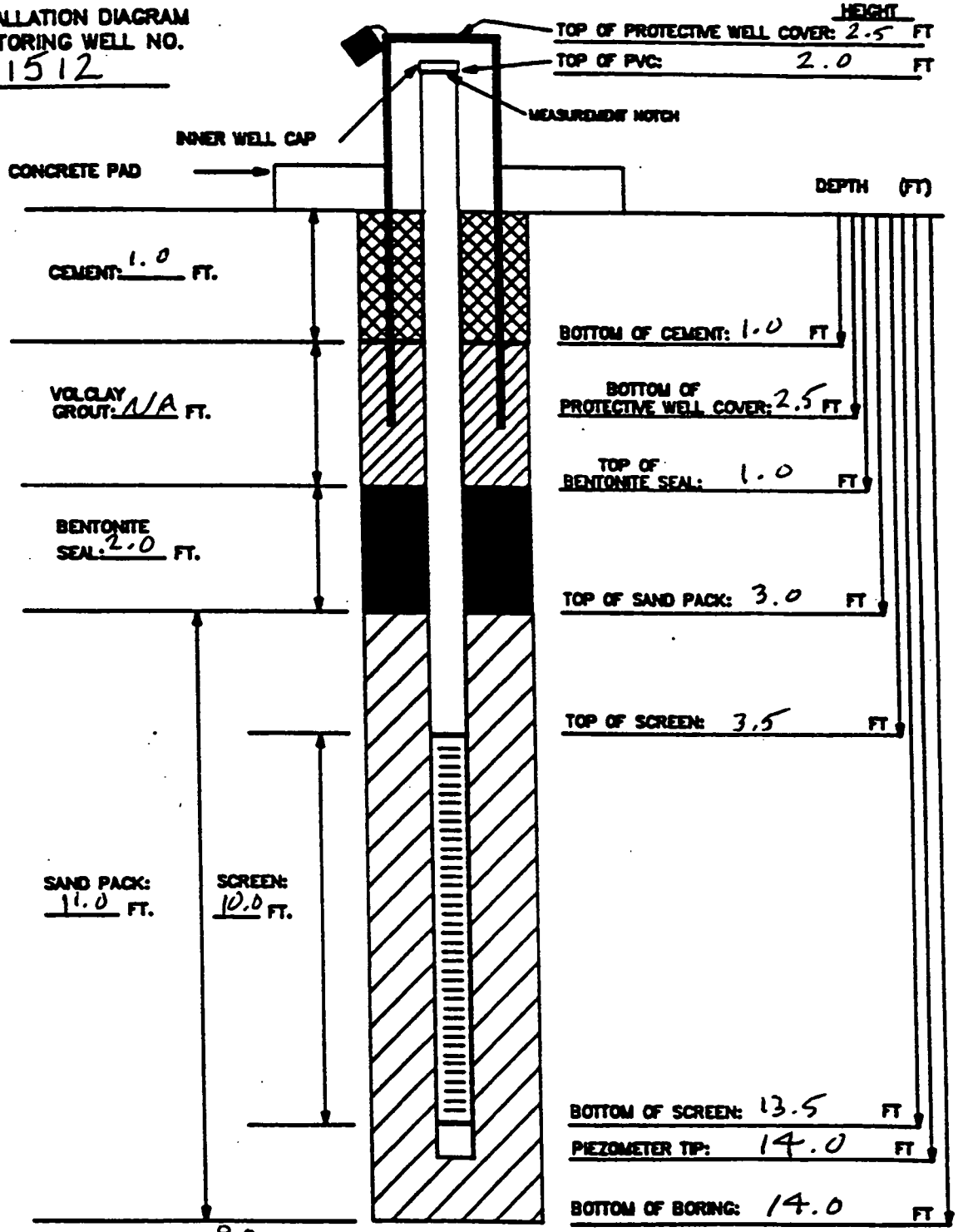
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1512

INSTALLATION DATE: 2-6-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 5.0 80 lb. SKS
BENTONITE PELLETS (5-GALLON BUCKETS): 1.0
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: ~~2 sacks~~ 0.5 SACK (94 lb)
AMOUNT OF WATER USED: 1.5 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 03.07.01 GEOLOGIST/ENGINEER: [signature]

4/2

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Gourman DATE 2-6-90
PROJECT NO. 6023.7 CHECKED BY G.T. DATE 2/8/90
BORING NO. 1512
PIEZOMETER NO. 1512 DATE OF INSTALLATION 2-6-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ ____ TO ____
FLUID NONE FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 1.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK \ INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.5~~ MC 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 3.0	TOP	BOTTOM
SAND	TOP 3.0	BOTTOM 14.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 3.5	BOTTOM 13.5	TOP	BOTTOM
PIEZOMETER TIP	14.0			
BOTTOM OF BOREHOLE	14.0			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 4.5 FT – BEGIN H_2O ZONE
5.0 FT – END H_2O ZONE

Date	2/8/90			
Initial	E.T.			
	Field Clerk	1st Review	2nd Review	Final Review

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 513	COORDINATES:	DATE: 2-6-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-6-90	
ENGINEER/GEOLOGIST: M. Gorman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	53515 1400 2-6	2	6	Med Stiff (2.5y 3/2) very dark grayish brown silty, sandy clay, low plasticity, very moist	CL	1.0	Hnu = 0 ppm; α = 0 cpm; βB = 80 cpm
1.0	53516 1400 2-6	3	6	Stiff (2.5y 3/2) very dark grayish brown silty clay, low plasticity, low moisture	CL	1.5	
1.5	53517 1400 2-6	4	4	SAA	CL	1.5	
2.0	53518 1400 2-6	4	0	NR	NA	NA	Hnu: 0.2 ppm; α = 0 cpm; βB = 80 cpm
2.5	53519 1445 2-6	HAND AUGERED	6	Very Stiff (2.5y, 5/6) Lt olive brown silty clay, low to med plasticity, low moisture	CL	2.5	
3.0	53520 1445 2-6	2	6	Very stiff (2.5y, 5/4) Lt. olive brown silty clay, trace gravel, low plasticity, slightly moist to moist	CL	2.5	
3.5	53521 1445 2-6	4	6	SAA	CL	2.5	Hnu = 0 ppm; α = 0 cpm; βB = 80 cpm
4.0	53522 1445 2-6	7	3	SAA	CL	2.5	
4.5	53523 1445 2-6	9	0	NR	NA	NA	
5.0	53524 1450 2-6	7	6	Very Stiff (2.5y, 5/4) Lt olive brown silty clay, trace gravel, low plasticity, slightly moist	CL	3.5	Hnu = 0.2 ppm; α = 0 cpm; βB = 60-80 cpm
5.5	53525 1450 2-6	9	6	SAA	CL	3.5	
6.0	53526 1450 2-6	12	1	SAA	CL	3.5	
6.5	53527 1452 2-6	7	6	HARD SAA	CL	4.0	Hnu = 0 ppm; α = 0 cpm; βB = 120 cpm
7.0	53528 1452 2-6	10	6	SAA	CL	4.0	
7.5	53529 1452 2-6	10	3	SAA	CL	4.0	

NOTES: Contractor: Pennsylvania Drilling
Driller: Jim Saccani
Drillers Assistant: Chris Coulter.

All samples collected according to ASTM Standards. Soil colors denoted by Munsell Soil Color Charts.

SAA - same as above
NR - NO RECOVERY

Background Readings

Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 60-80 cpm

000761

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1513	COORDINATES:	DATE: 2-6-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-6-90	
ENGINEER/GEOLOGIST: Mcarman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	53530 1454 2-6	13	6	Hard (2.5y 5/4) Lt olive brown silty clay, trace gravel, low plasticity, low moisture	CL	4.0	Hnu = 0 ppm, α = 0 cpm, β = 80 cpm
8.5	53531 1454 2-6	18	6	Very stiff SAA	CL	2.5	
9.0	53532 1454 2-6	15	2	Very stiff SAA	CL	2.5	
9.5	53533 1503 2-6	13	6	Very stiff 2.5y 5/4 Lt olive brown silty clay, trace gravel, low plasticity, low moisture	CL	3.0	Hnu = 0 ppm, α = 0 cpm, β = 80 cpm
10.0	53534 1503 2-6	12	6	Very stiff SAA	CL	3.0	
10.5	53255 1503 2-6	15	6	Very stiff SAA	CL	3.0	
11.0	53256 1508 2-6	10	6	Very stiff SAA	CL	3.0	Hnu = 0 ppm, α = 0 cpm, β = 100 cpm
11.5	53257 1508 2-6	12	6	HARD SAA	CL	>4.0	
12.0	53258 1508 2-6	14	6	HARD SAA	CL	>4.0	
12.5	53259 1515 2-6	13	6	HARD (2.5y, 4/4) olive brown silty clay, trace gravel, low plasticity, low moisture	CL	>4.0	Hnu = 0 ppm, α = 0 cpm, β = 60 cpm
13.0	53260 1515 2-6	16	6	HARD SAA	CL	>4.0	
13.5	53261 1515 2-6	17	2	HARD SAA	CL	>4.0	
14.0	53262 1520 2-6	16	6	HARD SAA	CL	>4.0	Hnu = 0 ppm, α = 0 cpm, β = 80 cpm
14.5	53263 1520 2-6	16	6	Very stiff (5y, 5/1) gray, silty clay, trace gravel, low to med plasticity, low moisture	CL	2.5	
15.0	53264 1520 2-6	19	6	Very stiff SAA	CL	2.5	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1513	COORDINATES:	DATE: 2-06-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-06-90	
ENGINEER/GEOLOGIST: M. Learman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	53265 1533 2-6	3	6	Stiff (5y, 5/1) gray silty clay, trace gravel, low to med plasticity, low moisture	CL	2.0	Ham = 0 ppm, α = 0 cpm, βB = 80 cpm
16.0	53266 1533 2-6	9	4	M. Dense (5y, 5/1) gray clayey silt, trace gravel, moist	ML	NA	
16.5	53267 1533 2-6	10	0	NR	NA	NA	
17.0	53268 1538 2-6	10	6	Med. Dense (5y, 5/1) gray clayey silt, trace gravel, moist	ML	NA	Ham = 0 ppm, α = 0 cpm, βB = 60-80 cpm
17.5	53269 1538 2-6	13	6	SAA	ML	NA	
18.0	53270 1538 2-6	10	6	~~Med~~ Stiff (5y 5/1) gray silty clay trace gravel, med plasticity, moist	CL	1.5	
18.5	53271 1548 2-6	8	6	Stiff SAA	CL	1.5	Ham = 0 ppm, α = 0 cpm, βB = 60 cpm
19.0	53272 1548 2-6	12	6	Med Dense (5y, 5/1) gray clayey silt, trace gravel, moist	ML	NA	
19.5	53273 1548 2-6	10	6	SAA	ML	NA	
20	53274 1548 2-6	14	0	NR	NA	NA	Ham = NA, α = NA, βB = NA
				Bottom of Boring and Sampling @ 20 Ft PIEZOMETER INSTALLED			

H_2O ZONE

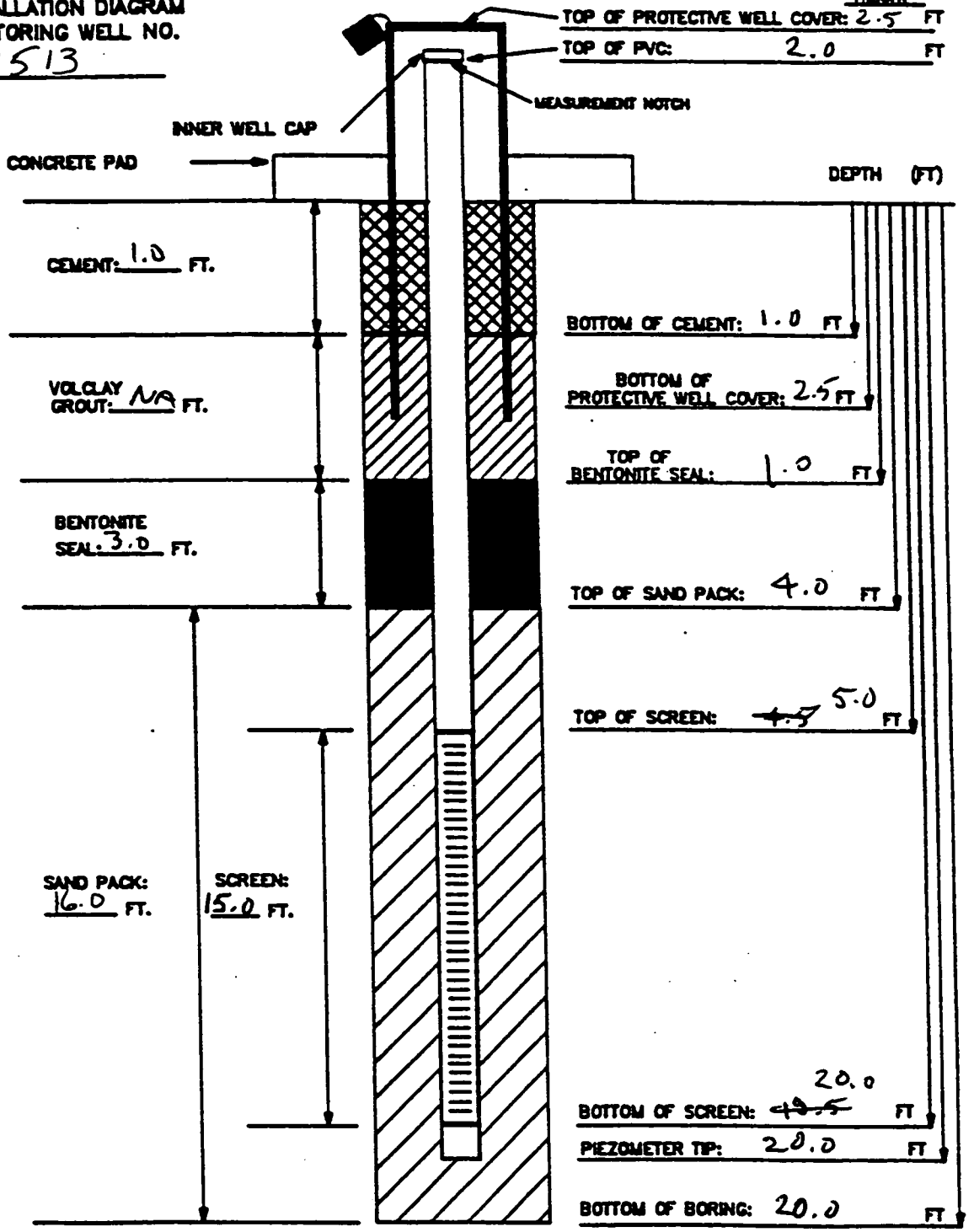
NOTES:

SEE PAGE

INSTALLATION DATE: 2-7-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1513



BOREHOLE DIAMETER: _____ INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1020) 8.0 80 lb. sacks
BENTONITE PELLETS (5-GALLON BUCKETS): 2.0
BAGS OF VOLCLAY GROUT: None used
AMOUNT OF CEMENT: ~~8 gal~~ 0.5 sack (94 lb.)
AMOUNT OF WATER USED: 2.0 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.7.1

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC\RI\FS FACILITIES TESTING FIELD ENG./GEO. M GARMAN DATE 2-7-90
PROJECT NO. 602 3.7.1 CHECKED BY RK DATE 2/8/90
BORING NO. 1513
PIEZOMETER NO. 1513 DATE OF INSTALLATION 2-7-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE FROM ~~TO~~	SIZE NONE FROM ~~TO~~
FLUID NONE FROM ~~TO~~	SIZE NONE FROM ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC	RISER PIPE MATERIAL SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 IN I.D. 2.0 IN
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 5.0 FT, 2.0 FT
AVERAGE SIZE OF PERFORATIONS 0.02 IN	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 15.0 FT	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT	OTHER PROTECTION LOCK\INNER
PROTECTIVE PIPE O.D. 4 3/8 IN	LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.0	TOP	BOTTOM
SAND	TOP 4.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 5.0	BOTTOM 20.0	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW CREW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 15.5 FT - BEGIN H_2O ZONE
13.5 FT - END H_2O ZONE
15 FT SCREEN USE BECAUSE OF APPARENT SEAMS OF WATER ENTRY ABOVE A DEPTH OF 10.0 FT.

000765

5711

	Date	2/8/90			
	Initial	E.T.			
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1514	COORDINATES:	DATE: 2-7-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-7-90	
ENGINEER/GEOLOGIST: M. Gorman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	NR = NO RECOVERY DESCRIPTION SAA - SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	54555 2-7 1545	2	6	Stiff (2.5y, 3/2) V. Dark grayish brown silty clay, some sand, low plasticity, very moist	CL	1.0	Hnu = 0 ppm α = 0 cpm βB = 100 cpm
1.0	54556 2-7 1545	3	4	Stiff (2.5y, 4/2) dark grayish brown silty clay, low plasticity, moist	CL	1.0	
1.5	54557 2-7 1545	2	0	NR	NA	NA	
2.0	54558 2-7 1545	2	0	NR	NA	NA	Hnu = 0 ppm α = 0 cpm βB = 140 cpm
2.5	54559 1550 2-7	2	6	Stiff (2.5y, 4/4) olive brown silty sandy clay, some gravel, low plasticity, moist	CL	1.5	RN HSL SAMPLE # 53782 WAS HAND AUGERED AT 2.0-2.5 FT ON 2-6-90 @ 1700
3.0	54560 1550 2-7	7	6	Very Stiff (2.5y, 5/4) Lt. olive brown mottled silty clay, low plasticity, low moisture	CL	2.5	
3.5	54561 1550 2-7	10	2	SAA	CL	2.5	Hnu = 0 ppm α = 0 cpm βB = 80 cpm
4.0	54562 1550 2-7	10	0	NR	NA	NA	
4.5	54563 1554 2-7	10	6	Very Stiff (2.5y, 5/4) Lt olive brown silty clay, (mottled) trace gravel trace sand, low plasticity, low moisture	CL	2.0	
5.0	54564 1554 2-7	10	6	SAA	CL	2.0	Hnu = 0 ppm α = 0 cpm βB = 80 cpm
5.5	54565 1554 2-7	12	4	SAA	CL	2.0	
6.0	54566 1554 2-7	11	0	NR	NA	NA	
H_2O zone 6.5	54567 1608 2-7	4	6	Stiff (2.5y, 3/4) Lt olive brown silty clay trace gravel, with a sand seam occurring at 6.5 feet, low plasticity, slightly moist to moist	CL	1.0	Hnu = 0 ppm α = 0 cpm βB = 80 cpm
7.0	54568 1608 2-7	10	4	Stiff (2.5y, 5/4) Lt olive brown silty clay, trace sand and gravel, slightly moist	CL	1.0	
7.5	54569 1608 2-7	9	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : Jim Seccani
Drillers Assistant: Chris Coulter

All Samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Charts.

NR = No Recovery

Background Readings/Lev.
Hnu = 0 ppm
Alpha (α) = 0 cpm
Gamma - Beta = 80 cpm

000766

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1514	COORDINATES:	DATE: 2-7-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-7-90	
ENGINEER/GEOLOGIST: M. Lorman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	NR = NO RECOVERY DESCRIPTION SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	54570 1610 2-7	0 0	6	Very stiff (2.5y,5/4) Lt olive brown silty clay, some sand and gravel, low to med plasticity, low moisture	CL	2.0	Hnu = 0 ppm α = 0 cpm β = 80 cpm
8.5	54571 1610 2-7	8	6	SAA	CL	2.0	
9.0	54572 1610 2-7	13	2	SAA	CL	2.0	
9.5	54573 1613 2-7	10	6	Very stiff (2.5y,5/4) Lt olive brown silty clay, trace gravel, low plasticity low moisture	CL	3.0	Hnu = 0 ppm α = 0 cpm β = 90 cpm
10.0	54574 1613 2-7	13	6	SAA	CL	3.0	
10.5	54935 1613 2-7	15	6	SAA	CL	3.0	
11.0	54936 1620 2-7	4	6	SAA	CL	3.5	Hnu = 0 ppm α = 0 cpm β = 80 cpm
11.5	54937 1620 2-7	9	6	HARD SAA	CL	4.0	
12.0	54938 1620 2-7	10	4	HARD SAA	CL	4.0	
12.5	54939 1625 2-7	10	6	SAA	CL	>4.0	Hnu = 0 ppm α = 0 cpm β = 80 cpm
13.0	54940 1625 2-7	10	6	HARD (5y,4/1) dark gray, silty clay, trace gravel, low plasticity, low moisture	CL	>4.0	
13.5	54941 1625 2-7	12	4	SAA	CL	>4.0	
14.0	54942			Bottom of Boring and sampling at 13.5 FT PIEZOMETER INSTALLED			Hnu = ppm α = cpm β = cpm
14.5	54943						
15.0	54944						

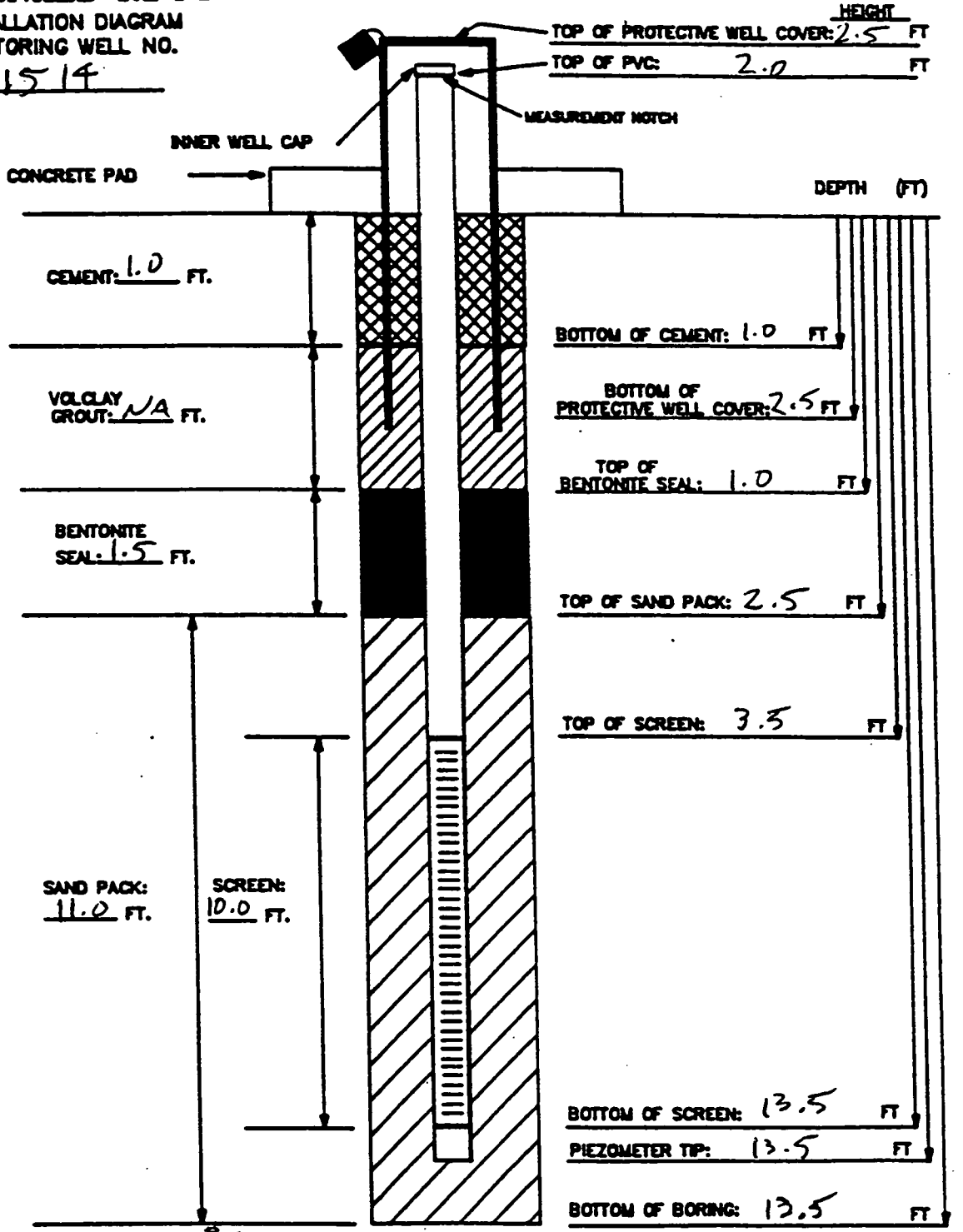
NOTES:

SEE PAGE 1

INSTALLATION DATE: 2-7-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1514



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (10 x 20) 5 80 lb. SKS.
BENTONITE PELLETS (5-GALLON BUCKETS): 1.0
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: ~~[illegible]~~ .5 SAK (94 lb)
AMOUNT OF WATER USED: 1.5 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.77.1 GEOLOGIST/ENGINEER: [illegible]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RAFS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 2-7-90
PROJECT NO. 602.3.7.1 CHECKED BY E.T. DATE 2/8/90
BORING NO. 1514
PIEZOMETER NO. 1514 DATE OF INSTALLATION 2-7-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ~~TO~~
FLUID NONE FROM ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ~~TO~~
SIZE NONE FROM ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 0.5 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK / INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 2.5	TOP	BOTTOM
SAND	TOP 2.5	BOTTOM 13.5	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 3.5	BOTTOM 13.5	TOP	BOTTOM
PIEZOMETER TIP	13.5			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW TEAM			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 6.0 FT - BEGIN H_2O ZONE
6.5 FT - END H_2O ZONE

	Date	2/8/90			
	Initial	E.T.			
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1515	COORDINATES:	DATE: 2-7-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-7-90	
ENGINEER/GEOLOGIST: M. Gearman	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6" Intervals)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	2-7 1340 52255	3	6	Soft (2.5y 4/2) Dk grayish brown silty clay med plastic, very moist. 4 in. Med dense (2.5y 4/4) olive brown clayey sand very moist	CL / SC	0.5 / NA	Hnu = 0 ppm α = 0 cpm βB = 80 cpm
1.0	2-7 1340 52256	7	6	Very stiff (2.5y 3/2) very dark grayish brown silty clay, low plasticity, low moisture	CL	3.5	
1.5	2-7 1340 52257	8	4	SAA	CL	3.5	
2.0	2-7 1340 52258	9	0	NR	NA	NA	Hnu = .2 ppm α = 0 cpm βB = 80 cpm
2.5	2-7 1415 52259	HAND AUGERED	6	Very stiff (2.5y 5/4) Lt olive brown mottled silty clay, low to med plasticity low moisture	CL	3.0	
3.0	2-7 1424 52260	3	6	Very stiff (2.5y 5/6) Lt olive brown mottled silty clay, trace sand & gravel low plasticity, moist, (water seam)	CL	2.5	
3.5	2-7 1424 52261	5	6	SAA	CL	2.5	Hnu = 0 ppm α = 0 cpm βB = 80 cpm
4.0	2-7 1424 52262	7	2	SAA	CL	2.5	
4.5	2-7 1424 52263	9	0	NR	NA	NA	
5.0	2-7 1428 52264	10	6	Soft (2.5y 4/4) olive brown gravelly clay, ~~some~~ trace silt, low plasticity, wet CAM 2-7-90	CL	<.5	Hnu = 0 ppm α = 0 cpm βB = 80-100 cpm
5.5	2-7 1428 52265	13	6	Hard (2.5y 5/4) Lt olive brown silty clay trace gravel, low plasticity, moist	CL	>4.0	
6.0	2-7 1428 52266	10	3	SAA	CL	~~3.5~~ >4.0	CAM 2-7-90
6.5	2-7 1430 52267	6	6	Very stiff SAA + Low moisture	CL	3.5	Hnu = 0 ppm α = 0 cpm βB = 80-100 cpm
7.0	2-7 1430 52268	7	6	Very stiff (2.5y 5/4) Lt olive brown silty clay, trace gravel, low plasticity, low moisture	CL	3.5	
7.5	2-7 1430 52269	9	0	NR	NA	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : Tom Succani
Drillers Assistant : Chris Cutter

All Samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Charts.

SAA - Same as above
NR - No Recovery

Background Readings/Le

Hnu = 0 ppm
Alpha (α) = 0 ppm
Gamma - Beta = 80

000770

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1515	COORDINATES:	DATE: 2-7-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-7-90	
ENGINEER/GEOLOGIST: M. Garmen.	Depth Date/Time	DATE COMPLETED: 2-7-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 4	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	52270 1435 2-7	9	6	Very stiff (2.5y 5/4) Lt olive brown, silty clay, trace gravel, low plasticity, low moisture	CL	3.5	Hnu = 0 ppm
8.0				Med Dense (2.5y, 5/4) Lt olive brown clayey silt very moist	ML	NA	α = 0 cpm
	52271 1435 2-7	13	6	Very Stiff (2.5y 5/4) Lt olive brown, silty clay, trace gravel, low plasticity, low moisture.	CL	2.5	β = 80 cpm
8.5							
	52272 1435 2-7	16	4	Med Dense (2.5y, 5/4) Lt olive brown clayey silt, very moist	ML	NA	
9.0							
	52273 1445 2-7	9	6	Hard (2.5y, 5/4) Lt olive brown silty clay, trace gravel, low plasticity, low moisture	CL	4.0	Hnu = 0 ppm
9.5							α = 0 cpm
	52274 1445 2-7	9	6	SAA	CL	4.0	β = 80 cpm
10.0							
	54435 1445 2-7	13	5	SAA	CL	4.0	
10.5							
	54436 1452 2-7	15	6	SAA	CL	4.0	Hnu = 0 ppm
11.0							α = 0 cpm
	54437 1452 2-7	13	6	SAA	CL	4.0	β = 80-100 cpm
11.5							
	54438 1452 2-7	13	6	SAA	CL	4.0	
12.0							
	54439 1458 2-7	12	6	SAA	CL	4.0	Hnu = 0 ppm
12.5							α = 0 cpm
	54440 1458 2-7	14	6	Hard (5y, 4/1) Dark gray silty clay low plasticity, low moisture	CL	>4.0	β = 80-100 cpm
13.0							
	54441 1458 2-7	15	0	NR	NA	NA	
13.5							
				Bottom of Boring and Sampling at 13.5 ft Piezometer installed			Hnu =
14.0							α =
14.5							β =
15.0							

H_2O ZONE

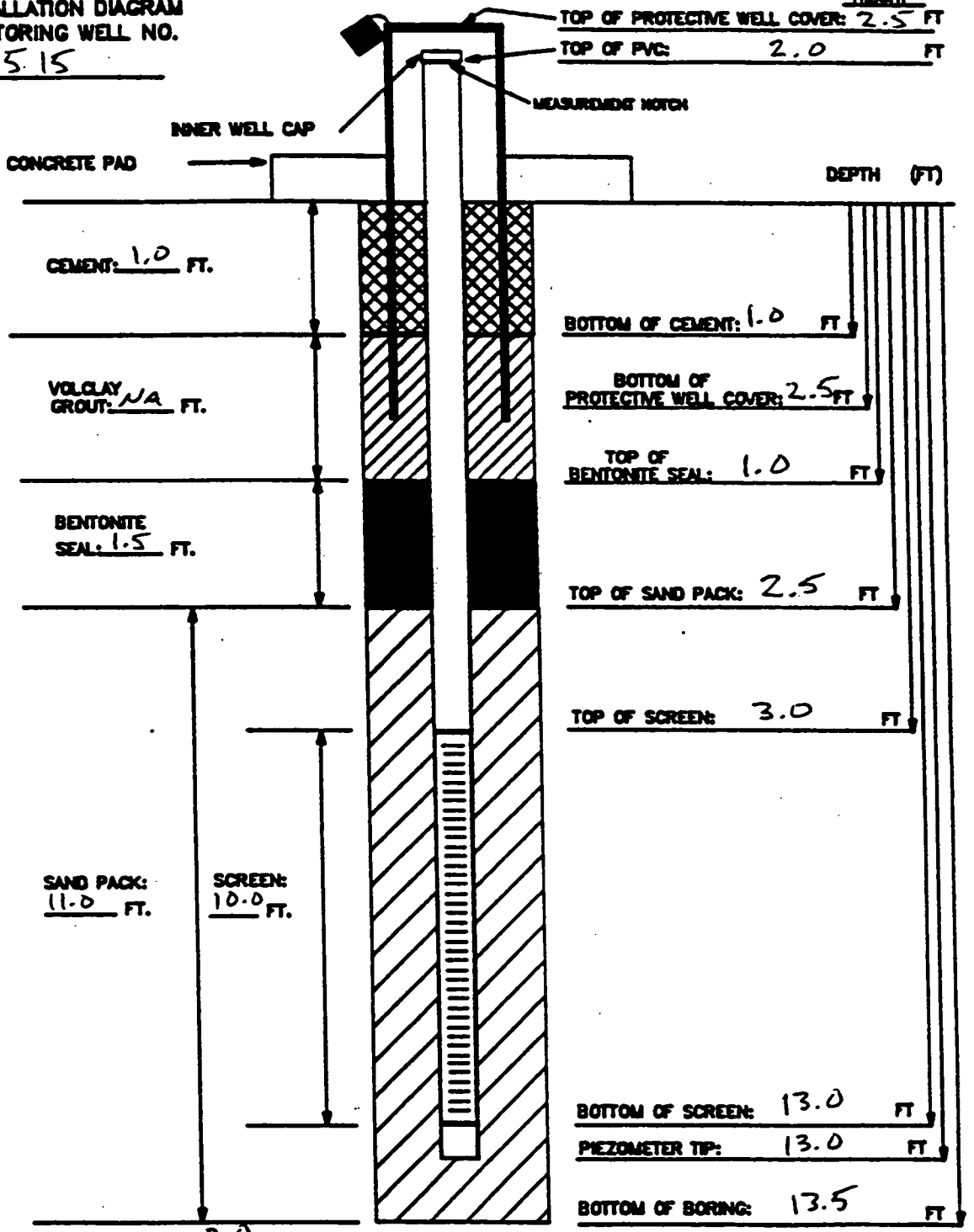
NOTES:

SEE Page 1

INSTALLATION DATE: 2-7-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
15.15



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: (1026) 5 80 lb sacks
BENTONITE PELLETS (5-GALLON BUCKETS): (0.5)
BAGS OF VOLCLAY GROUT: none used
AMOUNT OF CEMENT: 0.5 sak (94 lb)
AMOUNT OF WATER USED: 2.0 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602 3.7.1 GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS FACILITIES TESTING FIELD ENG./GEO. M. GARMAN DATE 2-7-90
PROJECT NO. 607.3.7.1 CHECKED BY E.T. DATE 2/8/90
BORING NO. 1515
PIEZOMETER NO. 1515 DATE OF INSTALLATION 2-7-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ~~TO~~ →
FLUID NONE FROM ~~TO~~ →

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~ →
SIZE NONE ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 5.0 FT, 0.5 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION LOCK \ INNER LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 2.5	TOP	BOTTOM
SAND	TOP 2.5	BOTTOM 13.5	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 3.0	BOTTOM 13.0	TOP	BOTTOM
PIEZOMETER TIP	13.0			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	TO BE MEASURED BY GW TEAM			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS ~ 7.8 FT – BEGIN H_2O ZONE
9.0 FT – END H_2O ZONE

000773

409-11

	Date:	5/30/90			
	Initial	ST			
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1516	COORDINATES:	DATE: 5-19-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-19-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-19-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (Inch)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	SS371 5-19 1010	2	6	LOOSE (10YR, 4/2) DARK GRAYISH BROWN CLAYEY SILT. TRACE FINE SAND. SLIGHTLY MOIST.	ML	NA	Hnu = 0
1.0	SS372 5-19 1010	3	6	LOOSE (10YR, 4/2) DARK GRAYISH BROWN SILTY FINE SAND. SLIGHTLY MOIST.	SM	NA	α = 0
1.5	SS373 5-19 1010	2	2	SAA	SM	NA	βB = 80 cpm
2.0	SS374 5-19 1026	20	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN MEDIUM GRAINED SAND. TRACE SILT. LOW MOISTURE.	SP	NA	Hnu = 0
2.5	SS375 5-19 1026	15	5	SAA.	SP	NA	α = 0
3.0	SS376 5-19 1026	14	0	NR	NA	NA	βB = 80 cpm
3.5	SS377 5-19 1030	16	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE.	SW	NA	Hnu = 0
4.0	SS378 5-19 1030	14	6	SAA	SW	NA	α = 0
4.5	SS379 5-19 1030	17	2	SAA	SW	NA	βB = 80 cpm
5.0	SS380 5-19 1046	2	6	LOOSE (10YR, 5/2) GRAYISH BROWN SILTY MEDIUM GRAINED SAND. LOW MOISTURE.	SM	NA	Hnu = 0
5.5	SS381 5-19 1046	3	0	NR	NA	NA	α = 0
6.0	SS382 5-19 1046	4	0	NR	NA	NA	βB = 90 cpm
6.5	SS383 5-19 1050	6	6	MEDIUM DENSE (10YR, 5/2) GRAYISH BROWN SILTY MEDIUM GRAINED SAND. LOW MOISTURE.	SM	NA	Hnu = 0
7.0	SS384 5-19 1050	11	4	MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE.	SW	NA	α = 0
7.5	SS385 5-19 1050	14	0	NR	NA	NA	βB = 90 cpm

NOTES: Contractor : Pennsylvania Drilling
Driller : CRAIG COULTER
Driller's Assistant: GARY KREPPS

All samples collected according to ASTM Standards Soil Colors described by Munsell Soil Color Charts.

Background Readings/Levels
Hnu = 0 ppm.
Alpha (α) = 0 dpm
Gamma - Beta = 40-80 dpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1516	COORDINATES:		DATE: 5-19-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 5-19-90
ENGINEER/GEOLOGIST: M.GARMAN	Depth	Date/Time	DATE COMPLETED: 5-19-90
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)			PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
8.0	55386 5-19 1055	34	6	VERY DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE.	SW	NA	Hnu = 0, α = 0, β = 80 cpm
8.5	55387 5-19 1055	30	6	SAA	SW	NA	
9.0	55388 5-19 1056	22	2	SAA	SW	NA	
9.5	55389 5-19 1105	5	6	MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED SAND, LOW MOISTURE.	SW	NA	Hnu = 0, α = 0, β = 80cpm
10.0	55390 5-19 1105	12	6	SAA	SW	NA	
10.5	55391 5-19 1105	15	2	SAA	SW	NA	
11.0	55392 5-19 1110	6	6	DENSE (10YR, 5/3) BROWN WELL GRADED SAND. TRACE SILT. MOIST.	SW	NA	Hnu = 0, α = 0, β = 90cpm
11.5	55393 5-19 1110	20	6	SAA	SW	NA	
12.0	55394 5-19 1110	28	3	SAA	SW	NA	
12.5	55395 5-19 1126	20	6	VERY DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. MOIST.	SW	NA	Hnu = 0, α = 0, β = 80cpm
13.0	55396 5-19 1126	31	6	SAA	SW	NA	
13.5	55397 5-19 1126	27	0	NR	NA	NA	
14.0	55398 5-19 1129	7	6	MEDIUM DENSE (10YR, 4/2) DARK GRAYISH BROWN WELL GRADED SAND (FINE TO MEDIUM GRAINED). SOME SILT. MOIST.	SW	NA	Hnu = 0, α = 0, β = 90cpm
14.5	55399 5-19 1129	11	6	SAA	SW	NA	
15.0	55400 5-19 1129	12	4	SAA	SW	NA	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1516	COORDINATES:	DATE: 5-19-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-19-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-19-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
BEGIN H_2O ZONE							
15.5	55401 5-19 1332	6	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME SILT. VERY MOIST.	SW	NA	Hum = 0, α = 0, βB = 80 cpm
16.0	55402 5-19 1332	18	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. WET.	SW	NA	
16.5	55403 5-19 1332	22	0	NR	NA	NA	
17.0	55404 5-19 1335	12	6	DENSE (10YR, 5/3) BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET.	SW	NA	Hum = 0, α = 0, βB = 80 cpm
17.5	55405 5-19 1335	17	6	SAA	SW	NA	
18.0	55406 5-19 1335	18	6	SAA	SW	NA	
18.5	55407 5-19 1340	8	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. WET.	SW	NA	Hum = 0, α = 0, βB = 80 cpm
19.0	55408 5-19 1340	12	6	SAA	SW	NA	
19.5	55409 5-19 1340	17	6	DENSE (10YR, 5/2) BROWN WELL GRADED SAND. SOME SILT. TRACE GRAVEL. WET.	SW	NA	
20	55410 5-19 1340	20	4	SAA	SW	NA	Hum = 0, α = 0, βB = 80 cpm
				20.0 FT - BOTTOM OF BORWG PIEZOMETER INSTALLED			

NOTES:

SEE PAGE 1

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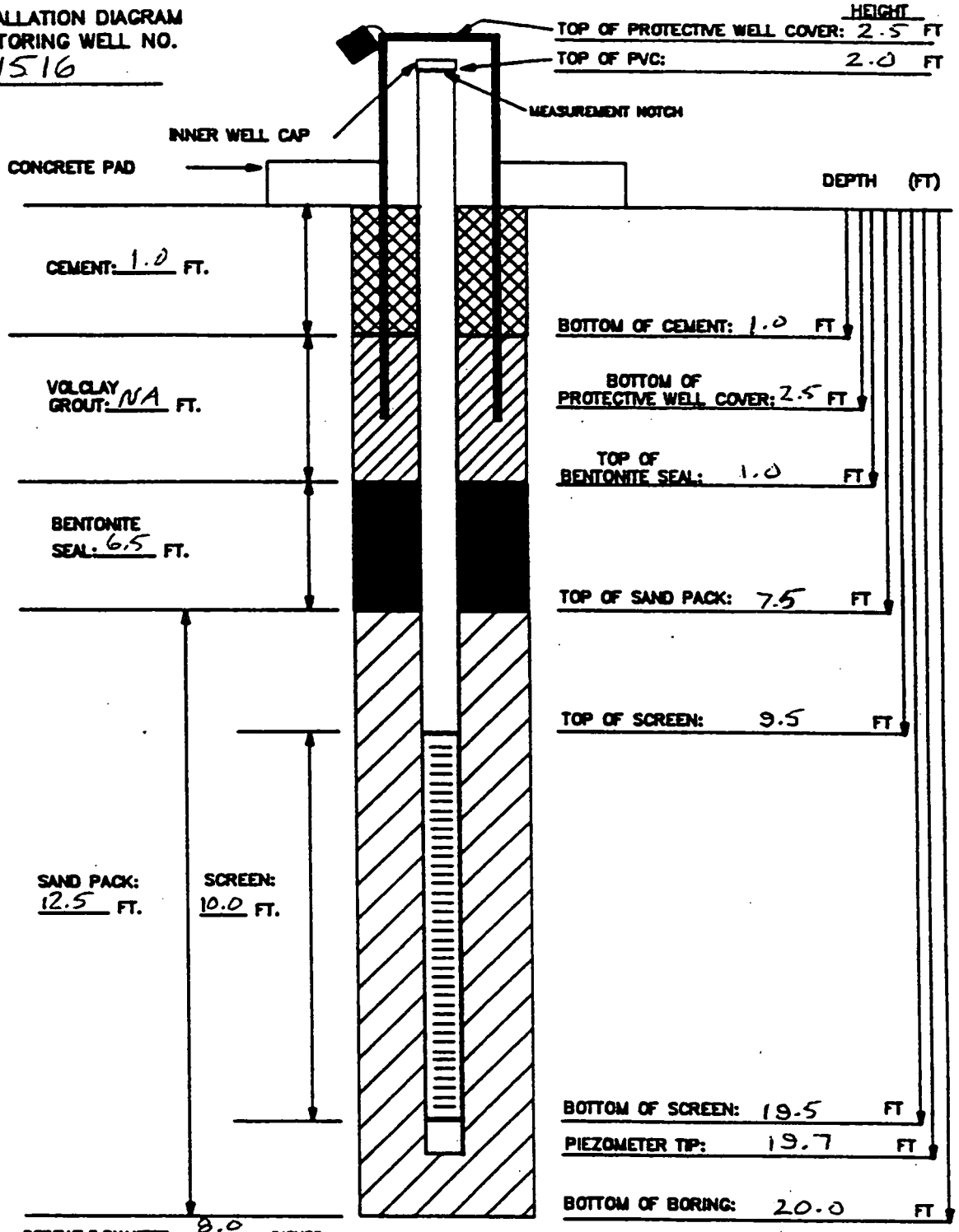
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1516

INSTALLATION DATE: 5-19-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 3 BAGS 10/20 SAND (80 lbs. EACH)
BENTONITE PELLETS (5-GALLON BUCKETS): 5-5 gal. BUCKETS
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 0.5 BAGS (30 lbs. each)
AMOUNT OF WATER USED: 2.5 gallons
OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.7

GEOLOGIST/ENGINEER: [signature]

5/5

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS FIELD ENG./GEO. M. GARMAN DATE 5-19-90
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 5-30-90
BORING NO. 1516
PIEZOMETER NO. 1516 DATE OF INSTALLATION 5-19-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC.
DIAMETER OF PERFORATED SECTION 2.0 IN I.D
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 10.0 FT, 1.7 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION HINGED LOCKING COVER W\ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: MG 5-19-90 CEMENT ~~GROUT/SLURRY NONE USED~~	TOP MG 5-19-90 ~~NA~~ 0.0	BOTTOM ~~NA~~ TC 5-19-90 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 7.5	TOP	BOTTOM
SAND	TOP 7.5	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP	BOTTOM
PIEZOMETER TIP	19.7			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS PIEZOMETER WAS TO BE SET AT 20.0 FT, BUT CAME UP 0.3 FT DURING INSTALLATION
15.0 FT - BEGIN H_2O ZONE

FERNALD RI/FS

Initials	Date
Input Check	5/3/90
1st Key In	
2nd Key In	
Hard Copy Verified	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1517	COORDINATES:	DATE: 5-20-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-20-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-21-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	55413 5-20 1040	3	6	MEDIUM DENSE (10YR, 5/3) DARK BROWN SILT, SOME CLAY, TRACE SAND. LOW MOISTURE.	ML	NA	Hnu = 0, α = 0, βB = 80 cpm
1.0	55414 5-20 1040	7	0	NR	NA	NA	
1.5	55415 5-20 1040	9	0	NR	NA	NA	
2.0	55416 5-20 1050	4	4	LOOSE (10YR, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. TRACE GRAVEL. LOW MOISTURE.	ML	NA	Hnu = 0, α = 0, βB = 70 cpm
2.5	55417 5-20 1050	5	0	NR.	NA	NA	
3.0	55418 5-20 1050	5	0	NR	NA	NA	
3.5	55419 5-20 1054	5	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE.	SM	NA	Hnu = 0, α = 0, βB = 80 cpm
4.0	55420 5-20 1054	9	6	SAA	SM	NA	
4.5	55421 5-20 1054	9	0	NR	NA	NA	
5.0	55422 5-20 1119	8	6	MEDIUM DENSE (10YR, 5/3) BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE.	SM	NA	Hnu = 0, α = 0, βB = 70 cpm
5.5	55423 5-20 1119	9	0	NR	NA	NA	
6.0	55424 5-20 1119	9	0	NR	NA	NA	
6.5	55425 5-20 1123	7	6	MEDIUM DENSE (10YR, 5/3) BROWN SILTY SAND. LOW MOISTURE.	SM	NA	Hnu = 0, α = 0, βB = 80 cpm
7.0	55426 5-20 1123	9	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. LOW MOISTURE.	SW	NA	
7.5	55427 5-20 1123	9	2	SAA	SW	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : CRAIG COULTER
Driller's Assistant: JOHN VANDINE

All samples collected according to ASTM standards. Soil colors described by Munsell Soil Color Charts.

Background Readings/Level
Hnu = 0 ppm.
Alpha (α) = 0 ppm
Gamma - Beta = 40-80

000779

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1517	COORDINATES:	DATE: 5-20-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-20-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-21-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	55428 5-20 1125	7	6	MEDIUM-DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME SILT. LOW MOISTURE.	SW	NA	Hnu = 0, α = 0, SB = 90cpm
8.5	55429 5-20 1125	6	6	SAA	SW	NA	
9.0	55430 5-20 1125	6	3	SAA	SW	NA	
9.5	55431 5-20 1129	7	6	SAA	SW	NA	Hnu = 0, α = 0, SB = 80cpm
10.0	55432 5-20 1129	7	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. SLIGHTLY MOIST TO MOIST.	SW	NA	
10.5	55433 5-20 1129	6	4	SAA	SW	NA	
11.0	55434 5-20 1315	7	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. LOW MOISTURE.	SW	NA	Hnu = 0, α = 0, SB = 90cpm
11.5	55435 5-20 1315	7	0	NR	NA	NA	
12.0	55436 5-20 1315	7	0	NR	NA	NA	
12.5	55437 5-20 1319	16	6	DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. LOW MOISTURE.	SW	NA	Hnu = 0, α = 0, SB = 90cpm
13.0	55438 5-20 1319	16	4	SAA	SW	NA	
BEGIN H_2O ZONE 13.5	55439 5-20 1319	17	0	NR	NA	NA	
14.0	55440 5-20 1322	16	6	DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL TRACE SILT. WET.	SW	NA	Hnu = 0, α = 0, SB = 80cpm
14.5	55441 5-20 1322	16	5	DENSE (10YR, 5/4) YELLOWISH BROWN SILTY FINE SAND. WET.	SM	NA	
15.0	55442 5-20 1322	12	0	NR	NA	NA	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1517	COORDINATES:	DATE: 5-20-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-20-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-21-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	55443 5-20 1333	5	5	MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED GRAVEL. SOME SAND. WET.	GW	NA	Hum = 0, α = 0, βB = 90cpm
16.0	55444 5-20 1333	12	0	NR	NA	NA	
16.5	55445 5-20 1333	15	0	NR	NA	NA	
17.0	55446 5-20 1337	8	6	MEDIUM DENSE (10YR, 5/3) BROWN SANDY WELL GRADED GRAVEL. TRACE SILT. WET.	GW	NA	Hum = 0, α = 0, βB = 80cpm
17.5	55447 5-20 1337	14	3	SAA	GW	NA	
18.0	55448 5-20 1337	12	0	NR	NA	NA	
18.5	55449 5-20 1343	8	6	MEDIUM DENSE (10YR, 5/3) BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. WET.	SW	NA	Hum = 0, α = 0, βB = 90 cpm
19.0	55450 5-20 1343	12	6	SAA	SW	NA	
19.5	55451 5-20 1343	14	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME SILT. WET.	SW	NA	
20	55452 5-20 1343	15	6	SAA	SW	NA	Hum = 0, α = 0, βB = 90 cpm

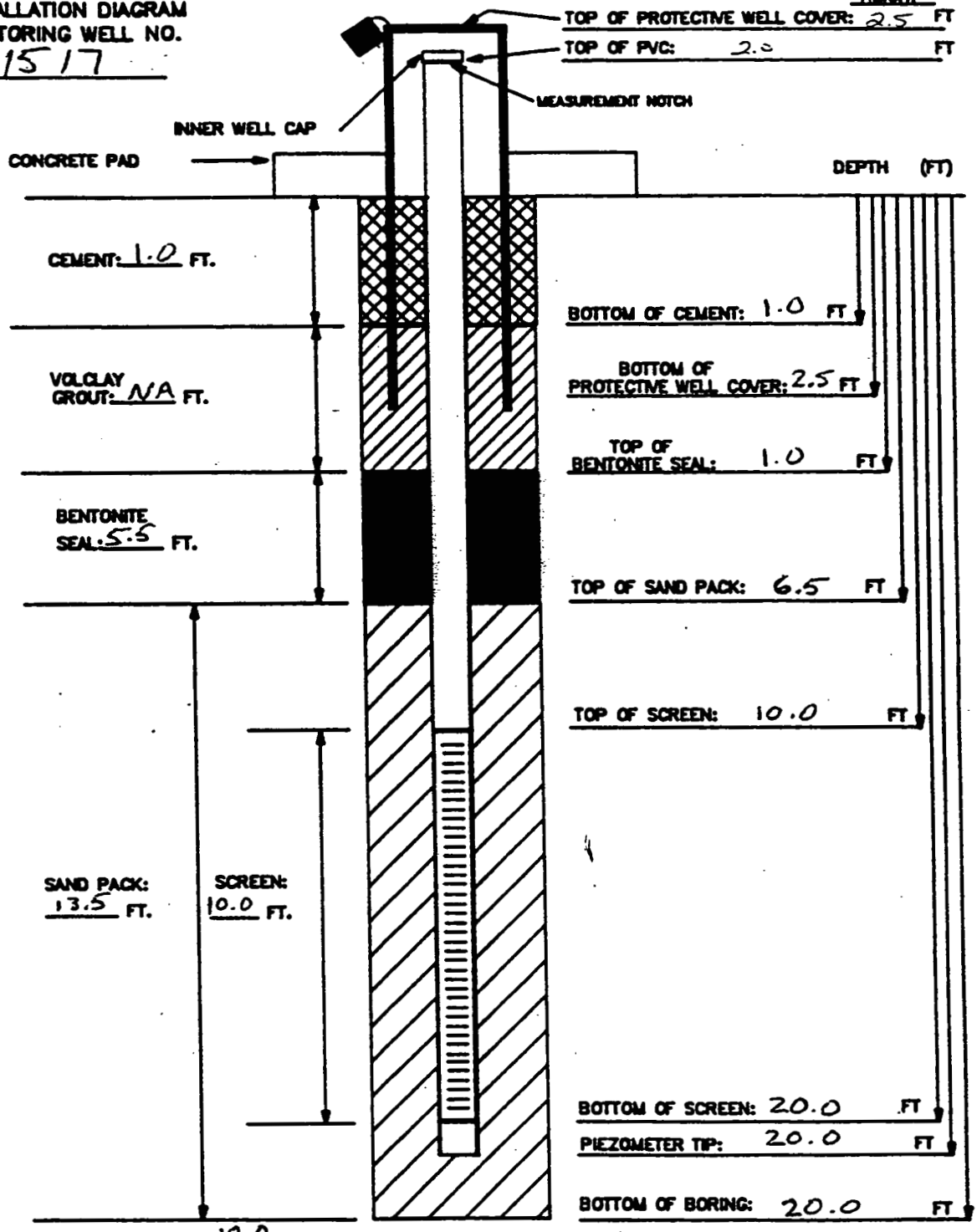
NOTES:

SEE PAGE 1

INSTALLATION DATE: 5-21-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1517



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 8 BAGS 10/20 (80 lbs. each)
BENTONITE PELLETS (5-GALLON BUCKETS): 6 - 5 gal BUCKETS
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 0.5 - 90 lb. BAGS
AMOUNT OF WATER USED: 5 gallons
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.7

GEOLOGIST/ENGINEER: [signature]

5/5

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS \ 602.3.7 FIELD ENG./GEO. M. GARMAN DATE 5-21-90
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 5/30/90
BORING NO. 1517
PIEZOMETER NO. 1517 DATE OF INSTALLATION 5-21-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 10.0 FT, 2.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN.

OTHER PROTECTION HINGED LOCKING COVER w/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY ~~NONE~~ CEMENT MG 5-21-90	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.5	TOP	BOTTOM
SAND	TOP 6.5	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 20.0	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 10.0 IN. AUGER USED TO SET WELL BECAUSE OF BLOW SANDS
13.5 FT – BEGIN H_2O ZONE

000783

Date	5/30/90			
Initial	LT			

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1518	COORDINATES:	DATE: 5-22-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-22-90	
ENGINEER/GEOLOGIST: M.GARMAN	Depth Date/Time	DATE COMPLETED: 5-22-90	
DRILLING METHODS: HOLLOW STEM AUGER(SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	55454 5-22 0816	6	6	MEDIUM DENSE (10YR, 4/3) BROWN SILT. TRACE SAND. LOW MOISTURE.	ML	NA	Hnu = 0 α = 0 γB = 100cpm
1.0	55455 5-22 0816	9	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN SILTY SAND. LOW MOISTURE.	SM	NA	
1.5	55456 5-22 0816	9	2	SAA	SM	NA	
2.0	55457 5-22 0818	6	6	MEDIUM DENSE (10YR, 5/3) BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE.	SM	NA	Hnu = 0 α = 0 γB = 90 cpm
2.5	55458 5-22 0816	11	6	SAA.	SM	NA	
3.0	55459 5-22 0818	12	2	SAA	SM	NA	
3.5	55460 5-22 0820	6	6	SAA	SM	NA	Hnu = 0 α = 0 γB = 90 cpm
4.0	55461 5-22 0820	8	6	SAA	SM	NA	
4.5	55462 5-22 0820	9	1	SAA	SM	NA	
5.0	55463 5-22 0823	4	6	LOOSE (10YR, 5/4) BROWN SILTY SAND. LOW MOISTURE.	SM	NA	Hnu = 0 α = 0 γB = 80 cpm
				(3 IN.) = SAA	SM	NA	
5.5	55464 5-22 0823	4	6	(3 IN.) = LOOSE (10YR, 5/4) YELLOWISH BROWN CLAYEY SILT. SLIGHTLY MOIST.	ML	NA	
6.0	55465 5-22 0823	5	3	SAA	ML	NA	
6.5	55466 5-22 0929	3	6	MEDIUM DENSE (10YR, 5/3) BROWN CLAYEY SILT. MOIST.	ML	NA	Hnu = 0 α = 0 γB = 90 cpm
7.0	55467 5-22 0929	5	6	STIFF (10YR, 5/3) BROWN SILTY CLAY. MEDIUM PLASTICITY. MOIST.	CL	1.75	
7.5	55468 5-22 0929	7	5	MEDIUM DENSE (10YR, 5/3) BROWN CLAYEY SILT. MOIST.	ML	NA	

NOTES: Contractor : Pennsylvania Drilling
Driller : CRAIG COULTER
Drillers Assistant: CHRIS COULTER

All Samples collected according to ASTM Standards. Soil Colors determined by Munsell Soil Color Charts.

Background Readings/Level
Hnu = 0 ppm.
Alpha (α) = 0 dpm
Gamma - Beta = 40-100 dpm

000784

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1518	COORDINATES:	DATE: 5-22-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-22-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-22-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 2 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8.0	55469 5-22 0932	10	6	DENSE (10YR, 5/4) YELLOWISH BROWN SILT. TRACE SAND. MOIST.	ML	NA	Hnu = 0 α = 0 SB = 90cpm
8.5	55470 5-22 0932	16	6	DENSE (10YR, 5/3) BROWN SILTY FINE SAND. LOW MOISTURE.	SM	NA	
9.0	55471 5-22 0932	21	3	SAA	SM	NA	
9.5	55472 5-22 0935	16	6	SAA	SM	NA	Hnu = 0 α = 0 SB = 90cpm
10.0	55473 5-22 0935	17	6	SAA	SM	NA	
10.5	55474 5-22 0935	22	4	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME SILT. LOW MOISTURE.	SW	NA	
11.0	55475 5-22 0944	12	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL TRACE SILT. LOW MOISTURE.	SW	NA	Hnu = 0 α = 0 SB = 100cpm
11.5	55476 5-22 0944	19	6	SAA	SW	NA	
12.0	55477 5-22 0944	21	0	NR	NA	NA	
BEGIN H2O ZONE 12.5	55478 5-22 1015	16	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND (GRAVELLY). SOME SILT. WET.	SW	NA	Hnu = 0 α = 0 SB = 100 cpm
13.0	55479 5-22 1015	18	6	SAA	SW	NA	
13.5	55480 5-22 1015	21	0	NR	NA	NA	
14.0	55481 5-22 1020	19	6	DENSE (10YR, 5/2) GRAYISH BROWN GRAVELLY WELL GRADED SAND. SOME SILT. WET.	SW	NA	Hnu = 0 α = 0 SB = 90cpm
14.5	55482 5-22 1020	24	6	SAA	SW	NA	
15.0	55483 5-22 1020	21	1	SAA	SW	NA	

NOTES:

SEE PAGE 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1518	COORDINATES:	DATE: 5-22-90	
ELEVATION: ~~MA~~ MG 5-21-90	GWL: Depth Date/Time	DATE STARTED: 5-22-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth Date/Time	DATE COMPLETED: 5-22-90	
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)		PAGE 3 OF 5	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 In.)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	55484 5-22 1030	6	6	MEDIUM DENSE (10YR, 5/2) GRAYISH BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. WET.	SW	NA	Hum = 0 α = 0 βB = 100cpm
16.0	55485 5-22 1030	11	5	SAA	SW	NA	
16.5	55486 5-22 1030	15	0	NR	NA	NA	
17.0	55487 5-22 1035	16	6	DENSE (10YR, 5/2) BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET.	SW	NA	Hum = 0 α = 0 βB = 90 cpm
17.5	55488 5-22 1035	18	6	DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. WET.	SW	NA	
18.0	55489 5-22 1035	23	5	SAA	SW	NA	
18.5	55490 5-22 1045	12	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. WET.	SW	NA	Hum = 0 α = 0 βB = 90cpm
19.0	55491 5-22 1045	16	6	SAA	SW	NA	
19.5	55492 5-22 1045	18	6	DENSE (10YR, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME SILT. WET.	SW	NA	
20	55493 5-22 1045	24	5	SAA	SW	NA	Hum = 0 α = 0 βB = 90cpm
				20.0 ft. BOTTOM OF BORING PIEZOMETER INSTALLED			

NOTES:

SEE PAGE 1

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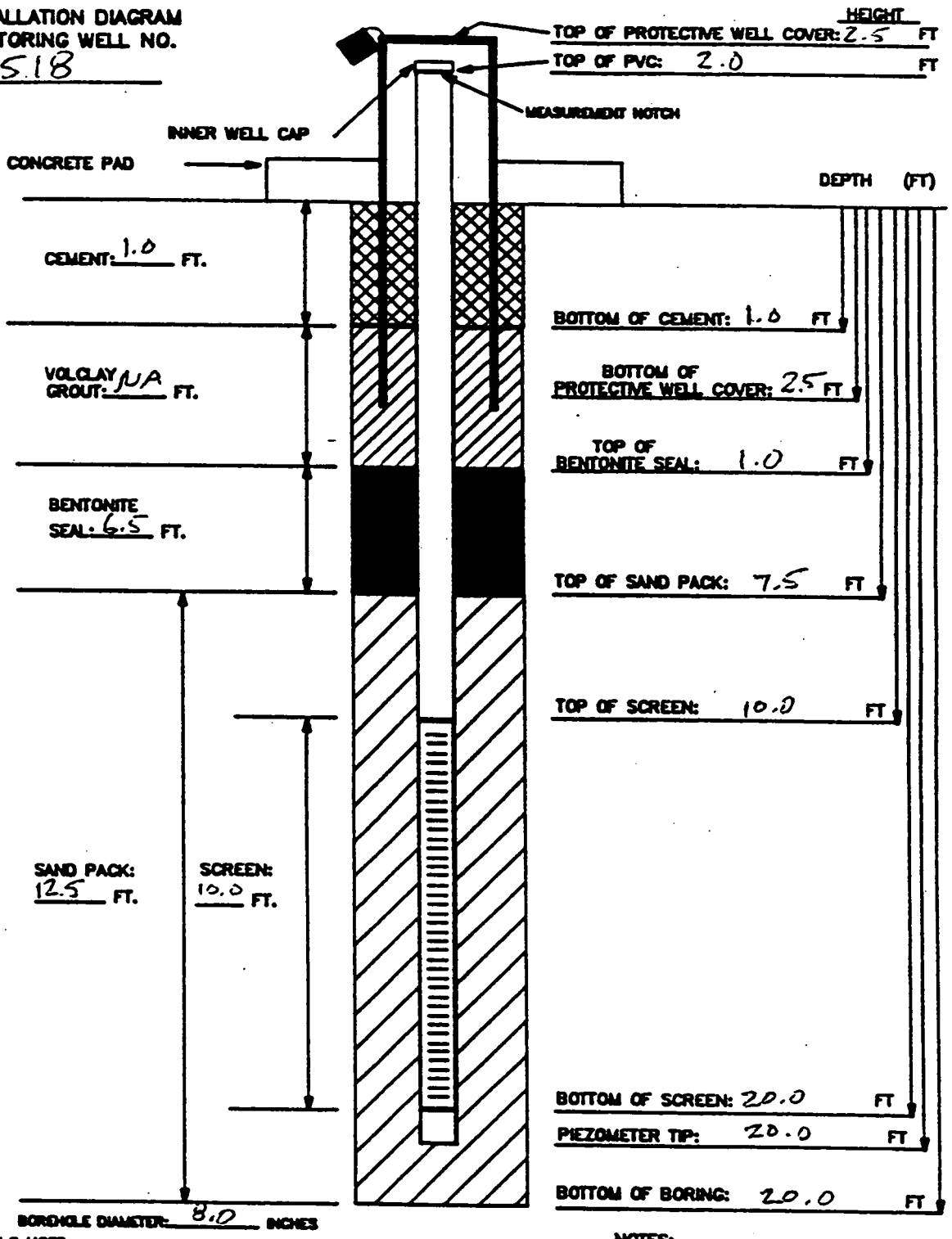
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1518

INSTALLATION DATE: 5-22-90



MATERIALS USED:

SAND TYPE AND QUANTITY: 4 BAGS 1020 (80 lbs. each)
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: none used
AMOUNT OF CEMENT: 0.5 BAG (90 lbs. each)
AMOUNT OF WATER USED: 5 gallons
OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.7

GEOLOGIST/ENGINEER: [illegible]

5711 5/5

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS
FIELD ENG./GEO. M. GARMAN DATE 5-22-90
PROJECT NO. 602.3.7
CHECKED BY P. Trollinger DATE 5/30/90
BORING NO. 1518
PIEZOMETER NO. 1518
DATE OF INSTALLATION 5-22-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION 2.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 IN. I.D. 2.0 IN
LENGTH OF PIPE SECTIONS 10.0 FT, 2.0 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 4 3/8 IN.

OTHER PROTECTION HINGED LOCKING COVER W/ PAD LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 7.5	TOP	BOTTOM
SAND	TOP 7.5	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 20.0	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 12.0 FT - BEGIN H_2O ZONE

FERNALD RI/FS

Date	7/3/90			
Initial	E.T.			
	[illegible]	[illegible]	[illegible]	[illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1519	COORDINATES: N 479,415.68, E 1,379,923.08	DATE: 6-29-90	
ELEVATION: 574.3 GROUND	GWL: Depth Date/Time	DATE STARTED: 6-29-90	
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED: 6-29-90	
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55659 6-29-90 1550	13	6	very dense 10yr 5/6 yellowish brown silty gravel, some clay	GM	NA	Hnu = 0 α = 0 BZ = 200 cpm
1	55660 6-29-90 1550	25	0	NR			
	55661 6-29-90 1550	19	0	NR			
2	55662 6-29-90 1555	12	6	medium dense 10yr 5/6 yellow brown clayey silt, MOIST	ML	N/A	Hnu = 0 α = 0 BZ = 260 cpm
	55663 6-29-90 1555	9	0	NR			
	55664 6-29-90 1555	10	0	NR			
3	55665 6-29-90 1557	7	4	10yr 5/6 yellowish brown clayey silt, organic matter present	OL	N/A	Hnu = 0 α = 0 BZ = 200 cpm
	55666 6-29-90 1557	7	0	NR			
4	55667 6-29-90 1557	9	0	NR			
	55668 6-29-90 1540	4	0	NR; GRAVEL STUCK IN BIT TIP OF SPOON ET 6/3/90	NA	NA	Hnu = N/A α = N/A BZ = N/A
5	55669 6-29-90 1540	3	0		NA	NA	
	55670 6-29-90 1540	2	0				
6	55671 6-29-90 1548	2	0	SAA	NA	NA	Hnu = NA α = NA BZ = NA
	55672 6-29-90 1548	1	0				
7	55673 6-29-90 1548	3	0				

NOTES: CONTRACTOR: PENN DRILL
RIG CME 45
DRILLER: BOB LOST
ASSISTANT: BRIAN STRAPAZZON
Hnu: B 221
α: ASI #6
BZ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu = 0
α = 0
BZ = 150 cpm
LEL =
O_2 = } NOT MEASURED outside drilling

SAA - SAME AS ABOVE
NR - NO RECOVERY

000789

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1519	COORDINATES:		DATE: 6-29-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-29-90
ENGINEER/GEOLOGIST: J. MASON	Depth	Date/Time	DATE COMPLETED: 6-29-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55674 6-29-90 1555	3	6	loose 10yr 5/6 yellowish brown clayey silt, moist, trace sand	ML	NA	HNU: 0 α 0 BZ 200 cpm
	55675 6-29-90 1555	5	3	SAA	ML	NA	
9	55676 6-29-90 1555	5	0	NR			
	55677 6-29-90 1557	7	6	medium dense, 10yr 5/6 yellowish brown sandy silt, some clay, wet	ML	NA	HNU: 0 α: 0 BZ: 200 cpm
10	55678 6-29-90 1557	7	6	very loose 10yr 5/6 yellowish brown sandy clayey silt, wet	ML		
	55679 6-29-90 1557	7	6	med. dense 10yr 5/1 gray clayey silt, trace sand, wet	ML		
11	55680 6-29-90 1604	5	6	very soft 10yr 5/6 yellowish brown silty clay, trace sand, moist	CL	<.25	HNU: 0 α: 0 BZ: 200 cpm
	55681 6-29-90 1604	3	6	loose 10yr 5/1 gray clayey silt, trace sand, moist	ML	NA	
12	55682 6-29-90 1604	6	6	SAA	ML	NA	
	55683 6-29-90 1610	5	6	soft 10yr 5/6 yellowish brown silty clay, trace sand, slightly moist	CL	<.25	HNU: 0 α: 0 BZ: 200 cpm
13	55684 6-29-90 1610	7	6	medium dense 10yr 5/1 gray clayey silt, trace sand, slightly moist	ML	NA	
	55685 6-29-90 1610	10	6	SAA	ML	NA	
	55686 6-29-90 1615	5	6	very soft 10yr 5/6 yellowish brown silty gravelly clay, wet	CL	<.25	HNU: 0 α: 0 BZ: 100 cpm
	55687 6-29-90 1615	10	6	medium dense 10yr 5/1 gray clayey silt, trace sand + gravel, wet	ML	NA	
	55688 6-29-90 1615	15	6	SAA	ML	NA	

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
HNU: B 221
α: ASI # 6
BZ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0
α = 0
BZ = 200 cpm
LEL = } NA
O2 = }

000790

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1519	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-29-90	
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED: 6-29-90	
DRILLING METHODS: CME 45 AUGER		PAGE 3 OF 3	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55689 6-29-90 1623	1	6	very soft 10yr 5/6 yellowish brown sandy silty clay, trace gravel, wet	CL	<.25	Hm = 0 α = 0 β = 200 cpm
16	55690 6-29-90 1623	3	0	NR			
	55691 6-29-90 1623	5	0	NR			
17	55692 6-29-90 1627	4	6	very loose 10yr 5/1 gray clayey silt, trace sand, wet	ML	NA	Hm = 0 α = 0 β = 200 cpm
	55693 6-29-90 1627	11	6	medium dense 10yr 5/1 gray sandy, clayey silt, wet, some gravel	ML		
18	55694 6-29-90 1627	17	2	SAA	ML		
	55695 6-29-90 1635	11	6	very loose, 10yr 5/1 gray clayey, silty, sandy, gravel - sand present is well graded, wet	GC	NA	Hm = 0 α = 0 β = 100 cpm
19	55696 6-29-90 1635	12	6	SAA			
	55697 6-29-90 1635	15	3	SAA			
20	55698 6-29-90 1635	17	5	medium dense 10yr 5/1 gray clayey silt, wet	ML	NA	Hm = α = β = JCM 6-29-90
				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT			β =
JCM 6-29-90							
				*ET 7/8/90 ~~BORING WILL HAVE PIEZOMETER INSTALLED~~ BORING WAS PLUGGED WITH BENTONITE AND CAPPED WITH 2.0 FT PLUG OF CEMENT. NO BURIED MATERIAL FOUND.			Hm = α = β =
JCM 6-29-90							

NOTES: CONTRACTOR: PENDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
Hm - B 221
α - AS1 #6
βγ - AS1 #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: Hm = 0
α = 0
βγ = 150 cpm

000791

FERNALD
RI/FS

Date	7/3/9	5	7	1
Initial	E.T.			
	Field Check	1st Rev Ia	2nd Rev Ia	Hard Copy Validation

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1
PROJECT NAME: FMPC RI/FS
BORING NUMBER: 1520
COORDINATES: N. 479,412.63, E. 1,379,852.03
ELEVATION: 574.5 GROUND
GWL: Depth Date/Time
Depth Date/Time
ENGINEER/GEOLOGIST: J. MASON
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45
DATE: 6-29-90
DATE STARTED: 6-29-90
DATE COMPLETED: 6-29-90
PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55617 6-29-90 0856	8	6	HARD (10yr 3/2) very dark grayish brown gravelly clay	CL	>4.0	Hnu = 0 α = 0 BZ = 250 cpm
1	55619 6-29-90 0856	10	0	NR			
	55620 6-29-90 0856	13	0	NR			
2	55621 6-29-90 0902	11	6	very stiff 10yr 5/6 yellowish brown gravelly clay (silty), moist	CL	3.5	H = 0 α = 0 B = 250 cpm
	55622 6-29-90 0902	7	4	very stiff 10yr 2/2 very dark brown silty clay, moist.	~~CE~~ CL	2.5	
3	55623 6-29-90 0902	7	0	NR			
	55624 6-29-90 0907	5	4	very stiff 10yr 5/6 yellowish brown silty clay, moist.	CL	2.5	H = 0 α = 0 B = 250 cpm
4	55625 6-29-90 0907	5	0	NR } TWO ATTEMPTS.			
	55626 6-29-90 0907	4	0	NR			
5	55627 6-29-9 0910	5	0	NR AFTER 2 ATTEMPTS			H = 0 α = 0 B = 100 cpm
	55628 6-29-90 0910	5	0				
6	55629 6-29-90 0910	4	0				
	55630 6-29-90 0922	2	6	very soft 10yr 3/3 dark brown silty clay, some sand, moist	CL	<.25	H = 0 α = 0 B = 200 cpm
7	55631 6-29-90 0922	2	2	loose 10yr 5/6 yellowish brown silty sand (poorly graded), wet	SP	NA	
	55632 6-29-90 0922	2	0				

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
Hnu: 8 221
α : AGI #6
BZ: AGI #11

SAMPLES COLLECTED PER ASTM. STAND. PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: Hnu = 0
α = 0
BZ = 250 cpm
LEL = } OUTSIDE DRILLING
O_2 =

SAA - SAME AS ABOVE
NR - NO RECOVERY

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1520	COORDINATES:		
ELEVATION:	GWL: Depth Date/Time	DATE	6-29-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE STARTED:	6-29-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		DATE COMPLETED:	6-29-90
		PAGE	2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55638 6-29-90 0930	8	6	loose 10yr 5/6 yellowish brown poorly graded sand, some gravel, wet	SP	NA	H = 0
	55639 6-29-90 0930	3	6	stiff 10yr 5/4 yellowish brown silty clay, wet	CL	1.0	C = 0 B = 200 cpm
9	55636 6-29-90 0930	6	0	NR			
	55637 6-29-90 0935	3	6	very loose 10yr 5/6 yellowish brown sandy silty gravel, wet	GM	NA	H = 0
10	55638 6-29-90 0935	7	6	very stiff 10yr 5/6 yellowish brown silty clay, wet	CL	2.5	C = 0 B = 200 cpm
	55638 6-29-90 0935	7	6	stiff 10yr 5/1 gray silty clay, wet	CL	1.5	
11	55639 6-29-90 0945	4	6	stiff 10yr 5/6 yellowish brown gravelly clay (silty), some sand moist	CL	1.5	H = 0
	55640 6-29-90 0945	5	4	~~stiff 10yr~~ JCM 6-29-90 SAA	CL	1.0	C = 0 B = 200 cpm
12	55641 6-29-90 0945	5	0	NR	NA	NA	
	55642 6-29-90 0950	3	6	very soft 10yr 5/6 yellowish brown gravelly silty clay, wet	CL	<.25	H = 0
13	55643 6-29-90 0950	5	6	very soft 10yr 5/1 gray silty clay, wet	CL	<.25	C = 0 B = 200 cpm
	55644 6-29-90 0950	5	0	NR			
14	55645 6-29-90 0953	9	6	very stiff 10yr 5/6 yellowish brown silty clay, wet, some sand	CL	3.5	H = 0
	55646 6-29-90 0953	11	6	stiff 10yr 5/1 gray silty clay, trace sand, wet	CL	1.5	C = 0 B = 200 cpm
	55647 6-29-90 0953	14	6	stiff 10yr 5/1 gray silty clay, some sand, wet	CL	2.0	

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
Hnu: B 221
α : ASI #6
BR: ASI #11

SAMPLES COLLECTED BY: ASTM STAN. 20 PENETRATION
COLORS IDENTIFIED USING MUN ELL COLOR CHART
BACKGROUND LEVEL: Hnu = 0
α = 0
BR = 200 cpm
LEL = }
O_2 = } outside drilling NA

000793

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1520	COORDINATES:	DATE	6-29-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	6-29-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED:	6-29-90
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE	3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55648 6-29-90 1055	2	6	MEDIUM DENSE (10yr 5/6) yellowish brown silty clayey sand wet	ML	NA	Hnu: 0
	55649 6-29-90 1055	4	6	very stiff (10yr 5/1) gray silty clay trace gravel trace sand wet	CL	3.0	α = 0 BX = 200 cpm,
16	55650 6-29-90 1055	7	0	NR	NA		
	55651 6-29-90 1100	15	6	soft 10y-5/1 gray sandy, silty clay, some gravel, wet	CL	.30	Hnu = 0 α = 0 BX = 200 cpm
17	55652 6-29-90 1100	20	0	NR			
	55653 6-29-90 1100	14	0	NR	NA	NA	
18	55654 6-29-90 1105	10	6	medium dense 5yr 4/2 dark reddish gray clayey silty gravel some sand wet.	GC	NA	Hnu = 0 α = 0 BX = 200 cpm
	55655 6-29-90 1105	13	6	SAA	GC	NA	
19	55656 6-29-90 1105	14	6	Stiff (10yr 5/1) gray silty clay trace sand wet	CL	1.5	
	55657 6-29-90 1105	15	6	SAA	CL	1.5	Hnu: α: BX:
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT.			
				* BORING WAS PLUGGED WITH BENTONITE PELLETS, VERY WET CONDITIONS FROM 10.0 FT TO 20.0 FT., TOP 2.0 FT PLUGGED WITH PORTLAND CEMENT.			H = = =
				* NO BURIED MATERIAL FOUND.			

NOTES: CONTRACTOR: PENNDRILL
RIG
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAZZA
Hnu: R 221
α : ASI # 6
BX: ASI # 11

SAMPLES COLLECTED BY: ASTM STAND. 20 PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: Hnu = 0
α = 0
BX = 200 cpm
LEL =
O_2 =

000794

FERNALD
RI/FS

Date	7/3/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verif.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1 | PROJECT NAME: FMPC RI/FS
BORING NUMBER: 1521 | COORDINATES: N.479,440.73 E.1379,883.13 | DATE: 6-28-90
ELEVATION: 574.8 GROUND | GWL: Depth Date/Time | DATE STARTED: 6-28-90
ENGINEER/GEOLOGIST: J MASON | Depth Date/Time | DATE COMPLETED: 6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45 | PAGE 1 OF 3

Depth (FT)	Sample Type & No.	Blows on Sampler per (6 IN)	Recovery (IN)	Description	USCS Symbol	Measured Consistency (TSF)	Remarks
1	55577 6-28-90 1445	10	6	MEDIUM DENSE (10yr 5/4) yellowish Brown Clayey gravel	GC	NA	H = 0
	55578 6-28-90 1445	14	0	NR			= 0
	55579 6-28-90 1445	9	0	NR			= 500 cpm
2	55580 6-28-90 1450	6	~~6~~ 0	ET ~~packing lot gravel fell in~~ GRAVEL ~~ET~~ MATERIAL CAUGHT in TIP OF SPOON ; NR	NR	NA	H = 0
	55581 6-28-90 1450	8	0				= 0
	55582 6-28-90 1450	6	0				= 500 cpm
3	55583 6-28-90 1451	7	6	stiff (10yr 3/3 dark brown clay, some silt, appears organic in origin	CL	ET 2.0 ~~BL~~	= 0
	55584 6-28-90 1451	7	0	NR			= 0
4	55585 6-28-90 1451	7	0	NR			= 500 cpm
	55586 6-28-90 1500	7	0	NR			H = 0
5	55587 6-28-90 1500	6	0	NOTE: GRAVEL CAUGHT IN BIT DISALLOWS SAMPLE COLLECTION			= 0
	55588 6-28-90 1500	6	0				= 500 cpm
6	55589 6-28-90 1510	1	0	NR AFTER 2 ATTEMPTS; SAME CONDITION AS ABOVE SUSPECTED			H = 0
	55590 6-28-90 1510	2	0				= 0
7	55591 6-28-90 1510	3	0				= 500 cpm

NOTES: CONTRACTOR: PENWALT
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPARON
HNU: B 221
α: ASI #6
βγ: ASI #4

SAMPLES COLLECTED BY: ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: HNU = 0
α = 0
βγ = 500 cpm
LEL = NOT NEEDED OUTSIDE
O_2 =

SAA - SAME AS ABOVE
NR - NO RECOVERY

000795

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7 1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1521	COORDINATES:	DATE:	6-28-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	6-28-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED:	6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		PAGE	2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55592 6-28-90 1515	2	6	very soft 10yr 5/6 yellowish brown silty clay - ranges to 10yr yellowish brown clayey sand SANDY CLAY	CL	<.25	H = 0 α = 0 B = 550 cpm
	55593 6-28-90 1515	3	6	E.T. 7/3/90 SAA, except sand to clay	CL	<.25	
9	55594 6-28-90 1515	2	0	NR			
	55595 6-28-90 1520	1	6	SAA	CL	<.25	H = 0 α = 0 Bγ = 500 cpm
10	55596 6-28-90 1520	1	2	very soft 10yr 5/6 yellowish brown silty clay	CL	<.25	
	55597 6-28-90 1520	3	0	NR			
11	55598 6-28-90 1528	2	6	stiff 10yr 5/6 yellowish brown silty clay, some gravel	CL	2.0	H = 0 α = 0 B = 500 cpm
	55599 6-28-90 1528	3	6	SAA	CL	2.0	
12	55600 6-28-90 1528	4	6	stiff 10yr 5/6 yellowish brown silty poorly graded sand WITH 10yr 5/1 gray silty clay	SP/CL	NA	
13	55601 6-28-90 1535	6		very soft 10yr 5/6 yellowish brown silty clay, some gravel, slight moisture	CL	<.25	H = 0 α = 0 Bγ = 550 cpm
	55602 6-28-90 1535	10		very soft, 10yr 5/1 gray silty clay, moist	CL	<.25	
	55603 6-28-90 1535	9		very stiff 10yr 5/1 gray silty clay ranging to 10yr 5/6 yellowish brown poorly graded sand, moist	CL/SP	3.0	
14	55604 6-28-90 1555	12	6	loose 10yr 5/6 yellowish brown poorly graded sand, some silt	SP	NA	H = 0 α = 0 Bγ = 500 cpm
	55605 6-28-90 1553	11	6	stiff 10yr 5/1 gray silty clay	CL	2.0	
	55606 6-28-90 1553	15	6	stiff 10yr 5/1 gray silty clay, trace of black gravel	CL	2.0	

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
Hnu: B 221
α : ASI #6
Bγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: Hnu = 0
α = 0
Bγ = 450 cpm
LEL = }
O_2 = } NOT NEEDED ON LOC

000796

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1521	COORDINATES:	DATE:	6-28-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	6-28-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED:	6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		PAGE	3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55607 6-28-90 1607	9	6	Hard, 10yr 5/1 gray silty clay, some black gravel, wet	CL	>4	H = 0 O = 0 B = 500 cpm
	55608 6-28-90 1607	9	2	very stiff 10yr 5/1 gray silty clay, some black gravel, wet	CL	2.5	
16	55609 6-28-90 1607	14	0	NR			
	55610 6-28-90 1615	9	6	Soft 10yr 5/1 gray gravelly silty clay, wet	CL	.30	H = 0 O = 0 B = 400 cpm
17	55611 6-28-90 1615	12	6	medium stiff 10yr 5/1 gray gravelly silty clay, some sand, wet	CL	1.0	
	55612 6-28-90 1615	14	6	SAA	CL	1.0	
18	55613 6-28-90 1622	17	6	very soft 10yr 5/1 gray silty clay, some gravel, wet	CL	<.25	H = 0 O = 0 B = 480 cpm
	55614 6-28-90 1622	18	6	SAA	CL	<.25	
19	55615 6-28-90 1622	19	6	stiff 10yr 5/1 gray silty clay, some gravel, some sand, wet	CL	1	
	55616 6-28-90 1622	32	6	very stiff 10yr 5/1 gray silty sandy clay, some gravel, wet	CL	2.5	H = O = B =
20							
				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT.			
				* BORING WAS BACKFILLED WITH BENTONITE AND CAPPED WITH 2.0 FT CEMENT PLUG. NO BURIED MATERIALS FOUND.			H = O = B =

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
HNU: B 221
α : ASI #6
βγ: ASI #11

SAMPLES COLLECTED PE ASTM STAN 20 PENETRAT
COLORS IDENTIFIED SING MUN ELL COLOR CHART
BACKGROUND LEVE : HNU = 0
α = 0
βγ = 460 cpm
LEL = ?
O_2 = } NA

000797

FERNALD
RI/FS

	7/3/90	5711	
	ET.		
Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1522	COORDINATES: N 479,411.87, E 1,371,915.73	DATE	6-28-90
ELEVATION: 575.1	GWL: Depth Date/Time	DATE	STARTED: 6-28-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE	COMPLETED: 6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		PAGE	1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	55536 6-28-90 0810	9	6	~~very dense~~ 10yr 4/6 dark yellowish brown hard, CLAY, DRY	~~SM~~ CL	7.4	H = 0 = 0 B = 500 cpm
	55537 6-28-90 0810	19	0	NR			
	55538 6-28-90 0810	20	0	NR			
2	55539 6-28-90 0820	7	6	~~medium dense~~ 10yr 5/6 yellowish brown hard gravelly, sandy clay	7/3/90 ET ~~SM~~ CL	7.4	H = 0 = 0 B = 500 cpm
	55540 6-28-90 0820	9	2	SAA	CL		
3	55541 6-28-90 0820	6	0	NR	7/3/90 ET		
4	55542 6-28-90 0822	8	6	very stiff, 10yr 5/6 yellowish brown gravelly clay, ~~trace~~ silt, trace sand	~~SM~~ CL	3.5	H = 0 = 0 B = 500 cpm
	55543 6-28-90 0822	9	0	NR			
	55544 6-28-90 0822	8	0	NR JCM 6/28/90			
5	55545 6-28-90 0825	7	6	very soft 10yr 5/3 brown clay trace sand, trace gravel	~~SM~~ CL	2.5	H = 0 = 0 B = 500 cpm
	55546 6-28-90 0825	10	2	SAA, but slightly wet	CL	2.5	
6	55547 6-28-90 0825	9	0	NR			
7	55548 6-28-90 0845	4	0	NR after 2 attempts			H = } NA
	55549 6-28-90 0845	3	0				
	55550 6-28-90 0845	4	0				

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPPAZZON
HNU: ~~[illegible]~~ B 221
α: ~~[illegible]~~ ASI #6
BZ: ~~[illegible]~~ ASI #11
JCM 6/28/90

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: HNU = 0
α = 0
BZ = 500 cpm
LEL = } NOT NEEDED OUTSIDE DRILLING
O2 =

SAA - Same as above
NR - No recovery

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1522	COORDINATES:	DATE	6-28-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	6-28-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED:	6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45		PAGE	2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55591 6-28-90 0855	2	0	NR AFTER 2 ATTEMPTS			
	55592 6-28-90 0855	3	0				
9	55593 6-28-90 0855	2	0	very soft			
	55594 6-28-90 0857	9	6	[redacted], 10yr 6/6 brownish yellow sandy, gravelly clay; trace silt	CL	<.25	
10	55595 6-28-90 0857	2	0	NR			
	55596 6-28-90 0857	5	0	NR			
11	55597 6-28-90 0903	3	6	stiff 10yr 5/6 yellowish brown silty clay, slightly moist	CL	1.5	
	55598 6-28-90 0903	3	6	SAA, moist	CL	1.5	
12	55599 6-28-90 0903	6	0	NR			
	55560 6-28-90 0910	4	6	very soft 10yr 5/6 yellowish brown silty clay, trace gravel, wet	CL	<.25	
13	55561 6-28-90 0910	6	6	very soft 10yr 5/6 yellowish brown silty clay, moist - ranges to 10yr 5/1 gray in color	CL	<.25	
	55562 6-28-90 0910	8	6	very stiff 10yr 5/6 yellowish brown silty clay, some sand, moist	CL	3.5	
14	55563 6-28-90 0915	5	6	hard 10yr 5/6 yellowish brown to 10yr 5/1 gray silty clay, some sand, some gravel, wet	CL	>4	
	55564 6-28-90 0915	7	6	soft 10yr 5/1 gray silty clay, wet	CL	.50	
	55565 6-28-90 0915	8	0	NR			

NOTES: CONTRACTOR: PENNDRILL
RIG
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
HNU: ~~[illegible]~~ 8221
α : ~~[illegible]~~ ASI #6
BR: ~~[illegible]~~ ASI #11

SAMPLES COLLECTED BY: ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVEL: HNU = 0
α = 0
BR = 500 cpm
LEL =
O_2 =

000799

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1522	COORDINATES:		DATE: 6-28-90
ELEVATION:	GWL: Depth Date/Time		DATE STARTED: 6-28-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time		DATE COMPLETED: 6-28-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45			PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55566 6-28-90 0928	1	6	very soft 10yr 5/6 yellowish brown to 10yr 5/1 gray silty clay; some sand, trace gravel, wet	CL	<.25	HNU = 0 α = 0 BY = 500 cpm
16	55567 6-28-90 0928	3	2	SAA		<.25	
	55568 6-28-90 0928	3	0	NR			
	55569 6-28-90 0935	3	6	very loose 10yr 5/3 brown poorly graded sand, trace silt, wet	SP	NA	HNU = 0 α = 0 BY = 600 cpm
17	55570 6-28-90 0935	1	6	very soft, 10yr 5/3 brown sandy clay some silt	CL	<.25	
	55571 6-28-90 0935	2	6	very soft 10yr 5/3 brown sandy clay, some small gravels, trace silt.	CL	<.25	
18	55572 6-28-90 0945	3	6	very loose 10yr 5/3 brown poorly graded sand, some silt, wet	SP	NA	HNU = 0 α = 0 BY = 550 cpm
	55573 6-28-90 0945	3	6	SAA	SP		
19	55574 6-28-90 0945	4	6	very soft 5yr 4/2 dark reddish gray silty clay, some gravel, some sand, wet	CL	<.25	
	55575 6-28-90 0945	5	6	SAA	CL	<.25	HNU = α = BY =
20							
							HNU = α = BY =

NOTES: CONTRACTOR: PENNDRILL
RIG CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
HNU: 3221
α: ASI #6
BY: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0
α = 0
BY = 500 cpm
LEL = 3
O_2 = 3 NM

000300

FERNALD RI/FS

Date	7/3/90			
Initial	E.T.			
	Field Check	1st Rev'n	2nd Rev'n	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1523	COORDINATES: N.479,406.55, E.1,379,945.37	DATE	6-26-90
ELEVATION: 574.3 4 FT GROUND	GWL: Depth Date/Time	DATE STARTED:	6-26-90
ENGINEER/GEOLOGIST: J. MASON	Depth Date/Time	DATE COMPLETED:	6-27-90
DRILLING METHODS: CME 45 AUGER RIG		PAGE	1 OF 5

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	DETERMINED CONSISTENCY (TSF)	REMARKS
1	55495 6-26-90 1625	8	5	medium dense (10yr 4/4) dark yellowish brown clayey gravel	GC	NA	Hnu = 0
	55496 6-26-90 1625	12	0	NR			α = 0
	55497 6-26-90 1625	12	0	NR			βγ = 500 cpm
2	55498 6-26-90 1628	10	6	very stiff (10yr 4/4) dark yellowish brown clayey gravel	GC	NA	Hnu = 0
	55499 6-26-90 1628	8	6	SAA	GC		α = 0
3	55500 6-26-90 1628	10	0	NR			βγ = 440 cpm
4	55501 6-26-90 1630	5	6	very stiff (10yr 3/2) very dark grayish brown clayey gravel	GC	NA	Hnu = 0
	55502 6-26-90 1630	9	6	SAA	GC		α = 0
	55503 6-26-90 1630	10	0	NR			βγ = 510 cpm
5	55504 6-26-90 1635	5	6	medium stiff, (10yr 5/3) brown clay, some gravel (small + broken up)	CL	<1	Hnu = 0
	55505 6-26-90 1635	6	0	NR			α = 0
6	55506 6-26-90 1635	4	0	NR			βγ = 400 cpm
7	55507 6-26-90 1639	6	6	very soft, (10yr 3/6) dark yellowish brown clay (silty)	CL	<.25	Hnu = 0
	55508 6-26-90 1639	2	2	SAA	CL	<.25	α = 0
	55509 6-26-90 1639	3	0	NR			βγ = 340 cpm

NOTES: CONTRACTOR: PENNDRILL
RIG: CME45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAWBRIDGE
α METER: ASI # 9
βγ METER: ASI # 11
Hnu METER: B 221

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART

BACKGROUND LEVELS
Hnu: 0 ppm
α: 0 cpm
βγ: 400 cpm
LEL: } NOT NEEDED FOR THIS LOCATION
O_2: }

NR - NO RECOVERY
SAA - SAME AS ABOVE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 371	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1523	COORDINATES:		DATE: 6-26-90 / 6-27-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-26-90
ENGINEER/GEOLOGIST: J MASON	Depth	Date/Time	DATE COMPLETED: 6-27-90
DRILLING METHODS: AUGER (HOLLOW STEM) CME 45			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	55510 6-26-90 1646	1	0	NR	NA	NA	HNU = 0
	55511 6-26-90 1646	2	0				α = 0
	55512 6-26-90 1646	2	0				Bδ: 400 cpm
9	55513 6-26-90 1718	3	6	~~medium dense~~ STIFF, 10yr 5/6, yellowish brown silty clay (some gravel), WET	~~SM~~ CL	2.0	HNU = 0
	55514 6-26-90 1718	8	0	NR			α = 0
10	55515 6-26-90 1718	4	0	NR			Bδ: 460 cpm
11	55516 6-26-90 1723	4	6	stiff (10yr 5/6) yellowish brown silty clay, WET	~~SM~~ CL	2.0	HNU = 0
	55517 6-26-90 1723	4	0	NR			α = 0
12	55518 6-26-90 1723	4	0	NR			Bδ: 460 cpm
	55519 6-27-90 0820	4	6	Loose, 10yr 5/2 grayish brown clayey silt, WET	~~SM~~ ML	NA	HNU = 0
13	55520 6-27-90 0820	3	2	SAA			α = 0
	55521 6-27-90 0820	2	0	NR			Bδ: 350 cpm
14	55522 6-27-90 0845	3	6	MEDIUM DENSE (10yr 5/3) Brown clayey silt. wet.	~~SM~~ ML	NA	HNU = 0
	55523 6-27-90 0845	5	6	SAA	ML	NA	α = 0
	55524 6-27-90 0845	9	0	NR			Bδ = 400 cpm

NOTES: CONTRACTOR: PENNDRILL
RIG: CME 45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
α METER: ASI # 9
Bδ METER: ASI # 11
HNU METER: B 221

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART

BACKGROUND LEVELS HNU: 0 ppm
α: 0 cpm
Bδ: 400 cpm
LEL: N/A

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1523	COORDINATES:	DATE: 6-27-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-27-90
ENGINEER/GEOLOGIST: J MASON	Depth Date/Time	DATE COMPLETED: 6-27-90
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55525 6-27-90 0850	4	4	Loose 10yr 5/2 grayish brown clayey silt, some gravel, wet	ML	NA	Hnu: 0 α: 0 Bγ: 350 cpm
	55526 6-27 0850	4	0	NR			
16	55527 6-27 0850	8	0	NR			
	55528 6-27 0900	8	6	Medium dense 10yr 5/2 grayish brown sand, poorly graded, wet some silt, some clay.	SP	NA	Hnu: 0 α: 0 Bγ: 400 cpm
17	55529 6-27 0900	10	6	SAA	SP	NA	
	55530 6-27 0900	11	0	NR			
18	55531 6-27 0905	7	5	Loose 10yr 5/2 grayish brown sandy silt, some gravel,	ML	NA	Hnu: 0 α: 0 Bγ: 380 cpm
	55532 6-27 0905	5	0	NR			
19	55533 6-27 0905	7	0	NR			
	55534 6-27 0905	5	0	NR			Hnu: α: Bγ:
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT.			

NOTES: CONTRACTOR: PENNDRILL
RIG:
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
α METER: ASI # 9
Bγ METER: ASI # 11
Hnu METER: B 221

SAMPLES COLLECTED PER ASTM STANDARD PENETRATIC
COLORS IDENTIFIED USING MUNSELL COLOR C
BACKGROUND LEVELS Hnu: 0
α: 0
Bγ: 375 cpm
LEL: } NA
O_2: }

000803

4/c

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J MASON DATE 6-27-90
PROJECT NO. 602 3.7.1
CHECKED BY E. Trollinger DATE 7-3-90
BORING NO. 1523
PIEZOMETER NO. 1523
DATE OF INSTALLATION 6-27-90

BOREHOLE DRILLING

DRILLING METHOD AUGER (8 in)
TYPE OF BIT AUGER
DRILLING FLUID (S) USED: NA
CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA
SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE PIEZOMETER
RISER PIPE MATERIAL SCH. 40 PVC
DIAMETER OF PERFORATED SECTION 2 in I.D.
RISER PIPE DIAMETERS:
PERFORATION TYPE:
O.D. 2 3/8 in. I.D. 2 in I.D.
SLOTS ☑ HOLES ☐ SCREEN ☐
LENGTH OF PIPE SECTIONS 10 feet, 2 feet
AVERAGE SIZE OF PERFORATIONS .020 in.
JOINING METHOD Screw type flush jointed
TOTAL PERFORATED AREA 10 feet

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 feet
OTHER PROTECTION Locking, hinged lid with padlock
PROTECTIVE PIPE O.D. 4 5/8 in.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	ET 7-3-90 ~~1.583~~ 1.8		576.2	
GROUND SURFACE	0.0		574.4	
BOTTOM OF PROTECTIVE PIPE	ET 7-3-90 ~~2.17~~ ~~5/32~~ 2.8		571.6	
BOREHOLE FILL MATERIALS:				
ET ~~GROUT/SLURRY~~ CEMENT	TOP ~~2~~ 0.0 (JCM 6-29-90)	BOTTOM ~~2~~ 2.0 (JCM 6-29-90)	TOP 574.4	BOTTOM 572.4
BENTONITE PELLETS	TOP 2.0	BOTTOM 8.0	TOP 572.4	BOTTOM 566.4
SAND 10/20 SIZE	TOP 8.0	BOTTOM 20.0	TOP 566.4	BOTTOM 554.4
GRAVEL NOT USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 10.0	BOTTOM 20.0	TOP 564.4	BOTTOM 554.4
PIEZOMETER TIP	20.0		554.4	
BOTTOM OF BOREHOLE	20.0		554.4	
GWL AFTER INSTALLATION	NOT MEASURED		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS PIEZOMETER WAS SET IN THIS LOCATION (IN) BY GANGWAM'S DIRECTION THIS WILL BE THE ONLY ONE SET FOR THESE BORINGS 1519-1523.

000804

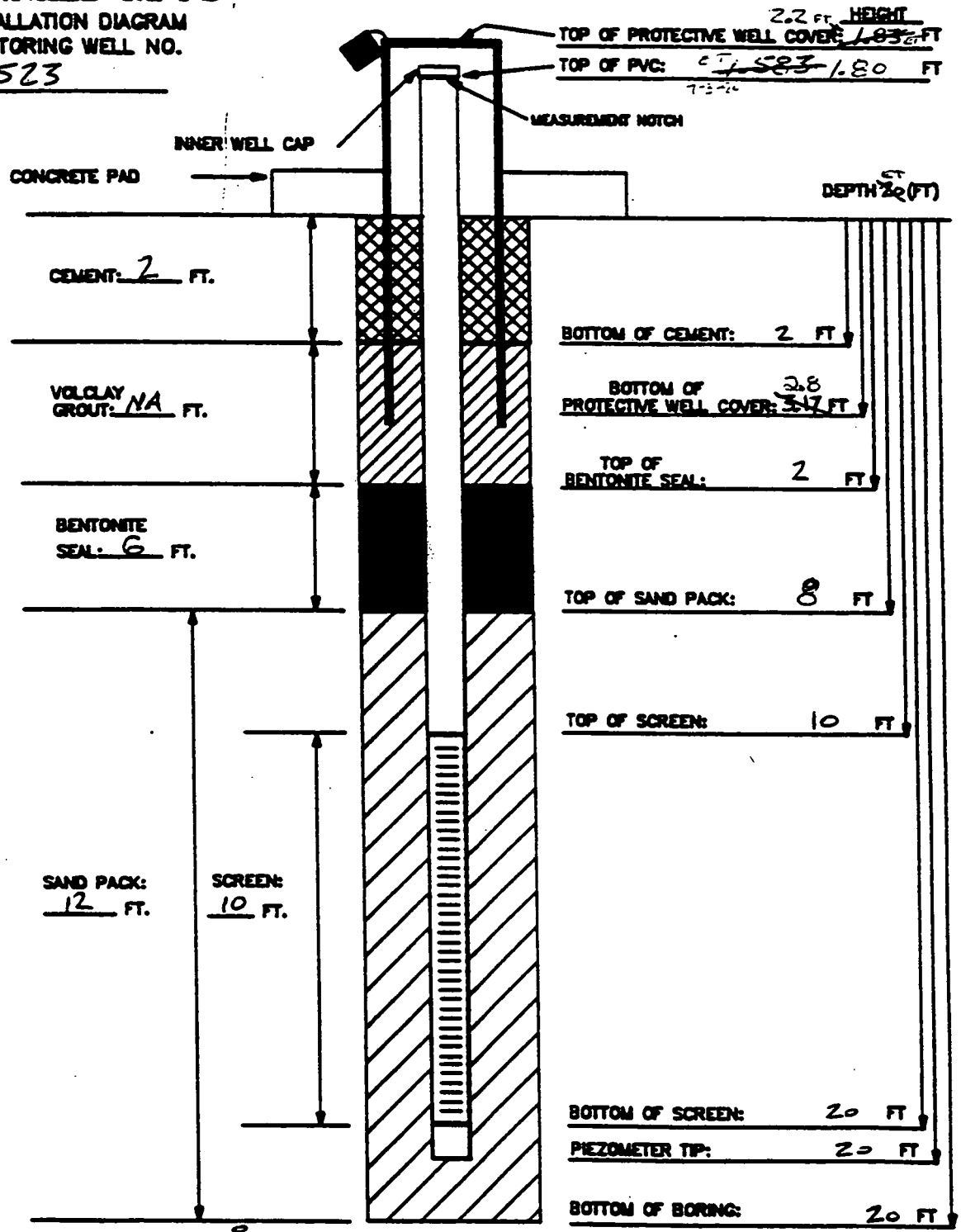
* Note (4) 4 in Diameter guard posts installed around this location because of parking lot location. 2 ft stickup.

5

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1523

INSTALLATION DATE: 6-27-90



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20 420 Silica @ 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 3 buckets
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NOT MEASURED

TASK: 3.7.1

GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

5711

Date	2/14/90			
Initials	ET.			
	Field Chkd	Tech. Rev.	Proj. Rev.	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.~~3-3-1~~ ET 9.31	PROJECT NAME: EMPC RI/FS (OUTFALL PIPELINE)		
BORING NUMBER: 1524	COORDINATES:		DATE: 2-13-90
ELEVATION: 537.00	GWL: Depth	Date/Time	DATE STARTED: 2-13-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 2-13-90
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED WATER CONTENT (%)	WELL CONSTRUCTION	REMARKS
				0.0 - 3.5 FT WERE AUGERED WITH 8 in. HSA. COMMENCED SAMPLING AT 3.5 FT				
3.5	00386 2-13 1518	5	6	MED. DENSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. SOME SAND. LOW MOISTURE.	ML	NA		HNU 0; α 0; βB 40 cpm
4.0	00387 2-13 1518	5	6	SAA	ML	NA		HNU 0; α 0; βB 40 cpm
4.5	00388 2-13 1518	6	2	SAA	ML	NA		HNU 0; α 0; βB 40 cpm
5.0	00389 2-13 1520	2	6	LOOSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. SOME SAND. TRACE GRAVEL. SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0; α 0; βB 50 cpm
5.5	00390 2-13 1520	2	0	NR	NA	NA		HNU NA; α NA; βB NA
6.0	00391 2-13 1520	3	0	NR	NA	NA		HNU NA; α NA; βB NA
6.5	00392 2-13 1522	3	6	MED. DENSE (10YR, 4/2) DARK GRAYISH BROWN CLAYEY SILT. SOME SAND AND GRAVEL. LOW MOISTURE.	ML	NA		HNU 0; α 0; βB 60 cpm
7.0	00393 2-13 1522	5	4	SAA	ML	NA		HNU 0; α 0; βB 60 cpm
7.5	00394 2-13 1522	7	0	NR	NA	NA		HNU NA; α NA; βB NA
8.0	00395 2-13 1524	4	6	MED. DENSE (10YR, 3/3) DARK BROWN CLAYEY SILT. TRACE SAND. SOME GRAVEL. LOW MOISTURE.	ML	NA		HNU 0; α 0; βB 60 cpm
8.5	00396 2-13 1524	5	4	SAA	ML	NA		HNU 0; α 0; βB 60 cpm
9.0	00397 2-13 1524	6	0	NR	NA	NA		HNU NA; α NA; βB NA
9.5				END OF SAMPLING, P/A. BOTTOM OF BORING @ 9.5 FT.				

CALCULATED DEPTH OF PIPELINE

NOTES:

HOLE WAS BACK-FILLED TO SURFACE WITH BENTONITE PELLETS

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: MOBILE B53

Driller: J. SALCANI

Mgr: C. COULTER

MATERIALS USED: 1 BUCKET BENTONITE PELLETS
1 gal WATER

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.9.31
BORING NO. 1524
PIEZOMETER NO.

FIELD ENG./GEO. Gorman DATE 2-[illegible]
CHECKED BY DATE
DATE OF INSTALLATION 2-13-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 9.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	9.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 1 Bucket Bentonite, 1 gal water

FERNALD RI/FS

5711

Date	3/4/90		
Initial	ET		
	Field Check	Lab Ver.	Data Ver.

VISUAL CLASSIFICATION OF SOILS

ET 3/4/90

PROJECT NUMBER: 602.~~23.1~~ 9.31	PROJECT NAME: FMPC RI/FS (OUTFALL PIPELINE)		
BORING NUMBER: 1524 DUPLICATE	COORDINATES:		DATE: 2-13-90
ELEVATION: 537.00	GWL: Depth	Date/Time	DATE STARTED: 2-13-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 2-13-90
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	SAA = SAME AS ABOVE NR = NO RECOVERY DESCRIPTION	USCS SYMBOL	MEASURED [illegible]	WELL CONSTRUCTION	REMARKS
				0.0 - 3.5 FT WERE AUGERED WITH 8 in HSA. SAMPLING COMMENCED AT 3.5 FT				
3.5	00516 2-13 1610	5	6	MED. DENSE ~~[illegible]~~ AG (10YR 4/2) DARK GRAYISH BROWN SANDY SILT. SOME CLAY AND GRAVEL. LOW MOISTURE.	ML	N/A		HNU 0 ⊥ 0 ⊥ 8B 40cpm
4.0	00517 2-13 1610	7	2	SAA	ML	N/A		HNU 0 ⊥ 0 ⊥ 8B 40cpm
4.5	00518 2-13 1610	4	0	NR	N/A	N/A		HNU NA ⊥ NA ⊥ 8B NA
5.0	00519 2-13 1611	4	6	MED. DENSE (10YR 4/3) BROWN SANDY ~~[illegible]~~ SILT. SOME CLAY AND GRAVEL. LOW MOISTURE.	ML	NA		HNU 0 ⊥ 0 ⊥ 8B 40cpm
5.5	00520 2-13 1611	5	6	HARD (2.5Y 3/2) VERY DARK GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. LOW MOISTURE.	CL	4.0		HNU 0 ⊥ 0 ⊥ 8B 40cpm
6.0	00521 2-13 1611	6	0	NR	NA	NA		HNU NA ⊥ NA ⊥ 8B NA
6.5	00522 2-13 1614	6	6	HARD (2.5Y 3/2) VERY DARK GRAYISH BROWN SILTY CLAY. TRACE GRAVEL. LOW PLASTICITY. LOW MOISTURE.	CL	3.0		HNU 0 ⊥ 0 ⊥ 8B 60-100cpm
7.0	00523 2-13 1614	10	0	NR	NA	NA		HNU NA ⊥ NA ⊥ 8B NA
7.5	00524 2-13 1614	11	0	NR	NA	NA		HNU NA ⊥ NA ⊥ 8B NA
8.0	00525 2-13 1618	24	0	SPOON REFUSAL CLOGGED BY COBBLE. NO RECOVERY.	NA	NA		HNU NA ⊥ NA ⊥ 8B NA
8.5	00526 2-13 1618	21	0		NA	NA		HNU NA ⊥ NA ⊥ 8B NA
9.0	00527 2-13 1618	28	0		NA	NA		HNU NA ⊥ NA ⊥ 8B NA
9.5				END OF SAMPLING, P/A				

CALCULATED DEPTH OF PIPELINE

NOTES: BOTTOM OF BORING @ 9.5 FT. → HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: Mobile B53

Driller: J. SACCAN

Asst.: C. COULTER

MATERIALS USED: 1 BUCKET BENTONITE PELLETS
1 gal WATER

FERNALD RI/FS

Initial	Date
ET	3/1/90

VISUAL CLASSIFICATION OF SOILS

ET 3/1/90

PROJECT NUMBER 602.~~9.3.T~~ 9.31	PROJECT NAME OUTFALL PIPELINE FMPC RI/FS		
BORING NUMBER 1525	COORDINATES	DATE 2-16-90	
ELEVATION: 530.5 FT	GWL: Depth	Date/Time	DATE STARTED 2-16-90
ENGINEER/GEOLOGIST M. GARMAN	Depth	Date/Time	DATE COMPLETED 2-16-90
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 1

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	WELL CONSTRUCTION	REMARKS		
0.0	00399 1248 2-16	2	6	LOOSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. MOIST.	ML	NA	NA	HNU 0	α 0	γβ 40
0.5	00400 1248 2-16	4	2	LOOSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN SANDY SILT. SOME CLAY. MOIST.	ML	NA		HNU 0	α 0	γβ 60
1.0	00401 1248 2-16	5	0	NR	NA	NA		HNU NA	α NA	γβ NA
1.5	00402 1250 2-16	7	6	MEDIUM DENSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0	α 0	γβ 20-40
2.0	00403 1250 2-16	8	3	MEDIUM DENSE (2.5Y, 4/2) DARK GRAYISH BROWN CLAYEY SILT. TRACE SAND. SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0	α 0	γβ 40-60
2.5	00404 1250 2-16	7	0	NR	NA	NA		HNU NA	α NA	γβ NA
3.0	00405 1252 2-16	3	6	LOOSE (2.5Y, 4/4) OLIVE BROWN SANDY SILT. TRACE CLAY. MOIST.	ML	NA		HNU 0	α 0	γβ 50
3.5	00406 1252 2-16	3	6	SAA	ML	NA		HNU 0	α 0	γβ 50
4.0	00407 1252 2-16	5	2	SAA	ML	NA		HNU 0	α 0	γβ 50
4.5	00408 1254 2-16	14	6	DENSE + SAA	ML	NA		HNU 0	α 0	γβ 70
5.0	00409 1254 2-16	21	6	DENSE (10YR, 5/2) GRAYISH BROWN SILTY GRAVEL (FINE TO COARSE). DRY	GM	NA		HNU 0	α 0	γβ 50
5.5	00410 1254 2-16	17	3	SAA	GM	NA		HNU 0	α 0	γβ 60
6.0				END OF SAMPLING P/A HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS BOTTOM OF BORING @ 6.0 FT.						

CALCULATED DEPTH OF P

NOTES.

Drilling Contractor: PENN DRILL

Drilling Equipment: MOBILE B-53

Driller: J. SACCAKI

Asst.: C. COULTER

MATERIALS USED 0.5 MG BUCKET BENTONITE

BACKGROUND
HNU = 0 ppm
α = 0 cpm
γβ = 40-60 cpm

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Garman DATE 2-16-90
PROJECT NO. 602.9.31 CHECKED BY _____ DATE _____
BORING NO. 1525
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-16-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	6.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS _____

FERNALD RI/FS

Date	3/4/90			
Initial	ET			
Field Check				Field Data Verification

VISUAL CLASSIFICATION OF SOILS

ET 3/4/90

PROJECT NUMBER: 602 03.1 9.31	PROJECT NAME: OUTFALL PIPELINE FMDC RI/FS		
BORING NUMBER: 1526	COORDINATES:	DATE: 02-16-90	
ELEVATION: 533.2 FT	GWL: Depth / Date/Time	DATE STARTED: 2-16-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth / Date/Time	DATE COMPLETED: 2-16-90	
DRILLING METHODS: 8 in HSA		PAGE: 1 OF 1	

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GAMMA-RADIATION (mR/hr)	NA WELL CONSTRUCTION	REMARKS
				0.0 - 2.0 FT WERE AUGERED - WITH 8in HSA. DEGAN SAMPLING AT 2.0 FT				
2.0	00412 1430 02-16-90	2	6	Very loose, (2.5Y 4/4) Olive Brown, silty sand, moist	SM	NA		HNU 0 / α 0 / γB NO
2.5	00413 1430 02-16-90	1	6	SAA	SM	NA		HNU 0 / α 0 / γB 20
3.0	00414 1430 02-16-90	1	2	SAA	SM	NA		HNU 0 / α 0 / γB NA
3.5	00415 1432 02-16-90	2	6	Very loose, (2.5Y N/2), Dark Greyish brown clayey sand, trace of silt, Moist,	SC	NA		HNU 0 / α 0 / γB 50
4.0	00416 1432 02-16-90	2	6	Very loose, SAA	SC	NA		HNU 0 / α 0 / γB NO
4.5	00417 1432 02-16-90	2	0	NR	NA	NA		HNU NA / α NA / γB NA
5.0	00418 1434 02-16-90	2	6	Very loose, (10YR 5/3) Brown, fine to coarse sand, Trace of silt, Slightly moist,	SW	NA		HNU 0 / α 0 / γB 50
5.5	00419 1434 02-16-90	2	6	SAA	SW	NA		HNU 0 / α 0 / γB 50
6.0	00420 1434 02-16-90	1	3	Very loose, (10YR 5/3) Brown, Silty sand, Slightly moist,	SM	NA		HNU 0 / α 0 / γB 50
6.5	00421 1440 02-16-90	3	6	Loose, (10YR 4/3), Brown, Clayey sand Some silt, Slightly moist,	SC	NA		HNU 0 / α 0 / γB NO
7.0	00422 1440 02-16-90	3	6	Loose, (10YR 5/3), Brown, Silty sand trace of clay, Slightly moist.	SM	NA		HNU 0 / α 0 / γB 50
7.5	00423 1440 02-16-90	2	6	(3") SAA (3") Loose, (10YR 4/3), Brown, Clayey sand, trace of silt Slightly moist.	SC	NA		HNU 0 / α 0 / γB 50
8.0				END OF SAMPLING P/A				

CALCULATED DEPTH OF PIPE

NOTES: BOTTOM OF BORING @ 8.0 FT

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND HNU = 0, α = 0, γB = [illegible]

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SALCANI
Asst.: C. COULTER

MATERIALS USED: 1 BUCKET BENTONITE PELLETS

000811

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Gearmon DATE 2-16-90
PROJECT NO. 602 9.31 CHECKED BY _____ DATE _____
BORING NO. 1526
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-16-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 8.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	8.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 1 Bucket Bentonite

FERNALD RI/FS

Date	3/4/90			
Initial	ET			
	Field Check	1st Rev.	2nd Rev.	Hard Copy (Initial)

VISUAL CLASSIFICATION OF SOILS

ET 3/4/90

PROJECT NUMBER 602.9.31	PROJECT NAME OUTFALL PIPELINE FNPL N/S		
BORING NUMBER 1527	COORDINATES	DATE 02-16-90	
ELEVATION 537.4	GWL: Depth Date/Time	DATE STARTED 2-16-90	
ENGINEER/GEOLOGIST M. GARMAN	Depth Date/Time	DATE COMPLETED 2-16-90	
DRILLING METHODS Hollow-Stemed Auger		PAGE 1 OF 1	

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT)	SAMPLE	TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GAMMA/BETA (CPM)	NA WELL CONSTRUCTION	REMARKS
					0.0 - 6.5 FT WERE AUGERED, WITH 8in HSA. BEGAN SAMPLING AT 6.5 FT.				
6.5	00425 1505 02-16-90		3	6	LOOSE, (10YR. 3/2) Very dark greyish brown, clayey silt, some sand, moist.	ML	NA		HNU 0 α 0 γβ 50
7.0	00426 1505 02-16-90		2	6	SAA	ML	NA		HNU 0 α 0 γβ 50
7.5	00427 1505 02-16-90		2	0	NR	NA	NA		HNU NA α NA γβ NA
8.0	00428 1507 02-16-90		3	6	LOOSE, (10YR. 3/2), Very dark greyish brown clayey silt, some sand, moist	ML	NA		HNU 0 α 0 γβ 4
8.5	00429 1507 02-16-90		3	0	NR	NA	NA		HNU NA α NA γβ NA
9.0	00430 1507 02-16-90		4	0	NR	NA	NA		HNU NA α NA γβ NA
9.5	00431 1509 02-16-90		3	6	LOOSE, (10YR. 3/2), Very dark greyish brown clayey silt, some sand, moist.	ML	NA		HNU 0 α 0 γβ 40
10.0	00432 1509 02-16-90		3	6	SAA	ML	NA		HNU 0 α 0 γβ 50
10.5	00433 1509 02-16-90		2	2	SAA	ML	NA		HNU 0 α 0 γβ 40
11.0	00434 1514 02-16-90		3	6	MEDIUM DENSE + SAA	ML	NA		HNU 0 α 0 γβ 30
11.5	00435 1514 02-16-90		4	6	MEDIUM DENSE, (10YR 5/2) Greyish brown sandy gravel, (Fine to course) slightly moist.	GW	NA		HNU 0 α 0 γβ 30
12.0	00436 1514 02-16-90		6	0	NR.	NA	NA		HNU NA α NA γβ NA
12.5					END OF SAMPLING P/A BOTTOM OF BORING @ 12.5 FT.				

CALCULATED DEPTH OF PIPE

NOTES

Drilling Contractor: PENN DRILL

Drilling Equipment: MOBILE B-53

Driller: JIM SACCINI

Helper: CHRIS COOLTER

MATERIALS USED: 2 HG + BUCKETS BENTONITE

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

Background
Hnu = 0
Alpha = 0
Gamma/Beta = 30-50

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMC RI/FS FIELD ENG./GEO. M. Garmed DATE 2-16-90
PROJECT NO. 602 9.31 CHECKED BY _____ DATE _____
BORING NO. 1527
PIEZOMETER NO. NA DATE OF INSTALLATION 2-16-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 12.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	12.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 2 Buckets Bentonite

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

ET 3/8/91

PROJECT NUMBER 602.~~2.3.1~~ 9.31	PROJECT NAME OUTFALL PIPELINE FMPC-RI/FS		
BORING NUMBER 1528	COORDINATES	DATE 02-17-90	
ELEVATION 538.7	GWL: Depth Date/Time	DATE STARTED 2-17-90	
ENGINEER/GEOLOGIST M. GARMAN	Depth Date/Time	DATE COMPLETED 2-17-90	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 1	

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY IN	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	NA WELL CONSTRUCTION	REMARKS
				0.0 – 8.0 FT WERE AUGERED WITH 8in HSA. BEGAN SAMPLING AT 8.0 FT				
8.0	00438 1005 02-17-90	2	6	LOOSE (10YR 3/1) VERY DARK GREY, SANDY SILT, TRACE OF CLAY, MOIST.	ML	NA		HNU 0, α 0, γB 30
8.5	00439 1005 02-17-90	3	6	SAA.	ML	NA		HNU 0, α 0, γB 60
9.0	00440 1005 02-17-90	3	0	NR	NA	NA		HNU NA, α NA, γB NA
9.5	00441 1006 02-17-90	2	5	VERY LOOSE, (10YR 3/2) VERY DARK GREYISH BROWN CLAYEY SILT, SOME SAND, MOIST				HNU 0, α 0, γB 30
10.0	00442 1006 02-17-90	2	0	NR	NA	NA		HNU NA, α NA, γB NA
10.5	00443 1006 02-17-90	2	0	NR	NA	NA		HNU NA, α NA, γB NA
11.0	00444 1007 02-17-90	1	6	VERY LOOSE, (10YR 3/4) YELLOWISH BROWN, SANDY SILT, MOIST.	ML	NA		HNU 0, α 0, γB 40
11.5	00445 1007 02-17-90	1	3	SAA	ML	NA		HNU 0, α 0, γB 70
12.0	00446 1009 02-17-90	1	0	NR	NA	NA		HNU NA, α NA, γB NA
12.5	00447 1009 02-17-90	1	6	VERY LOOSE, (10YR 6/8) BROWN, SILTY SAND, SOME GRAVEL (FINE TO COARSE)	SM	NA		HNU 0, α 0, γB 40
13.0	00448 1009 02-17-90	1	3	VERY LOOSE, (10YR 5/2) GREYISH BROWN, SANDY, COARSE GRAVEL, SLIGHTLY MOIST.	GP	NA		HNU 0, α 0, γB 60
13.5	00449 1009 02-17-90	3	0	NR	NA	NA		HNU NA, α NA, γB NA
14.0				BOTTOM OF SAMPLING P/A				

CALCULATED DEPTH OF PIPE

NOTES: BOTTOM OF BORING @ 14.0 FT.

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND
HNU = 0
α = 0
γB = 20-80

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SACCANI
ASST.: C. COULTER

MATERIALS USED: ~~1~~ 2 BUCKETS BENTONITE

000815

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Gaeman DATE 2-17-90
PROJECT NO. 602.9.31 CHECKED BY _____ DATE _____
BORING NO. 1528
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-17-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 14.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	14.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 2 Buckets Bentonite

FERNALD RI/FS

Date	2/4/90			
Initial	ET			
	Field Check	1st Ver.	2nd Ver.	3rd Ver. Verification

VISUAL CLASSIFICATION OF SOILS

ET 2/4/90

PROJECT NUMBER: 602.9.31 ~~602.9.3.1~~ | PROJECT NAME: OUTFALL PIPELINE FMPC RI/FS
BORING NUMBER: 1529 | COORDINATES: | DATE: 02-18-90
ELEVATION: 534.5 | GWL: Depth Date/Time | DATE STARTED: 2-18-90
ENGINEER/GEOLOGIST: M. GARMAN | Depth Date/Time | DATE COMPLETED: 2-18-90
DRILLING METHODS: HOLLOW STEM AUGER | PAGE 1 OF 1

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED GW INTERSECTION (FT)	NA WELL CONSTRUCTION	REMARKS
				0.0 – 4.0 FT. WERE AUGERED WITH 8in HSA.				
				BEGAN SAMPLING AT 4.0 FT				
4.0	00477 1033 02-18-90	3	6	VERY LOOSE, (2.5Y 3/2) VERY DARK GREYISH BROWN. CLAYEY, SILT. LOW MOISTURE.	ML	NA		HNU 0, α 0, γB 40
4.5	00478 1033 02-18-90	2	6	SAA	ML	NA		HNU 0, α 0, γB 40
5.0	00479 1033 02-18-90	2	0	NR	NA	NA		HNU NA, α NA, γB NA
5.5	00480 1034 02-18-90	2	6	LOOSE, (2.5Y 3/2) VERY DARK GREYISH BROWN, CLAYEY, SILT, LOW MOISTURE	ML	NA		HNU 0, α –, γB 50
6.0 (CALCULATED DEPTH OF PIPE)	00481 1034 02-18-90	2	3	SAA	ML	NA		HNU 0, α –, γB 50
6.5	00482 1034 02-18-90	3	0	NR	NA	NA		HNU NA, α NA, γB NA
7.0	00483 1035 02-18-90	5	6	LOOSE, (2.5Y 3/2) VERY DARK GREYISH BROWN, CLAYEY SILT, TRACE OF FINE SAND LOW MOISTURE	ML	NA		HNU 0, α –, γB 50
7.5	00484 1035 02-18-90	5	5	SAA	ML	NA		HNU 0, α –, γB 60
8.0	00485 1035 02-18-90	5	0	NR	NA	NA		HNU NA, α NA, γB NA
8.5	00486 1037 02-18-90	5	6	LOOSE, (10YR. 4/2) DARK GREYISH BROWN CLAYEY SILT, TRACE OF SAND AND FINE GRAVEL LOW MOISTURE.	ML	NA		HNU 0, α –, γB 80
9.0	00487 1037 02-18-90	4	6	SAA	ML	NA		HNU 0, α –, γB 80
9.5	00488 1037 02-18-90	4	6	SAA	ML	NA		HNU 0, α –, γB 80
10.0				END OF SAMPLING P/A				

BOTTOM OF BORING @ 10.0 FT.

NOTES:
Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SACCANI
Asst.: C. COULTER

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND: HNU = 0ppm, α = 0 cpm, γB = 20-80 cpm

MATERIALS USED: 1 BUCKET BENTONITE

000817

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Gorman DATE 2-18-9
PROJECT NO. 602 9.31 CHECKED BY _____ DATE _____
BORING NO. 1529
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-18-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 1 Bucket Bentonite

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 9.31 9.31 (FT 3/4/90)	PROJECT NAME OUTFALL PIPELINE		
BORING NUMBER 1530	COORDINATES	DATE 02-18-90	
ELEVATION 534.7	GWL: Depth / Date/Time	DATE STARTED 2-18-90	
ENGINEER/GEOLOGIST M. GARMAN	Depth / Date/Time	DATE COMPLETED 2-18-90	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 1	

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GW DEPTH (FT)	NA WELL CONSTRUCTION	REMARKS
				0.0 – 4.5 FT WERE AUGERED WITH 8 in HSA. BEGAN SAMPLING AT 4.5 FT				
4.5	00490 1404 02-18-90	3	6	LOOSE, (10YR 3/2) Very dark grayish brown, Clayey Silt, Low moisture.	ML	NA		HNV 0, α 0, γB 40
5.0	00491 1404 02-18-90	4	2	SAA	ML	NA		HNV 0, α 0, γB 40
5.5	00492 1404 02-18-90	4	0	NR	NA	NA		HNV NA, α NA, γB NA
6.0	00493 1405 02-18-90	5	6	MEDIUM DENSE, (10YR 4/2) Dark grayish brown, Clayey Silt, Low moisture.	ML	NA		HNV 0, α 0, γB 50
6.5 (CALCULATED DEPTH OF PIPE)	00494 1405 02-18-90	6	3	SAA	ML	NA		HNV 0, α 0, γB 50
7.0	00495 1405 02-18-90	8	0	NR	NA	NA		HNV NA, α NA, γB NA
7.5	00496 1406 02-18-90	5	6	LOOSE, (10YR 4/2) DARK GREYISH BROWN, CLAYEY SILT, LOW MOISTURE.	ML	NA		HNV 0, α 0, γB 50
8.0	00497 1406 02-18-90	5	6	LOOSE, (10YR 4/2) DARK GREYISH BROWN, CLAYEY SILT, TRACE OF SAND, LOW MOISTURE.	ML	NA		HNV 0, α 0, γB 50
8.5	00498 1406 02-18-90	4	5	SAA	ML	NA		HNV 0, α 0, γB 60
9.0	00499 1407 02-18-90	4	6	LOOSE, (10YR 4/3) BROWN, SANDY SILT, LOW MOISTURE.	ML	NA		HNV 0, α 0, γB 40
9.5	00500 1407 02-18-90	4	6	LOOSE, (10YR 4/3) BROWN, SILTY SAND LOW MOISTURE.	GM	NA		HNV 0, α 0, γB 50
10.0	00501 1407 02-18-90	6	6	LOOSE, (10YR 4/3 BROWN SANDY SILT, TRACE OF CLAY, SLIGHTLY MOIST TO MOIST.	ML	NA		HNV 0, α 0, γB 50
10.5				END OF SAMPLING P/A, BOTTOM OF BORING @ 10.5 FT				

NOTES.

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SACCANI
Asst: C. COULTER

MATERIALS USED:
1 BUCKET BENTONITE

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND
HNV = 0 ppm
α = 0 cpm
γB = 20-~~80~~ cpm

000819

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline Expc RI/FS FIELD ENG./GEO. M. Gaeman DATE 2-18-9
PROJECT NO. 602 9.31 CHECKED BY _____ DATE _____
BORING NO. 1530
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-18-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Hollow Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 10.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 1 Bucket Bentonite

FERNALD RI/FS

Date	5/4/90			
Initial	ET			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.9.31	PROJECT NAME OUTFALL PIPELINE FMPC RI/FS		
BORING NUMBER 1531	COORDINATES	DATE 02-18-90	
ELEVATION 537.1	GWL: Depth	Date/Time	DATE STARTED 2-18-90
ENGINEER/GEOLOGIST M. GARMAN	Depth	Date/Time	DATE COMPLETED 2-18-90
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 1

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GW ELEV (FT)	NA WELL CONSTRUCTION	REMARKS
				0.0 - 7.5 FT WERE AUGERED WITH 8in HSA				
7.5				BEGAN SAMPLING AT 7.5 FT.				
8.0	00503 1550 02-18-90	2	6	VERY LOOSE (10YR 5/2) VERY DARK GREYISH BROWN, CLAYEY SILT, TRACE OF SAND, SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
8.5	00504 1550 02-18-90	2	6	SAA	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
9.0	00505 1550 02-18-90	2	3	SAA	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
9.5	00506 1551 02-18-90	2	6	VERY LOOSE (10YR 4/2) VERY DARK GREYISH BROWN, CLAYEY SILT, SLIGHTLY MOIST TO MOIST	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
10.0	00507 1551 02-18-90	2	4	SAA	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
10.5	00508 1551 02-18-90	2	0	NR	NA	NA		HNU NA; ⊿ NA; YB NA
11.0	00509 1554 02-18-90	2	6	LOOSE, (10YR 4/2) DARK GREYISH BROWN, CLAYEY SILT, SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0 ppm; ⊿ 0; YB 50
11.5	00510 1554 02-18-90	2	6	LOOSE, (10YR 4/2) DARK GREYISH BROWN, SILTY SAND, TRACE OF GRAVEL, SLIGHTLY MOIST TO MOIST.	GM	NA		HNU 0 ppm; ⊿ 0; YB 50
12.0	00511 1554 02-18-90	3	1	LOOSE (10YR 4/2) DARK GREYISH BROWN SANDY SILT, TRACE OF GRAVEL, SLIGHTLY MOIST TO MOIST.	ML	NA		HNU 0 ppm; ⊿ 0; YB 40
12.5	00512 1555 02-18-90	3	6	LOOSE (10YR 4/2) DARK GREYISH BROWN SILTY SAND, TRACE OF CLAY, SLIGHTLY MOIST TO MOIST (2") → SAA	GM	NA		HNU 0 ppm; ⊿ 0; YB 60
13.0	00513 1555 02-18-90	3	6	(4") (10YR 5/2) GREYISH BROWN, FINE TO COARSE SAND SOME GRAVEL TRACE OF SILT, SLIGHTLY MOIST TO MOIST	2" GM 4" GW	NA		HNU 0 ppm; ⊿ 0; YB 60
13.5	00514 1555 02-18-90	5	0	NR	NA	NA		HNU NA; ⊿ NA; YB NA
				END OF SAMPLING P/A				

CALCULATED DEPTH OF PIPE

NOTES: BOTTOM OF BORING @ 13.5 FT. HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS.

BACKGROUND: HNU 0 ppm; ⊿ 0 cpm; YB 20-60 cpm

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SACCANI
Asst: C. COULTER

MATERIALS USED:
2 BUCKETS BENTONITE

000821

A2 NTRW

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Garman DATE 2-18-9.
PROJECT NO. 602.9.31 CHECKED BY _____ DATE _____
BORING NO. 1531
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-18-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 13.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 2 Buckets Bentonite

FERNALD
RI/FS

Date	8/4/90			
Initial	E.T.			
	Final Check	1st Rev. In	2nd Rev. In	Hard Copy

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.9.31	PROJECT NAME Outfall Pipeline FMCR/FS		
BORING NUMBER 1532	COORDINATES		DATE 02-AB-90
ELEVATION 536.8	GWL: Depth	Date/Time	DATE STARTED 2-19-90
ENGINEER/GEOLOGIST M. Garman	Depth	Date/Time	DATE COMPLETED 2-19-90
DRILLING METHODS Hollow Stem Auger			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (PER 6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GW ELEV (FT)	NA WELL CONSTRUCTION	REMARKS		
				SAA = SAME AS ABOVE NR = NO RECOVERY						
				OD - 8.0 FT WERE AUGERED. WITH 8in HSA.						
				BEGAN SAMPLING AT 8.0 FT						
8.0	00529 1015 02-19-90	1	6	VERY LOOSE, (10YR 3/6) DARK BROWN, SILT, TRACE of clay, trace of sand, MOIST	ML	NA		HNU 0	∝ 0	BB 40
8.5	00530 1015 02-19-90	1	6	SAA	ML	NA		HNU 0	∝ 0	BB 40
9.0	00531 1015 02-19-90	1	4	SAA	ML	NA		HNU 0	∝ 0	BB 40
9.5	00532 1016 02-19-90	1	6	SAA	ML	NA		HNU 0	∝ 0	BB 60
10.0	00533 1016 02-19-90	1	6	SAA	ML	NA		HNU 0	∝ 0	BB 60
10.5	00534 1016 02-19-90	1	0	NR	NA	NA		HNU NA	∝ NA	BB
11.0	00535 1017 02-19-90	1	6	VERY LOOSE, (10YR 3/3) DARK BROWN, SILT TRACE OF CLAY, TRACE OF SAND, MOIST	ML	NA		HNU 0	∝ 0	BB 60
11.5	00536 1017 02-19-90	1	6	SAA	ML	NA		HNU 0	∝ 0	BB 60
12.0	00537 1017 02-19-90	1	1	VERY LOOSE, (10YR 4/2) DARK GREYISH RED CLAYEY SILT, TRACE of SAND, LOW MOISTURE	ML	NA		HNU 0	∝ 0	BB 60
12.5	00538 1018 02-19-90	1	6	SAA	ML	NA		HNU 0	∝ 0	BB 50
13.0	00539 1018 02-19-90	1	4	VERY LOOSE, (10YR 4/2) DARK GREYISH BROWN SILTY SAND, SOME GRAVEL, LOW MOISTURE	GM	NA		HNU 0	∝ 0	BB 50
13.5	00540 1018 02-19-90	2	0	NR	NR	NA		HNU NA	∝ NA	BB NA
14.0				END OF SAMPLING P/A						

ACTUAL DEPTH OF PIPE

NOTES.

BOTTOM OF BORING @ 14.0 FT.

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

Drilling Contractor PENN-DRILL

Drilling Equipment MOBILE B-

Driller: JIM SACANNI

Asst: CHRIS COULTER

MATERIALS USED: 2 BUCKETS BENTONITE

BACKGROUND

HNU 0 ppm

∝ 0 cpm

BB 20-60 cpm

000823

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Garman DATE 2-19-9
PROJECT NO. 602.9.431 CHECKED BY _____ DATE _____
BORING NO. 1532
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-19-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 14.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	14.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 2 Buckets Bentonite

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.9.31	PROJECT NAME: Outfall Pipeline FMPC RI/FS
BORING NUMBER: 1537	COORDINATES:
ELEVATION: 537.6	GWL: Depth / Date/Time
ENGINEER/GEOLOGIST: M. GARMAN	Depth / Date/Time
DRILLING METHODS: Hollowed Stem Auger	

DATE: 02-19-90
DATE STARTED: 2-19-90
DATE COMPLETED: 2-19-90
PAGE 1 OF 1

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6/6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	N/A WELL CONSTRUCTION	REMARKS
				0.0 - 9.0 FT WERE AUGERED WITH 8in HSA.				
				BEGAN SAMPLING AT 9.0 FT				
9.0	00542 1351 02-19-90	3	5	LOOSE (10YR 3/2) VERY DARK GREYISH BROWN. CLAYEY SILT LOW MOISTURE	ML	NA		HNU 0, α 0, BB 60
9.5	00543 1351 02-19-90	4	0	NR	NA	NA		HNU NA, α NA, BB NA
10.0	00544 1351 02-19-90	2	0	NR	NA	NA		HNU NA, α NA, BB NA
10.5	00545 1352 02-19-90	1	6	LOOSE (10YR 3/2) VERY DARK GREYISH BROWN CLAYY SILT; LOW MOISTURE. (TRACE SAND)	ML	NA		HNU 0, α 0, BB 60
ALCULATED DEPTH OF PIPE 11.0	00546 1352 02-19-90	1	6	SAA	ML	NA		HNU 0, α 0, BB 60
11.5	00547 1352 02-19-90	1	2	SAA	ML	NA		HNU 0, α 0, BB 60
12.0	00548 1355 02-19-90	4	6	LOOSE, (10YR 3/2) VERY DARK GREYISH BROWN CLAYEY SILT, TRACE OF SAND, MOIST. (3") → SAA	ML	NA		HNU 0, α 0, BB 60
12.5	00549 1355 02-19-90	5	6	(3") LOOSE (10YR 5/2) Greyish brown, sandy GRAVEL, TRACE SILT, MOIST.	ML GW	NA		HNU 0, α 0, BB 60
13.0	00550 1355 02-19-90	7	2	SAA	GW	NA		HNU 0, α 0, BB 60
13.5	00551 1359 02-19-90	7	6	SAA	GW	NA		HNU 0, α 0, BB 40
14.0	00552 1359 02-19-90	21	6	SAA	GW	NA		HNU 0, α 0, BB 40
14.5	00553 1359 02-19-90	15	0	NR	NA	NA		HNU NA, α NA, BB NA
15.0				END OF SAMPLING P.A.				

NOTES.
BOTTOM OF BORING @ 15.0 FT.
HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: JIM JACANJI
Asst: CHRIS COULTER

MATERIALS USED: 2 BUCKETS BENTONITE

BACKGROUND
HNU = 0 ppm
α = 0 cpm
BB = 20-80 cpm

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline Fnpc RI/FS
PROJECT NO. 602.9.31
BORING NO. 1533
PIEZOMETER NO.

FIELD ENG./GEO. M. Garnand DATE 2-19-90
CHECKED BY DATE
DATE OF INSTALLATION 2-19-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 15.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 2 Buckets Bentonite

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6002.9.31	PROJECT NAME OUTFALL PIPELINE FMPC-RI/FS		
BORING NUMBER 1533 DUPLICATE	COORDINATES		DATE 02-19-90
ELEVATION 537.6	GWL: Depth	Date/Time	DATE STARTED 2-19-90
ENGINEER/GEOLOGIST M. Barman	Depth	Date/Time	DATE COMPLETED 2-19-90
DRILLING METHODS Hollow-Stem Auger			PAGE 1 OF 1

SAA = SAME AS ABOVE
NR = NO RECOVERY

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GW DEPTH (FT)	NA WELL CONSTRUCTION	REMARKS HNU	α	γB
				0.0 - 9.0 FT WERE AUGERED						
				BEGAN SAMPLING AT 9.0 FT						
9.0	00555 1515 02-19-90	2	6	VERY LOOSE (10YR 3/2) DARK BROWN, CLAYEY SILT, TRACE OF SAND LOW MOISTURE	ML	NA		0	0	50
9.5	00558 1515 02-19-90	1	6	SAA	ML	NA		0	0	50
10.0	00557 1515 02-19-90	2	6	SAA	ML	NA		0	0	50
10.5	00558 1516 02-19-90	2	6	SAA	ML	NA		0	0	60
CALCULATED DEPTH OF PIPE 11.0	00559 1516 02-19-90	3	6	SAA	ML	NA		0	0	60
11.5	00560 1516 02-19-90	3	3	SAA	ML	NA		0	0	60
12.0	00561 1518 02-19-90	3	6	VERY LOOSE (10YR 3/3) DARK BROWN CLAYEY SILT, TRACE SAND, MOIST.	ML	NA		0	0	50
12.5	00562 1518 02-19-90	3	2	VERY LOOSE (10YR 3/3) DARK BROWN CLAYEY SILT, TRACE OF SAND AND GRAVEL MOIST.	ML	NA		0	0	50
13.0	00563 1518 02-19-90	3	0	NR	NA	NA		NA	NA	NA
13.5	00564 1520 02-19-90	3	5	MEDIUM DENSE, (10YR 5/2) GREYISH BROWN SANDY GRAVEL, TRACE OF SILT, LOW MOISTURE — well graded	GW	NA		0	0	50
14.0	00565 1520 02-19-90	9	0	NR	NA	NA		NA	NA	NA
14.5	00566 1520 02-19-90	4	0	NR	NA	NA		NA	NA	NA
15.0				END OF SAMPLING PIAG						

NOTES.

BOTTOM OF BORING @ 15.0 FT.

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

Drilling Contractor PENN DRILL
Drilling Equipment MOBILE B-53
Driller: JIM SPCANNI
CHRIS COULTER

BACKGROUND
HNU = 0 ppm
α = 0
γB = 20-80 cpm

MATERIALS USED: 2 BUCKETS BENTONITE

000827

FERNALD
RI/FS

Date	3/4/90		5711	
Initial	ET			
	Field Chk	Data Ent	Data Ver	Data Rev

VISUAL CLASSIFICATION OF SOILS

ET 3/4/90

PROJECT NUMBER: 602.~~3.1~~ 9.21 | PROJECT NAME: OUTFALL PIPELINE FUNDRIES
BORING NUMBER: 1534 | COORDINATES: | DATE: 02-17-90
ELEVATION: 536.4 PT | GWL: Depth Date/Time | DATE STARTED: 2-17-90
ENGINEER/GEOLOGIST: M. GARMAN | Depth Date/Time | DATE COMPLETED: 2-17-90
DRILLING METHODS: HOLLOW STEM AUGER | PAGE 1 OF 1

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	N/A WELL CONSTRUCTION	REMARKS
				0.0 - 5.0 FT. WERE AUGERED WITH 8in HSA. BEGAN SAMPLING AT 5.0 FT.				
5.0	00451 1340 02-17-90	5	6	(2") MEDIUM DENSE (2.5Y 4/4) Olive brown, silty sandy gravel slightly moist	GM	NA		HNU 0 / ∠ 0 / YB 50
5.5	00452 1340 02-17-90	4	4	(4") MEDIUM DENSE (2.5Y 3/2) Very dark grayish brown clayey silt. Low moisture SAA	ML	NA		HNU 0 / ∠ 0 / YB 50
6.0	00453 1340 02-17-90	M	0	NR	NA	NA		HNU NA / ∠ NA / YB NA
6.5	00454 1342 02-17-90	M	6	MEDIUM DENSE (2.5Y 4/4) Olive brown silty sandy gravel (Fine to coarse) Slightly moist to moist,	GM	NA		HNU 0 / ∠ 0 / YB 30
7.0	00455 1342 02-17-90	6	6	MEDIUM DENSE (2.5Y 3/2). Very dark grayish brown, clayey silt, Low moisture.	ML	NA		HNU 0 / ∠ 0 / YB 30
7.5	00456 1342 02-17-90	M	0	NR	NA	NA		HNU NA / ∠ NA / YB NA
8.0	00457 1344 02-17-90	9	6	MEDIUM DENSE (2.5Y 4/4) Olive brown silty sandy gravel (Fine to coarse). Trace of clay. Slightly moist to moist	GM	NA		HNU 0 / ∠ 0 / YB 40-60
8.5	00458 1344 02-17-90	11 WLB 10 2-1-1	6	SAA	GM	NA		HNU 0 / ∠ 0 / YB 40
9.0	00459 1344 02-17-90	10 WLB 11 2-1-1	4	SAA	GM	NA		HNU 0 / ∠ 0 / YB 40
9.5	00460 1345 02-17-90	9	6	SAA	GM	NA		HNU 0 / ∠ 20 WLB / YB 20
10.0	00461 1345 02-17-90	12	6	SAA	GM	NA		HNU 0 / ∠ 0 / YB 40
10.5	00462 1345 02-17-90	11	5	SAA	GM	NA		HNU 0 / ∠ 0 / YB 30-60
11.0				END OF SAMPLING P/A				

CALCULATED DEPTH OF PIPE

NOTES: BOTTOM OF BORING @ 11.0 FT. HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND HNU = 0
∠ = 0
YB = 20-60

Drilling Contractor: PENN-DRILL
Drilling Equipment: MOBILE B-53
Driller: J. SACCANI
ASST: C. COULTER

MATERIALS USED: 1 BUCKET BENTONITE

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Outfall Pipeline FMPC RI/FS FIELD ENG./GEO. M. Garman DATE 2-[illegible]-9
PROJECT NO. 602.9.31 CHECKED BY _____ DATE _____
BORING NO. 1534
PIEZOMETER NO. _____ DATE OF INSTALLATION 2-17-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 11.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	11.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Used 1 Bucket Bentonite

000829

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.9.3.1 9.31 (ET 3/4/90)	PROJECT NAME: OUTFALL PIPELINE		
BORING NUMBER: 1534-DUPLICATE	COORDINATES:		DATE: 02-17-90
ELEVATION: 536.4 FT.	GWL: Depth	Date/Time	DATE STARTED: 2-17-90
ENGINEER/GEOLOGIST: M. Garman	Depth	Date/Time	DATE COMPLETED: 2-17-90
DRILLING METHOD: HOLLOW STEM AUGER			PAGE 1 OF 1

NR = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED LIQUID LIMIT (%)	NA WELL CONSTRUCTION	REMARKS (HNU / α / γB)
				0.0 – 5.0 FT WERE AUGERED WITH 8in HSA. BEGAN SAMPLING AT 5.0 FT				
5.0	00464 1535 02-17-90	3	6	LOOSE, (10YR 4/2) DARK GREYISH BROWN, CLAYEY SANDY, SILT, MOIST.	ML	NA		HNU 0, α 0, γB 50
5.5	00465 1535 02-17-90	4	6	LOOSE, (10YR 3/2) VERY DARK GREYISH BROWN CLAYEY, SILT, LOW MOISTURE	ML	NA		HNU 0, α 0, γB 50
6.0	00466 1535 02-17-90	4	4	SAA	ML	NA		HNU 0, α 0, γB 40
6.5	00467 1537 02-17-90	7	6	(4") MEDIUM DENSE, (10YR 5/3) BROWN, SILTY, SAND, MOIST. (2") HARD (10YR 3/2) VERY DARK GREYISH BROWN SILTY CLAY, LOW PLASTICITY, LOW MOISTURE	SM / CL	NA / 3.5		HNU 0, α 0, γB 30
7.0	00468 1537 02-17-90	10	6	SAA	CL	3.5		HNU 0, α 0, γB 20
7.5	00469 1537 02-17-90	9	2	SAA	CL	3.5		HNU 0, α 0, γB 50
8.0	00470 1540 02-17-90	10	6	MEDIUM DENSE, (10YR 4/3) CLAYEY, SANDY, GRAVEL, SLIGHTLY MOIST TO MOIST.	GC	NA		HNU 0, α 0, γB 40
8.5	00471 1540 02-17-90	12	6	MEDIUM DENSE, (10YR 5/3) BROWN SILTY GRAVEL, TRACE OF CLAY, LOW MOISTURE.	GM	NA		HNU 0, α 0, γB 50
9.0	00472 1540 02-17-90	11	2	SAA	GM	NA		HNU 0, α 0, γB 50
9.5	00473 1545 02-17-90	4	6	SAA	GM	NA		HNU 0, α 0, γB 30
10.0	00474 1545 02-17-90	9	3	SAA	GM	NA		HNU 0, α 0, γB 30
10.5	00476 1545 02-17-90	7	0	NR	NA	NA		HNU NA, α NA, γB NA
11.0				END OF SAMPLING (PIA)				

CALCULATED DEPTH OF PIPE

NOTES: BOTTOM OF BORING @ 11.0 FT.

HOLE WAS BACKFILLED TO SURFACE WITH BENTONITE PELLETS

BACKGROUND: HNU = 0, α = 0, γB = 20–60

Drilling Contractor: PENN DRILL
Drilling Equipment: MOBILE B-53
Driller: JIM SACANNI
Assist: CHRIS COULTER

MATERIALS USED: 1 BUCKET BENTONITE

2539

Project 4700-016 Site PRRS PZ-01 Sh 1 of 1

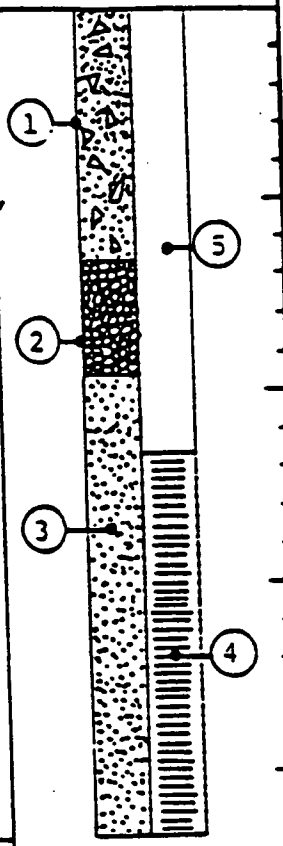
Date Started 6-18-89 Completed 6-18-89 TOC Elevation 532.19 FT.

Total Depth 21.7' Location R-N Site Logged by M. Ferlin

Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 14.5 feet

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 in.	Sample Depth Range	Sample Rec.	OVA/SM VALUES	Sample Description	Equipment Installed
			1-2-2-5	0'-2'	0.2	ND/ND	Clay, brown, with some fine sand, wet	
	5		3-5-7-13	4'-6'	1.3	ND/ND	Sand, medium to coarse, and Gravel, tan to gray to black, wet (2" organic silt layer found above sand and gravel)	
	10		4-8-10-9	9'-11'	0.8	NR		
	15		-	14'-16'	1.7	94/ND		
	20		-	19'-21'	1.1	6/ND		
							Total Depth - 21.7'	



ND-Indicates no deflection on the linear display scale.
OVA-Value represents equivalent concentrations of methane (in ppm).
SM-Counts per minute as noted on the linear display scale.
NR - Value not recorded.

ENSR

000831

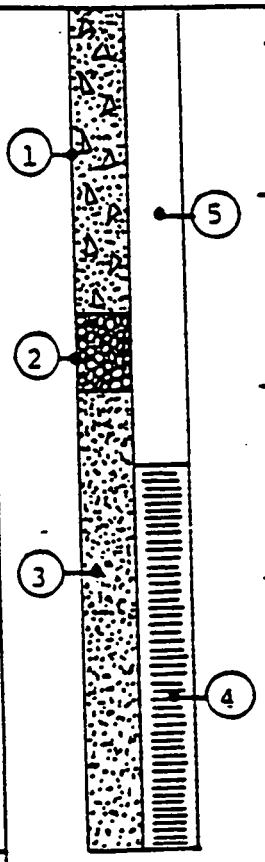
Project 4700-016 Site PRRS PZ-02 Sh 1 of 1
Date Started 6-20-89 Completed 6-20-89 TOC Elevation 531.34 FT.
Total Depth 22.0' Location R-N Site Logged by M. Ferlin
Casing I.D. 2-inch PVC Contractor Bowser-Morner
Remarks Water level during drilling - 13.3 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description
			4-11-16-14	0'-2'	1.4	0.3/ND	Clay, brown, with trace to some fine sand/silt, moist
	5		8-23-70	4'-6'	0.8	1.8/ND	Sand, medium to coarse, and Gravel, large, tan to light gray, moist to wet
	10		25-37-37-30	9'-11'	0.7	0.6/ND	Water level 13.3'
	15		16-21-50-42	14'-16'	0.8	0.6/NR	
	20		35-15-27-27	19'-21'	0.9	0.2/ND	

Total Depth - 22.0'

ND- No deflection on the linear display scale.
NR-Value not recorded.
OVA-Value represents equivalent concentrations of methane (in ppm).
SM-Counts per minute as noted on the linear display scale.

Equipment Installed



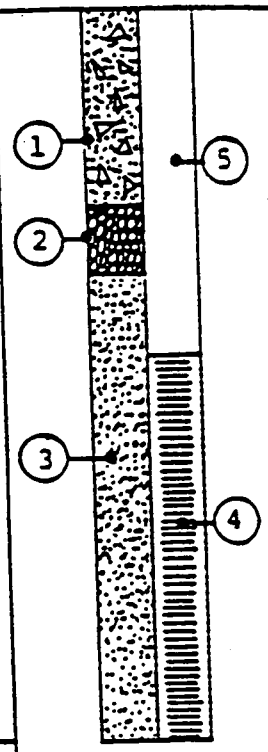
Stick up - 2.5

ENSR

2541

Project 4700-016 Site PRRS PZ-03 Sh 1 of 1
Date Started 6-20-89 Completed 6-20-89 TOC Elevation 528.83 FT.
Total Depth Location A&W Site Logged by M. Ferlin
Casing I.D. 2-inch PVC Contractor Bowser-Morner
Remarks Water level during drilling - 10.5 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description	Equipment Installed
			4-6-9-10	0'-2'	2.0	ND/ND	Silt, brown, with some clay, trace sand, moist	
	5		9-11-9-11	4'-6'	1.2	ND/ND	Sand, medium to coarse, and Gravel, fine to medium to large, tan to orange, damp to wet	
	10		18-82	9'-11'	0.7	ND/ND		
	15		17-23-82/0.4	14'-16'	0.5	0.2/ND		
	20						Total Depth - 19.0' ND-No deflection on the linear display scale. OVA-Value represents equivalent concentrations of methane (in ppm). SM-Counts per minute as noted on the linear display scale.	Stick up-1.6'



ENSR

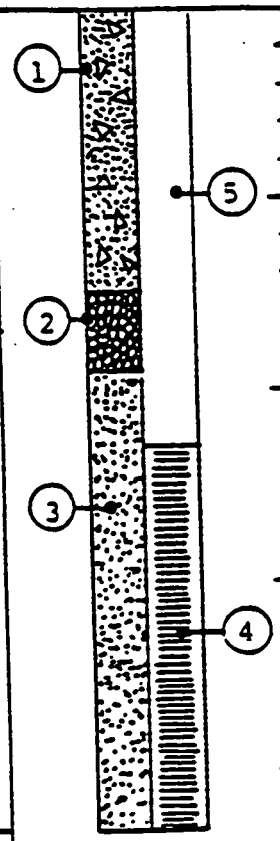
Project 4700-016 Site PRRS PZ-04 Sh 1 of 1
Date Started 6-20-89 Completed 6-20-89 TOC Elevation 528.94 FT.
Total Depth 21.5 Location Harrisons Foundations Logged by M. Ferlin
Casing I.D. 2-inch PVC Contractor Bowser-Morner
Remarks Water level during drilling - 12.8 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description
			10-31-17-21	0'-2'	2.0	ND/407	Silt, brown, with gravel and sand, moist; to Clay, light tan, with fine sand and silt, moist to wet
	5		5-8-7-6	4'-6'	0.7	0.1/395	
	10		15-50-50	9'-11'	1.2	0.4/385	Sand, medium to coarse, and Gravel, wet
	15		15-35-41-36	14'-16'	1.1	0.3/377	
	20		6-5-8-21	19'-21'	0.0	NR	

Total Depth - 21.5'

ND-Indicates no deflection on the linear display scale.
OVA-Value represents equivalent concentrations of methane. (in ppm).
SM-Cumulative counts per 0.10 minutes as recorded on the digital readout.
NR-No recovery.

Equipment Installed



ENSR

2543

Project 4700-016 Site PPRS PZ-05 Sh 1 of 1

Date Started 6-21-89 Completed 6-21-89 TOC Elevation 531.82 FT.

Total Depth 22.0 Location Harrison's Foundation Logged by M. Ferlin

Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 14.0 feet

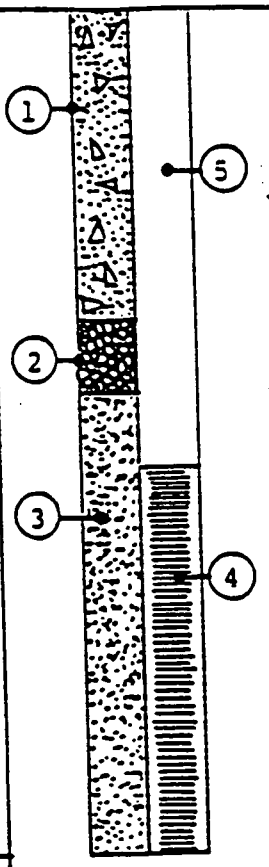
Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description
			5-10-17-24	0'-2'	0.8	ND/485	Clay, with trace to some silt, and trace sand at bottom, dark brown to light brown to tan, some orange mottling at bottom, moist
	5		3-4-6-9	4'-6'	1.7	ND/471	
	10		3-4-6-9	9'-11'	2.0	ND/540	
							Sand, medium to coarse, and Gravel, orange, moist to wet
	15		13-13-18-23	14'-16'	0.2	ND/515	
	20		13-31-48-52	19'-21'	0.9	ND/654	
							Total Depth - 22.0'

ND-Indicates no deflection on the linear display scale.

OVA-Value represents equivalent concentrations of methane (in ppm).

SM-Cumulative counts per 0.10 minute as recorded on the digital readout.

Equipment Installed



ENSR

2544 5711

Project 4700-016 Site PRRS PZ-06 Sh 1 of 1

Date Started 6-21-89 Completed TOC Elevation 539.61 FT.

Total Depth 24.5 Location Delta Steel Logged by M. Ferlin

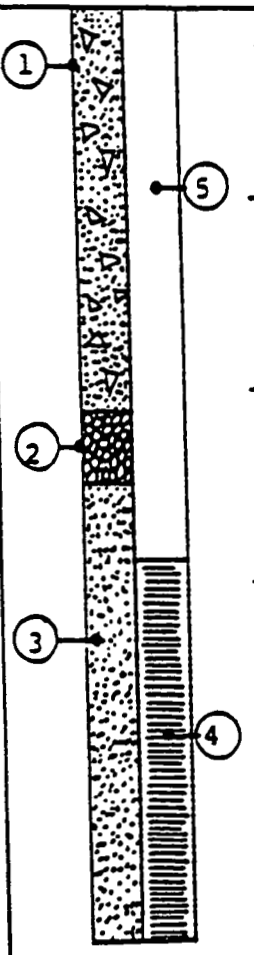
Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 16.5 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/ SM VALUES	Sample Description
			5-5-10 -12	0'-2'	1.2	ND/ 522	Clay, with trace silt, brown to tan, moist
	5		3-3-4-	4'-6'	0.6	ND/ 514	
	10		8-12- 16-22	9'-11'	1.3	0.3/ 580	Sand, medium to coarse, and Gravel, fine to coarse, tan to orange to gray to orange brown, moist to wet
	15		24-36- 40-60	14'-16'	1.8	1.2/ 542	
	20		18-24- 28-31	19'-21'	1.0	0.3/ 545	
	25		15-30- 40-38	24'-26'	1.3	3.2/ 513	Total Depth - 26.0'

ND-No deflection on the linear display scale.
OVA-Value represents equivalent concentrations of methane (in ppm).
SM-Cumulative counts per 0.10 minute as recorded on the digital readout.

Equipment Installed



ENSR

2545

Project 4700-016 Site PRRS PZ-07 Sh 1 of 1

Date Started 6-21-89 Completed 6-21-89 TOC Elevation 529.09 FT.

Total Depth 17.5' Location Logged by M. Ferlin

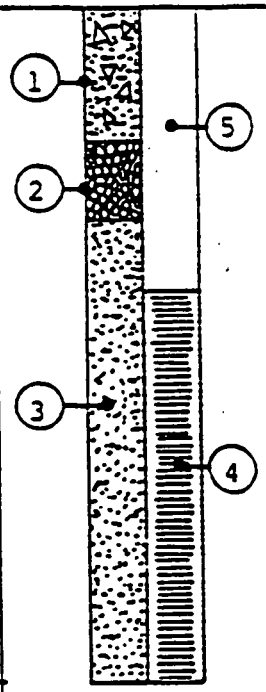
Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 9.2 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description
			3-3-4-5	0'-2'	1.7	ND/483	Silt, with trace fine sand, brown, moist
	5		3-3-5-7	4'-6'	1.2	ND/503	Sand, medium to fine to medium, with some fine gravel and coarse sand, gray, moist to wet
	10		3-4-5-7	9'-11'	1.3	ND/469	
	15		11-7-14-13	14'-16'	-	0.1/559	
	20						Total Depth - 17.5'

ND-No deflection on the linear display scale.
OVA-Value represents equivalent concentrations of methane (in ppm).
SM-Cumulative counts per 0.10 minute as recorded on the digital readout.

Equipment Installed



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ENSR

2546 5711

Project 4700-016 Site PRRS PZ-08 Sh 1 of 1

Date Started 6-22-89 Completed 6-22-89 TOC Elevation 530.84 FT.

Total Depth 21.5' Location Logged by M. Ferlin

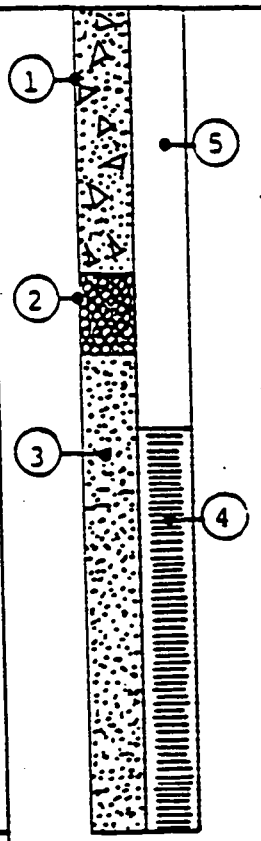
Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 12.4 feet

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 in.	Sample Depth Range	Sample Rec.	OVA/SM VALUES	Sample Description	Equipment Installed
			5-7-15-7	0'-2'	1.2	*/460	Silt, with trace fine sand to trace to some clay, brown, moist	
	5		10-21-20-9	4'-6'	1.2	*/461		
	10		10-90	9'-11'	0.4	*/470	Sand, medium to coarse and Gravel, fine to medium to coarse, tan to orange, wet	
	15		45-50/0.3	14'-16'	0.5	*/597		
	20		25-40-48-30	19'-21'	-	*/443		
							Total Depth - 21.5'	

*OVA readings not taken due to pump malfunction.

SM-Cumulative counts per 0.10 minute as recorded on the digital readout.



ENSR

2547

Project 4700-016 Site PRRS PZ-09 Sh 1 of 1

Date Started 6-22-89 Completed 6-22-89 TOC Elevation 528.02 FT.

Total Depth 18.2' Location CSX Logged by M. Ferlin

Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks Water level during drilling - 11.1 feet

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 in.	Depth Range	Rec.	OVA/SM VALUES	Sample Description
			5-6-11-12	0'-2'	1.2	*/551	Clay and Silt, with trace very find sand, brown, moist to Sand, medium and Gravel fine, with clay, light brown, wet
	5		4-4-11-11	4'-6'	1.3	*/610	
	10		18-40-60	9'-11'	1.0	*/579	Sand, medium to coarse, and Gravel, fine to coarse, tan to light gray to orange, wet
	15		94-27-27-24	14'-16'	0.9	*/593	
	20		11-9-18-30	19'-21'	0.0	NR	

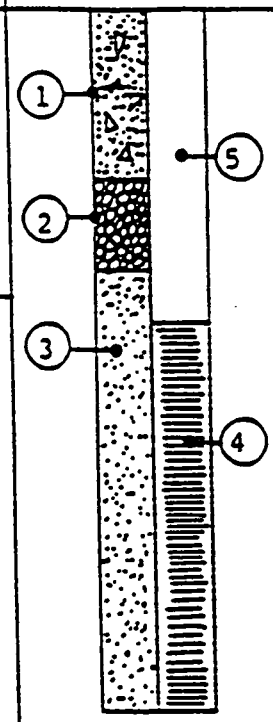
Total Depth - 21.0'

*OVA readings not taken due to pump malfunction.

SM-Cumulative counts per 0.10 minute as recorded on the digital readout.

NR-No recovery.

Equipment Installed



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ENSR

2548

5711

Project 4700-016 Site PRRS PZ-10 Sh 1 of 1

Started 6-22-89 Completed 6-22-89 TOC Elevation 529.94 FT.

Total Depth 19.0 Location Logged by M. Ferlin

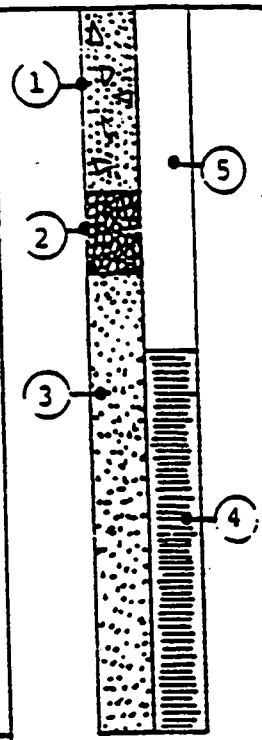
Casing I.D. 2-inch PVC Contractor Bowser-Morner

Remarks

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 In.	Depth Range	Rec.		Sample Description	Equipment Installed
			8-7-16 -19	0'-2'	1.2	*/438	Silt and Clay, brown, moist, to Sand, fine to medium with trace silt, dark tan, moist	
	5		4-8-15-21	4'-6'		*/582	Sand, medium to coarse, and Gravel, fine to coarse, tan to gray to brown, with trace of silt, wet	
	10			9'-11'	0.9	*/550		
	15		18-42 -58	14'-16'	1.0	*/751	Very large cobbles from 16.0	
	20						Total Depth - 19.0'	

*OVA readings not taken due to pump malfunction.

SM-Cumulative counts per 0.10 minute as recorded on the digital readout.



ENSR

FERNALD RI/FS

Date	12/1/90			
Initial	ET.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2550	COORDINATES:	DATE: 11-28-90 & 11-29-90
ELEVATION:	GWL: Depth 13.1 FT Date/Time 11-29-90 @ 1330	DATE STARTED: 11-28-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth 12.6 FT Date/Time 11-30-90 @ 0800	DATE COMPLETED: 11-29-90
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33345 ~~0814~~ 1410 11-28-90	1 1 5	18	SOFT, VERY DARK GRAY (10YR 3/1) SILT, SOME CLAY, TRACE OF SAND, SLIGHT PLASTICITY, MOIST 0.6	OL	.30	Hnu = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
1				SOFT, DARK YELLOWISH BROWN (10YR 4/6), CLAYEY SILT, SOME SAND, LOW PLASTICITY, SLIGHTLY MOIST TO MOIST	ML	.50	
2	33346 1416 ~~0814~~ 11-28	3 5 6	18				Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
3							
4	33347 ~~0821~~ 1423 11-28	3 5 6	18	4.0			Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
				MEDIUM DENSE, GRAYISH BROWN (10YR 5/2), POORLY GRADED COARSE SAND, SOME SILT, DRY 4.9	SP	N/A	
5	33348 ~~0824~~ 1429 11-28	8 9 11	10	MEDIUM DENSE, GRAYISH BROWN (10YR 5/2), GRAVELLY SAND, SOME SILT, POORLY GRADED, DRY	SP	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
6							Hnu = PPM α = CPM βγ = CPM
7							
8							
9							
10	33349	15		MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6), POORLY GRADED FINE SAND, TRACE OF PEBBLES, WET TO MOIST			
11	0900 11-29-90	16 10	10		SP	N/A	Hnu = 2.0 UNSUSTAINED α = 0 CPM βγ = 20-40 CPM READINGS FOR 10.0 - 11.5 FT
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
Hnu	A01344	0.0 PPM
α	ASI #6	0 CPM
βγ	ASI #5	20-80 CPM

2438-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2550	COORDINATES:		DATE: 11-29-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11-28-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 11-29-90
DRILLING METHODS: CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONDITIONS (FT)	REMARKS
15	33350	8		MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 4/6), WELL GRADED COARSER SAND, SOME SILT, TRACE OF GRAVEL, WET	SW	N/A	Hnu: 0.0 PPM
16	0924	11	8				α: 0 CPM
	11-29	17					βγ: 20-50 CPM
17							
18							
19							
20	33351	20		DENSE, DARK YELLOWISH BROWN (10YR 4/4) POORLY GRADED FINE SAND, SOME SILT, PEBBLES, WET	SP	N/A	Hnu: 0.0 PPM
21	1022	26	15				α: 0 CPM
	11-29	18					βγ: 40-60 CPM
22							
23							
24							
25	33352	7		MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 3/6), GRAVEL-SAND-SILT MIXTURE, TRACE OF COBBLES, WET	GM	N/A	Hnu: 0.0 PPM
26	1105	11	13		MS 11-30-90		α: 0 CPM
	11-29	11					βγ: 40-80 CPM
27							
28							
29	33353	8		DENSE, DARK YELLOWISH BROWN (10YR 3/6), FINE SAND-SILT MIXTURE, TRACE OF GRAVEL, WET	SM	N/A	Hnu: 0.0 PPM
	1140	12	9				α: 0 CPM
30	11-29	19		*BOTTOM OF BORING = 30.0 FT. DRILLED AND SAMPLED TO 30.0 FT.			βγ: 40-60 CPM

NOTES

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

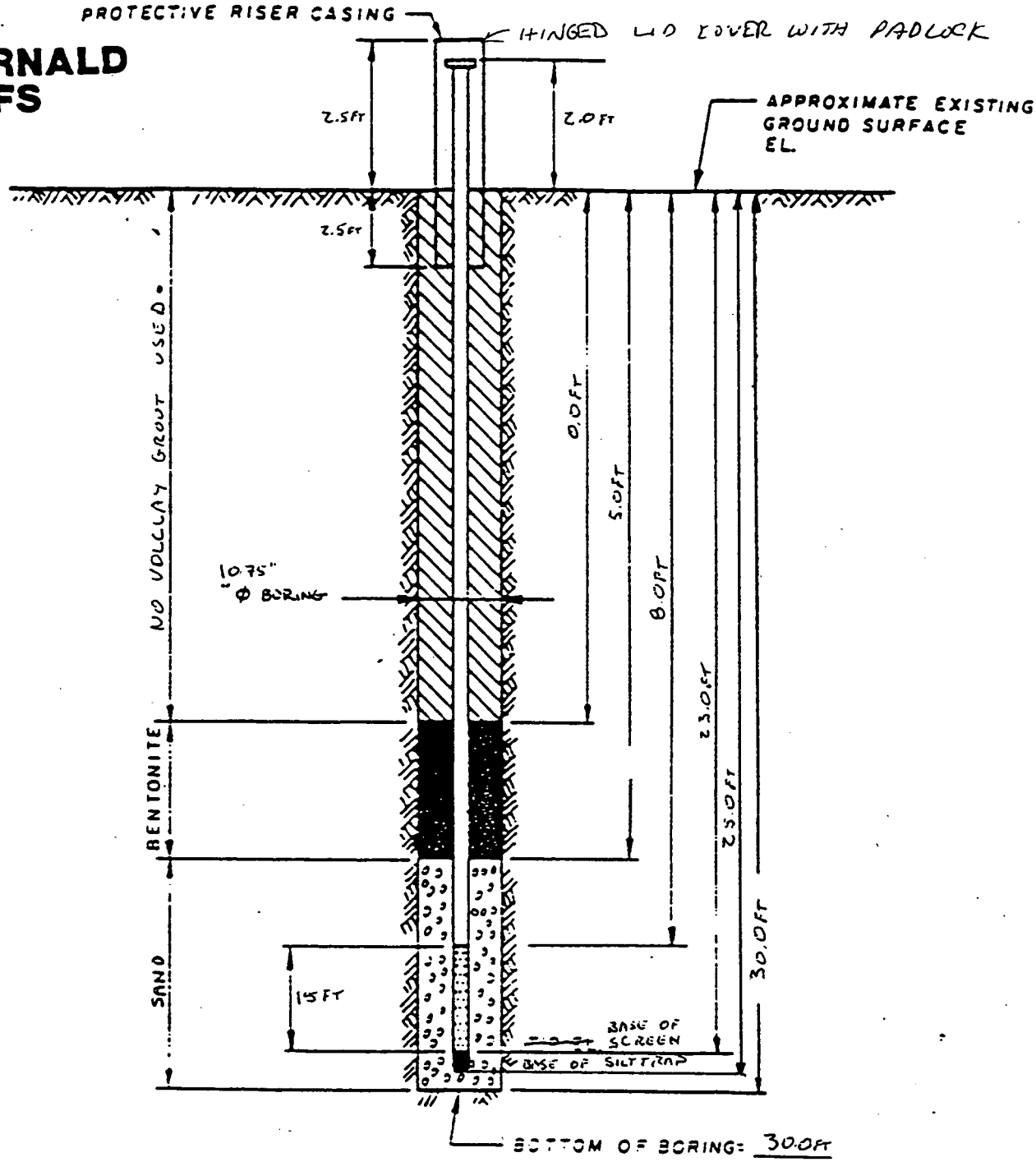
BACKGROUND

Hnu = 0.0 PPM

α = 0 CPM

βγ = 20-80 CPM

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 13.1 FT ; 12.6 FT
5. WATER LEVEL READING ON 11-29-90 ; 11-30-90

MATERIALS USED DURING WELL INSTALLATION:

14 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
7 5 GALLON BUCKETS OF BENTONITE PELLETS
200 GALLONS OF WATER USED DURING DRILLING AND GROUTING PROCEDURES
SS SECTIONS: 1-15 FT SCREEN WITH 2 FT WELDED SILTTRAP ; 1-10 FT RISER

INSTALLATION DETAILS
MONITORING WELL #2550

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER	
CHECKED BY	APPROVED BY
DRAWN BY	11-30-90

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 3.2.1
BORING NO. 2550
PIEZOMETER NO. 2550

FIELD ENG./GEO. M. SWANSON DATE 11-29-90
CHECKED BY E. Trollinger DATE 12-1-90
DATE OF INSTALLATION 11-29-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 FT TO 30.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0.0 FT TO 30.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 15 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN

OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5 FT			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 30.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 23.0	TOP	BOTTOM
PIEZOMETER TIP	25.0 FT			
BOTTOM OF BOREHOLE	30.0 FT			
GWL AFTER INSTALLATION	12.6 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 1 BUCKET BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: Temp RI/FS	
BORING NUMBER: 3550	COORDINATES: E 1379346.62 N 475766.47	DATE: 10-9-91
ELEVATION: 534.4 (GR)	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10-9-91
ENGINEER/GEOLOGIST: J. Lear	Depth 16.68 Date/Time 12/5/91	DATE COMPLETED: 10-18-91
DRILLING METHODS: cable tool		PAGE 1 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Descriptions may be cross referenced from Boring 2550 up to 30.0 ft.			
5							
10							
15							
20							
25							
30							

NOTES:
Drilling Equipment - Cyclone 45 cable tool
Drilling Company - Penn Drilling
Driller - Craig Coulter
Asst - - Gary Dye

S.A.A. - Same As Above
N.R. - No Recovery

Background
Hnu - 0 ppm
BD - 50-60 cpm
α - 0 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3550	COORDINATES: SEE Pg 1	DATE 10-15-91
ELEVATION: SEE Pg 1	GWL: Depth Date/Time	DATE STARTED: 10-10-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 10-18-91
DRILLING METHODS: cable Tool		PAGE 2 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31							
32							
33							
34							
35	33443	15		Dense, yellowish brown, (10yr, 5/4) fine sand (well sorted) some silt, wet.	SP	NA	Hnu - 0 ppm Bb - 50 cpm
36	1330 10-15-91	23 25	18	36.0' Dense, yellowish brown, (10yr, 5/4) well sorted, fine silty sand, wet.	SP	NA	α - 0 cpm
37							
38							
39							
40	33444	13		Dense, yellowish brown, (10yr, 5/4) well sorted med. sand some silt, trace gravel, wet.	SP	NA	Hnu - 0 ppm Bb - 60 cpm α - 0 cpm
41	1350 10-15-91	15 18	18				
42							
43							
44							
45							

NOTES:
Drilling Equipment - cyclone 45 cable tool
Drilling Company: Penn Drilling
Driller - Craig Coulter
Asst. - Gary Dye

000846

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3550	COORDINATES: See Pg 1	DATE: 10-15-91
ELEVATION: See Pg 1	GWL: Depth / Date/Time	DATE STARTED: 10-10-91
ENGINEER/GEOLOGIST: J. Lear	Depth / Date/Time	DATE COMPLETED: 10-18-91
DRILLING METHODS: Cable Tool		PAGE 3 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	J.L. 10-15-91						
46	33445 1500 10-15-91	10 19 28	12	Dense, yellowish brown. (10yr, 5/4) Poorly sorted sand Trace gravel, trace silt, wet.	SW	NA	Hnu - 0 ppm Gd - 50 cpm α - 0 cpm
47							
48							
49							
50	J.L. 10-15-91 33446 1615 10-15-91	38 50/5	12	V. Dense dark grayish brown (10yr 4/2) Poorly sorted Gravelly sand, Trace silt. wet	SW	NA	Hnu - 0 ppm Gd - 60 cpm α - 0 cpm
51							
52							
53							
54							
55	33447 1700 10-15-91	12 17 31	18	J.L. 10-15-91 ~~Dense~~, S.A.A. add dense	SW	NA	Hnu - 0 ppm Gd - 60 cpm α - 0 cpm
56							
57							
58							
59							
60							

NOTES: See Pg 1

000847

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3550	COORDINATES: See Pg 1	DATE: 10-16-91
ELEVATION: See Pg 1	GWL: Depth Date/Time	DATE STARTED: 10-10-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 10-18-91
DRILLING METHODS: Cable Tool		PAGE 2 OF 8

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	33448 0900 10-16-91	12 22 22	18	Dense, yellowish brown, (10yr, 5/4) well sorted med sand, some silt, Trace gravel, wet.	SP	NA	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
62							
63							
64	JL 10-16-91						
65	33449 0930 10-16-91	6 7 11	18	med. dense, yellowish brown (10yr, 5/4) poorly sorted sand, some gravel, wet. 66.0 / med dense, yellowish brown, (10yr 5/4) Poorly sorted gravel, some sand, wet.	SW / GW	NA / NA	Hnu - 0 ppm BD - 60 cpm α - 0 cpm
67							
68							
69	JL 10-16-91						
70	33450 1045 10-16-91	17 26 23	18	Dense, yellowish brown, (10yr, 5/4) poorly sorted sand, Trace silt, Trace gravel, wet.	SW	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
71							
72							
73							
74							
75							

NOTES: See Pg 1

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3550	COORDINATES: See Pg 1	DATE: 10-16-91
ELEVATION: See Pg 1	GWL: Depth Date/Time	DATE STARTED: 10-10-91
ENGINEER/GEOLOGIST: J. Leor	Depth Date/Time	DATE COMPLETED: 10-18-91
DRILLING METHODS: Cable Tool		PAGE 5 OF 8

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75							
76	33451 1200 10-16-91	6 7 11	18	med. dense, very dark grayish brown (10yr, 3/2) poorly sorted sand, some gravel, trace silt.	SW	NA	Hnu - 0 ppm; BS - 60 cpm; α - 0 cpm
77							
78							
79							
80	33452 1300 10-16-91	10 15 20	0	N.R	NA	NA	Hnu - ~~0 ppm~~; BS - ~~60c~~ J.L 10-16-91; α - NA
81							
82							
83							
84							
85	33453 1430 10-16-91	11 17 23	11	Dense, very dark ~~yellowish~~ grayish brown, (10yr, 3/2) poorly sorted sand, some gravel, trace silt, wet.	SW	NA	Hnu - 0 ppm; BS - 60 cpm; α - 0 cpm
86							
87							
88							
89							
90							

NOTES: See Pg 1

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3350	COORDINATES: See Pg 1	DATE: 10-16-91
ELEVATION: See Pg-1	GWL: Depth Date/Time	DATE STARTED: 10-10-91
ENGINEER/GEOLOGIST: J. Kar	Depth Date/Time	DATE COMPLETED: 10-18-91
DRILLING METHODS: Cable Tool		PAGE: 6 OF 8

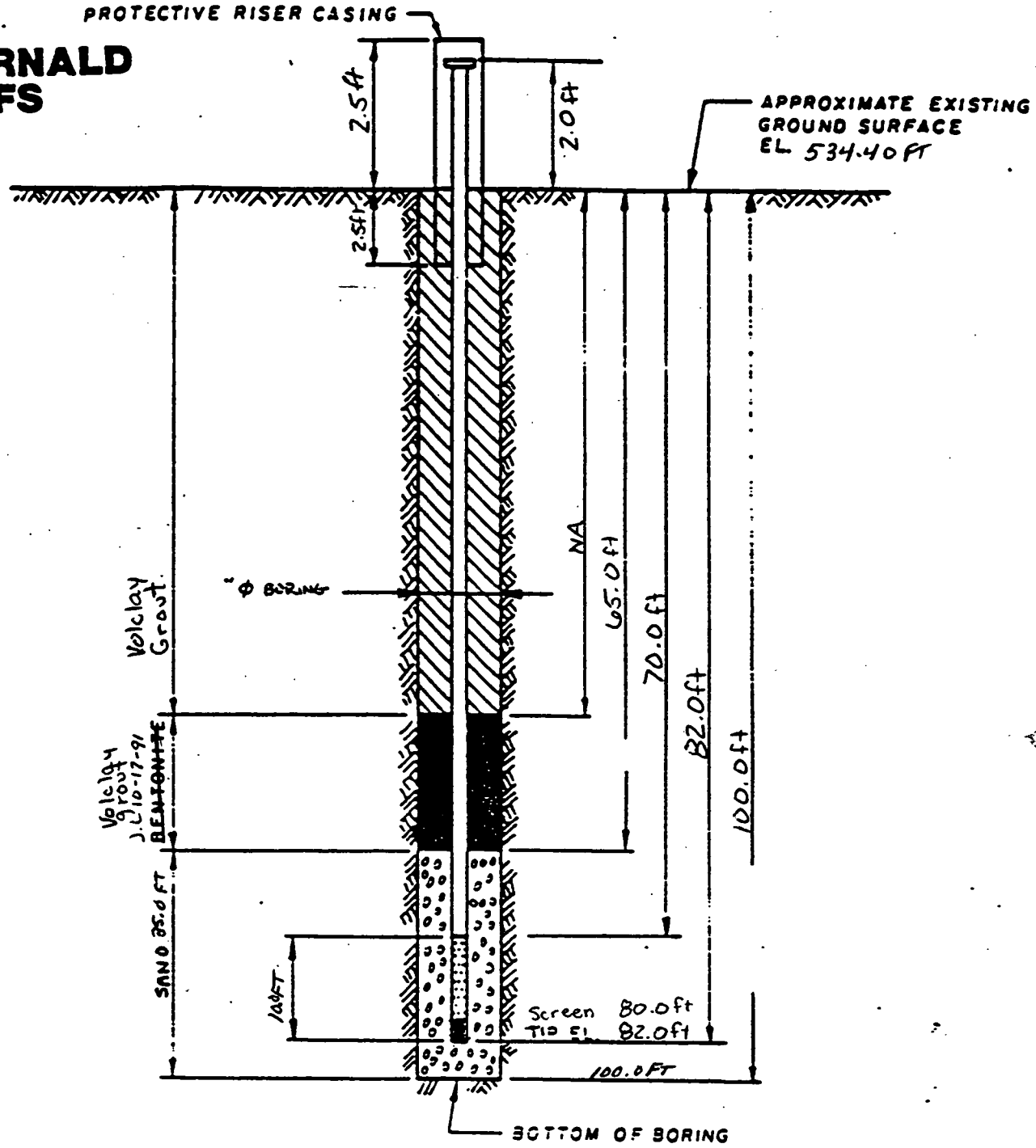
DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90							
91	33454 1445 10-16-91	11 21 23	12	S.A.A.	SW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
92							
93							
94							
95	33455 1600 10-16-91	9 11 16	13	S.A.A.	SW	NA	Hnu - 0 ppm Bd - 60 cpm α - 0 cpm
97							
98							
99							
100	33456 1645 10-16-91	10 11 21	13	Dense, dark grayish brown (10yr. 4/2) well sorted med sand trace gravel, trace silt, wet	SP	NA	Hnu - 0 cpm Bd - 60 cpm α - 0 cpm
101							
102				Drilling Ends at 100.0' Sampling Ends at 101.5' Well set at 80.0'			

NOTES: See Pg 1

402-11-86

7/8

FERNALD RI/FS



DRAWN BY	J. Lear 10-17-91	CHECKED BY	
		APPROVED BY	

DRAWING NUMBER

NOTES:

1. RISER PIPE IS 4 IN ID SCHEDULE 40 PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

10-Bags 80 lb 10x20 sand
25-Bags 50 lb volclay grout
300 - gals used in grouting
800 - gals used in drilling

INSTALLATION DETAILS
MONITORING WELL
3550
PREPARED FOR
fernald RI/FS

Stainless lengths used in well construction: 7-10ft sections, 1-2ft riser 1-2ft sump

FERNALD RI/FS

8/8

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
FIELD ENG./GEO. J. Lear DATE 10-17-91
PROJECT NO. 602.3.11
CHECKED BY C. Thube DATE 01/21/92
BORING NO. 3550
PIEZOMETER NO. 3550
DATE OF INSTALLATION 10-17-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0ft TO 100.0 J.L 10-17-91
FLUID NA FROM NA TO NA

TYPE OF BIT Cable Tool
CASING SIZE (S) USED:
SIZE 8in FROM 0.0 TO 100.0
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ Slotted SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 10.0 ft

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10ft, 2ft
JOINING METHOD Threaded, flush joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION hinged well cap, locked, well cover, vented

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT)	
TOP OF RISER PIPE	Bon ~~2.0~~ 1.77		536.17	
GROUND SURFACE	0.0		534.40	
BOTTOM OF PROTECTIVE PIPE	2.56		536.96	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 65.0	TOP 534.40	BOTTOM 469.40
BENTONITE	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
SAND	TOP 65.0	BOTTOM 100.0	TOP 469.40	BOTTOM 434.40
~~GRAVEL~~ J.L 10-17-91	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 70.0	BOTTOM 80.0	TOP 464.40	BOTTOM 454.40
PIEZOMETER TIP	82.0		452.40	
BOTTOM OF BOREHOLE	100.0		434.40	
GWL AFTER INSTALLATION	To be taken later			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

459-...-96

FERNALD RI/FS

OFF SITE

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2551	COORDINATES: N 475347.36, E 879005.84		DATE: 10-25-90
ELEVATION: 530.6 GROUND	GWL: Depth 7.98 FT	Date/Time 10-31-90 @ 1630	DATE STARTED: 10-25-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth NA	Date/Time NA	DATE COMPLETED: 10-31-90
DRILLING METHODS: CABLE TOOL			PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33258 0850 10-25-90	1 2 2	18	VERY DARK GRAY (10YR 3/1), ORGANIC SILT, SOME SAND, NO PLASTICITY, MOIST 0.7	OH	N/A	H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 40-80
1				DARK YELLOW-SH BROWN (10YR 4/6), SAND-SILT MIXTURE, TRACE OF CLAY, NO PLASTICITY, MOIST	SM	N/A	
2	33259 0855 10-25	1 2 3	18				H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 40-60 CPM
3	33260 0859 10-25	3 2 3	18	3.7			H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 20-60 CPM
4				LOOSE, YELLOW-SH BROWN (10YR 5/8), POORLY GRADED FINE SILTY SAND, MOIST 4.4	SP	N/A	
5	33261 0911 10-25	2 3 13	18	VERY SOFT, DARK YELLOWISH BROWN (10YR 4/4) SILT-SAND MIXTURE, TRACE OF CLAY, NO PLASTICITY, MOIST 5.3	SM	N/A	H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 40-60 CPM
6				MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6) GRAVEL-SAND-SILT MIXTURE, SOME COBBLES, TRACE OF CLAY, DRY 6.5	GM	N/A	
7	33262 0919 10-25	11 13 10	14	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), WELL-GRADED GRAVEL, SOME SAND, SILT, TRACE OF COBBLES, DRY 7.5	GW	N/A	H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 40-70 CPM
8							
9							
10	33263 1022 10-25	10 22 47	13	VERY DENSE, STRONG BROWN (7.5YR 4/6) GRAVEL-SAND-SILT MIXTURE, TRACE OF COBBLES, WET	GM	N/A	H_{AV} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 40-100 CPM
11							
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEUMAN

ASST. B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

H_{AV}: A01344 - 0.0 PPM

α: A5103 - 0 CPM

$\beta\gamma$: A5101 - 40 80 CPM

REVIEWED BY QA AB DATE 2-14-91

000853

243B-3-86

FERNALD
RI/FS

5711

Date		
Initial		
	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2551	COORDINATES See p.1		DATE 10-30-90
ELEVATION: See p.1	GWL: Depth 8.03 FT	Date/Time 10-30-90 @ 0900	DATE STARTED: 10-25-90
ENGINEER/GEOLOGIST M. SWANSON	Depth p.1	Date/Time p.1	DATE COMPLETED 10-31-90
DRILLING METHODS. CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	REMARKS
15	33864	18		MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 4/4) POORLY GRADED COARSE SAND, SOME SILT, TRACE OF PEBBLES, WET	SP	N/A	H_{NU} = 0.0 PPM
16	1020	12	12				α = 0 cpm
	10-30-90	12					$\beta\gamma$ = 40-85 cpm
17							
18							
19							
20	33265	8		LOOSE, DARK YELLOWISH BROWN (10YR 3/4) SILT-FINE GRAINED SAND MIXTURE, WET			H_{NU} = 0.0 PPM
21	1325	5	16		SM	N/A	α = 0 cpm
	10-30	4					$\beta\gamma$ = 40-100 cpm
22							
23							
24							
25	33266	9		MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED COARSE SAND, SOME SILT, WET			H_{NU} = 0 PPM
26	1344	7	15		SP	N/A	α = 0 cpm
	10-30	11					$\beta\gamma$ = 40-80 cpm
27							
28							
29	33267	10		MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 3/4) SILTY FINE GRAINED SAND, TRACE OF GRAVEL, WET			H_{NU} = 0.0 PPM
	1403	8	10		SM	N/A	α = 0 cpm
30	10-30	6					$\beta\gamma$ = 40-80 cpm

NOTES.

Drilling Contractor: PERMA DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BOTTOM OF BORING = 30.0 FT; DRILLED, SAMPLED TO 30.0 FT.

BACKGROUND

H_{NU} = 0.0 PPM

α = 0 cpm

$\beta\gamma$ = 40-100 cpm

REVIEWED BY QA MB DATE 2/14/91

3/4

FERNALD RI/FS

Date	2-7	2-26	
Initial			
	1st Review	2nd Review	Last Copy Verification

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON
DATE 10-30-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger
DATE 11-13-90
BORING NO. 2551
PIEZOMETER NO. 2551
DATE OF INSTALLATION 10-31-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 30.0 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 30.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN I.D.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 15.0 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

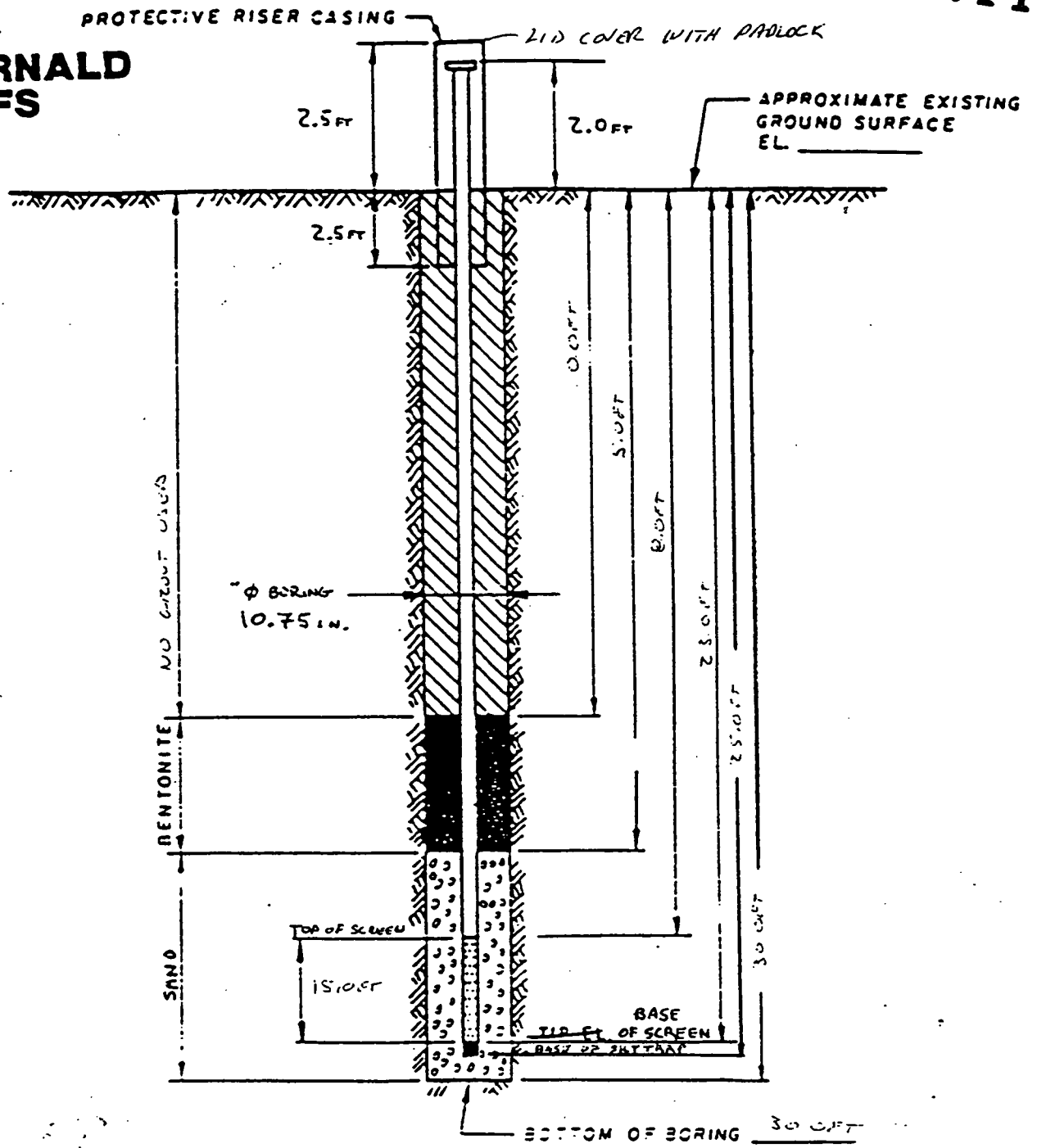
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.)	
TOP OF RISER PIPE	+ 2.0		532.6	
GROUND SURFACE	0.0		530.6	
BOTTOM OF PROTECTIVE PIPE	- 2.5		528.1	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP 530.6	BOTTOM 525.6
SAND	TOP 5.0	BOTTOM 30.0	TOP 525.6	BOTTOM 500.6
~~GRAVEL~~ EST. 2-6 A' NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.0	BOTTOM 23.0	TOP 522.6	BOTTOM 507.6
PIEZOMETER TIP	25.0 FT		505.6	
BOTTOM OF BOREHOLE	30.0 FT		500.6	
GWL AFTER INSTALLATION	7.98 FT ON 10-31-90 (FROM TOW)		VARIABLE	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING.
+ TOW - TOP OF WELL

REVIEWED BY QA MB DATE 2-14-91

000855

FERNALD RI/FS



DRAWN BY	DATE	CHECKED BY	APPROVED BY	DRAWING NUMBER
[illegible]	11-27-90	[illegible]	MA	MW 2557

NOTES:

1. RISER PIPE 1.54 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN 1.54 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 8.0 FT ; 7.98 FT
5. WATER LEVEL READING ON 10-30-90 ; 10-5-90

MATERIALS USED DURING WELL INSTALLATION:

14 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
7 5 GAL. BUCKETS OF BENTONITE PELLETS
300 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-15 FT SCREEN w/ 2 FT WELDED SILTTRAP, 1-10.0 FT RISER

INSTALLATION DETAILS
MONITORING WELL # 2557

PREPARED FOR
FERNALD RI/FS

REVIEWED BY QA MB DATE 2-14-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.11	PROJECT NAME FEMP RI/FS	
BORING NUMBER 3551	COORDINATES E 1379006.93 N 475356.88	DATE 10-2-91
ELEVATION: T.O.C. 532.36'	GWL: Depth 11.81 Date/Time 10-8-91 0945	DATE STARTED 10-2-91
ENGINEER/GEOLOGIST J. Lear	Depth N/A Date/Time N/A	DATE COMPLETED: 10-7-91
DRILLING METHODS Cable Tool	Paddy's Run	PAGE 1 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				All Descriptions for 0.0 - 30.0 ft can be cross referenced from Boring Log # 2551. J.L. 10-2-91			
5							
10							
15							
20							
25							
30							

NOTES Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 45
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A. - Same As Above
N.R. - No Recovery

Back ground
H_{nu} - 0 ppm
β - 50 cpm
α - 0 cpm

402-11-88

FERNALD
RI/FS

571

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.11	PROJECT NAME FEMP RI/FS	J.C 10/2/91
BORING NUMBER 3551	COORDINATES See Pg 1	DATE 10-3-91
ELEVATION: See Pg 1	GWL: Depth See Pg 1 Date/Time See Pg 1	DATE STARTED 10-2-91
ENGINEER/GEOLOGIST J. Lear	Depth N/A Date/Time N/A	DATE COMPLETED: 10-7-91
DRILLING METHODS Cable tool		PAGE 2 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
29							
30							
31							
32							
33							
34							
35	33428 1625 10-3-91	3 6 9	16	m. dense, brown, (10yr, 5/3) well sorted fine sand, trace gravel, wet. 35.8 ft	SP	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
36				m dense, brown (10yr, 5/3) poorly sorted gravelly sand, wet.	SW	NA	
37							
38							
39							
40	33429 1625 10-3-91	5 6 8	16	S.A.A.	SW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
41							
42							
43							
44							

NOTES
See page 1

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

J.C 10-7-91

PROJECT NUMBER: 6.02 ~~30.03.03~~ 3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3551	COORDINATES: see Pg 1	DATE 10-3-91
ELEVATION: see Pg 1	GWL: Depth see Pg 1 Date/Time see Pg 1	DATE STARTED: 10-2-91
ENGINEER/GEOLOGIST: J. Lear	Depth N/A Date/Time N/A	DATE COMPLETED: 10-7-91
DRILLING METHODS: cable tool		PAGE 3 OF 9

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
44							
45	JC1-16-92 33430 1720 10-3-91	37 38 40	18	V dense, dark yellowish brown (10yr, 4/4) well sorted med sand some gravel, wet.	SP	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
46							
47							
48							
49							
50	JC1-16-92 33431 0940 10-4-91	9 20 20	16	Dense, brown (10yr, 5/3) poorly sorted sand, some gravel, trace silt, wet.	SW	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
51							
52							
53							
54							
55	JC1-16-92 33432 0950 10-4-91	15 20 21	0	N.R			Hnu - BD - α - NA
56							
57							
58							
59							

NOTES: See Page 1

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FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602. ~~5.03.03~~ 3.11 J.L 10-7-91	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 3551	COORDINATES: SEE Pg-1		DATE 10-4-91
ELEVATION: SEE Pg 1	GWL: Depth SEE Pg 1	Date/Time SEE Pg 1	DATE STARTED: 10-2-91
ENGINEER/GEOLOGIST: J. Lear	Depth N/A	Date/Time N/A	DATE COMPLETED: 10-7-91
DRILLING METHODS: cable tool			PAGE 4 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	3343B JL 1-16-92 1000 10-4-91	16 10 13	18	med dense, dark grayish brown (10yr 4/2) poorly sorted med sand, Trace gravel, trace silt, wet.	SP	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
62							
63							
64							
65	3343B JL 1-16-92 200 10-4-91	11 13 10	18	S.A.A.			Hnu - 0 ppm BD - 50 cpm α - 0 cpm
66							
67							
68							
69							
70	JL 1-16-92 3343B 1445 10-4-91	17 21 35	12	dense, dark grayish brown (10yr 4/2) poorly sorted ~~med~~ sand, Trace gravel, Trace silt, wet J.L 10-4-91	SW	NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
71							
72							
73							
74							
75							

NOTES:
See page 1

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.11	PROJECT NAME FEMP RI/FS	
BORING NUMBER 3551	COORDINATES See Pg-1	DATE 10-4-91
ELEVATION: See Pg-1	GWL: Depth See Pg 1 Date/Time See Pg 1	DATE STARTED 10-2-91
ENGINEER/GEOLOGIST J. Lear	Depth N/A Date/Time N/A	DATE COMPLETED 10-7-91
DRILLING METHODS Cable Tool		PAGE 5 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75							
76	33436 JC1146-92 1600 10-4-91	5 6 11	18	med dense, dark grayish brown (10yr 4/2) Poorly sorted sand, some gravel, trace silt, wet.	SW	N.A.	Hnu - 0 ppm Bs - 50 cpm α - 0 cpm
77							
78							
79							
80	33437 JC1146-92 0830 10-6-91	25 50/3	8	v. dense, dark grayish brown (10yr-4/2) well sorted fine sand, trace silt, wet.	SP	NA	Hnu - 0 ppm Bs - 50 cpm α - 0 cpm
81							
82							
83							
84							
85	JC1146-92 33438 0900 10-6-91	11 27 50	8	very dense, dark grayish brown. (10yr, 4/2) Poorly sorted sand, some gravel, wet.	SW	NA	Hnu - 0 ppm Bs - 50 cpm α - 0 cpm
86							
87							
88							
89							
90							

NOTES see page 1

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3551	COORDINATES: See Pg-1	DATE 10-6-91
ELEVATION: See Pg-1	GWL: Depth See Pg-1 Date/Time See Pg-1	DATE STARTED: 10-2-91
ENGINEER/GEOLOGIST: J. Lear	Depth N/A Date/Time NA	DATE COMPLETED: 10-7-91
DRILLING METHODS: cable tool		PAGE 6 OF 9

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	SL 1-16-92						
91	33439 0935 10-6-91	30 50/6	8	V. dense, dark grayish brown, (10yr. 4/2) Poorly sorted sandy gravel, Trace clay! Trace silt, wet	GW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
92							
93							
94							
95	SL 1-16-92						
	33440 1110 10-6-91	36 31 25	18	S.A.A.	GW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
97							
98							
99							
100	SL 1-16-92						
101	33441 1400 10-6-91	32 50/2	6	V. dense, dark grayish brown, (10yr. 4/2) Poorly sorted gravelly sand, wet	SW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
102							
103							
104							
105							

NOTES: See page 1

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402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.11	PROJECT NAME FEMP RI/FS	
BORING NUMBER 3551	COORDINATES See Pg-1	DATE 10-6-91
ELEVATION: See Pg-1	GWL: Depth See Pg-1 Date/Time See Pg-1	DATE STARTED 10-2-91
ENGINEER/GEOLOGIST J. Lear	Depth N/A Date/Time N/A	DATE COMPLETED 10-7-91
DRILLING METHODS Cable Tool		PAGE 7 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105							
106	33442 1630 10-6-91	25 50/3	7	V. dense, grayish brown (10yr, 5/2) poorly sorted gravel, some sand, Trace silt, wet * Some odor	GW	NA	Hav - 0 ppm BD - 50 cpm α - 0 cpm
107				Drilling ends at 105.0 ft. Sampling Ends at 106.5 ft. well set at 85 ft No Blue Clay encountered.			

NOTES See Pg 1

000863

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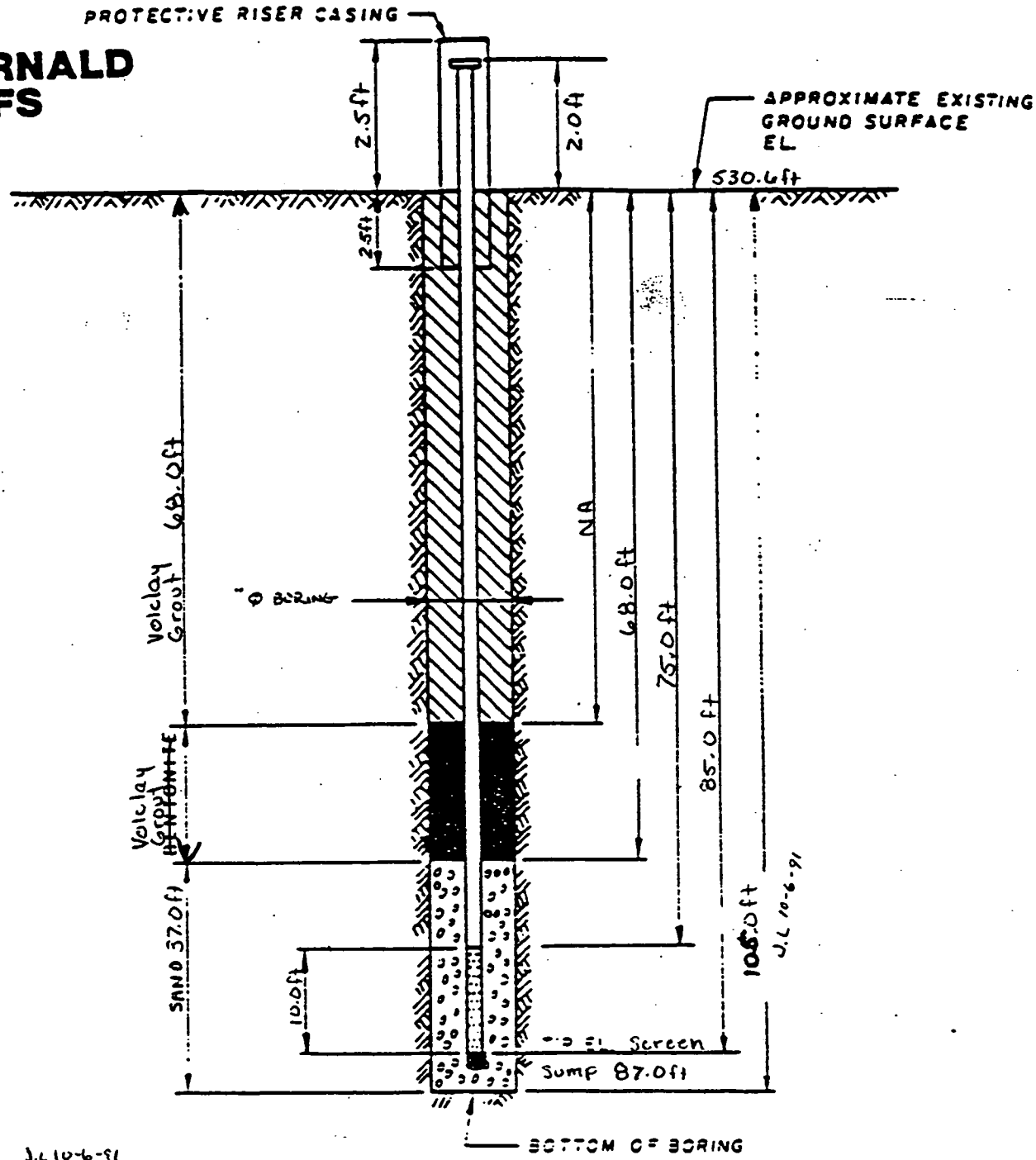
FERNALD RI/FS



DRAWN BY	CHECKED BY	CRAWING NUMBER
J. Lear 10-7-91	APPROVED BY	

NOTES ~~NA~~ J.L 10-6-91

1. RISER PIPE IS 4.0IN I.D SCHEDULE 80 PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

9 - 80 lb bags 10x20 sand
20 - 50 lb bags volclay grout
100 - gals of H_2O used in drilling and grouting
2 - 5 gal buckets of bentonite

INSTALLATION DETAILS
MONITORING WELL
3551
PREPARED FOR
Fernald RI/FS

9/9

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. J. Lear DATE 10-7-91
PROJECT NO. 602.3.11 CHECKED BY C. Grube DATE 01-16-92
BORING NO. 3551
PIEZOMETER NO. 3551 DATE OF INSTALLATION 10-7-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Cable tool Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 TO 10.0 ft	SIZE 10 in FROM 0.0 ft TO 105.0 ft
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless steel	RISER PIPE MATERIAL J.L. 10-6-91 Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☐ HOLES ☐ Slotted SCREEN ☑	LENGTH OF PIPE SECTIONS 7-10 ft sections 1-5 ft 1-10 ft screen, 2 ft sump
AVERAGE SIZE OF PERFORATIONS .010 in	JOINING METHOD Threaded, flush joined
TOTAL PERFORATED AREA 10.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION vented well cap,
PROTECTIVE PIPE O.D. 10.75 in	Hinged hole cover, locked

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0		531.86'	
GROUND SURFACE	0.0		529.86'	
BOTTOM OF PROTECTIVE PIPE	2.5		527.36'	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 68.0	TOP 529.86	BOTTOM 461.86
BENTONITE	TOP 0.0	BOTTOM 0.0	TOP 0.0	BOTTOM 0.0
SAND	TOP 68.0	BOTTOM 105.0	TOP 461.86	BOTTOM ~~356.86~~ 424.86
J.L. 10-7-91 ~~GRAVEL~~ None used	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 75.0	BOTTOM 85.0	TOP 454.86	BOTTOM 444.86
PIEZOMETER TIP	87.0		442.86'	
BOTTOM OF BOREHOLE	105.0		424.86'	
GWL AFTER INSTALLATION	11.81		518.05'	

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

VISUAL CLASSIFICATION OF SOILS

:OJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
ING NUMBER: 2552	COORDINATES: N 473909.82, E 1379195.72	DATE 10/29/91
:EVATION: 525.7 (GR)	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/29/91
ENGINEER/GEOLOGIST: Ken Marion	Depth 7.95 Date/Time 10-31-91 0745	DATE COMPLETED: 10/31/91
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33476 10-29-91 1700	2 5 5	16	Loose dark yellowish brown (10YR, 4/4) SAND and SILT with organic matter, damp	SM	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
1.0				Loose light olive brown (2.5Y, 5/4) SAND and SILT with organic matter, dry	SM	N/A	
1.3 1.5				No Recovery			
	33477 10-29-91 1705	7 5 5	16	Loose light olive brown (2.5Y, 5/4) SAND with silt and a little gravel, dry	SM	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
2.8 3.0				No Recovery			
	33478 10-29-91 1710	7 8 7	6	Medium dense light olive brown (2.5Y, 5/4) SAND with silt and a little gravel, dry	SM	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
				No Recovery			
4.5	33479 10-29-91 1715	9 13 10	6	Medium dense olive yellow (2.5Y, 6/6) gravelly SAND; dry	SP	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
5.0				No Recovery			
6.0				Hit aquifer at 4.5 – 6.0 ft. interval Samples will be taken at 5 ft. intervals			
7.5							

NOTES:
Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu	S/N: A01345	0 ppm	Background Levels
Bγ	S/N: 86112	30 cpm	
α	S/N: 55361	0 cpm	

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2552	COORDINATES: SEE Pg 1	DATE 10/30/91	
ELEVATION: SEE Pg 1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/29/91	
ENGINEER/GEOLOGIST: Ken Morion	Depth N/A Date/Time N/A	DATE COMPLETED: 10/31/91	
DRILLING METHODS: Cable Tool	10" drill bit	PAGE 2 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5				Hit aquifer at 4.5 – 6.0 ft. interval Samples will be taken at 5 ft. intervals			
10	33480 10-30-91 1015	27 23 18	18	Dense grayish brown (2.5Y, 5/2) Gravel and SAND, wet	GW	N/A	Hnu = .1 ppm Bσ = 35 cpm α = 0 cpm
11.5				Hit aquifer at 4.5 – 6.0 ft. interval Samples will be taken at 5 ft. intervals			
15							

NOTES

Hnu S/N: A01345	.1 ppm	Background Levels
Bσ S/N: 86112	35 cpm	
α S/N: 55361	0 cpm	

402-11-88

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2552	COORDINATES: SEE Pg 1		DATE 10/30/91
ELEVATION: SEE Pg 1	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 10/29/91
ENGINEER/GEOLOGIST: Ken Marien	Depth N/A	Date/Time N/A	DATE COMPLETED: 10/31/91
DRILLING METHODS: Cable Tool	10" drill bit		PAGE 3 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33481 10-30-91 1045	13 15 20	18 in.	Dense light olive brown (2.5Y, 5/4) Gravel and SAND, Wet	GW	N/A	Hnu = .1 ppm Bγ = 35 cpm α = 0 cpm
16.5				Hit aquifer at 4.5 - 6.0 ft. interval Samples will be taken at 5 ft. intervals			
20	33482 10-30-91 1415	2 6 7	18	Medium dense olive brown (2.5Y, 4/4) SAND, wet	SW	N/A	Hnu = .1 ppm Bγ = 35 cpm α = 0 cpm
21.5				Bottom of Bore hole at 25 ft.			

NOTES:

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FERNALD
RI/FS

Monitoring Well ~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 10-31-91
PROJECT NO. 602.3.11 CHECKED BY _____ DATE _____
BORING NO. 2552
PIEZOMETER NO. N/A DATE OF INSTALLATION 10-31-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 25 ft.
FLUID _____ FROM _____ TO _____

TYPE OF BIT 10" Churn bit
CASING SIZE (S) USED:
SIZE 10 3/4 FROM 0 TO 25
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in
TOTAL PERFORATED AREA 15 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0
LENGTH OF PIPE SECTIONS 7 ft.
JOINING METHOD Flush Joint - Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Steel well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	1.9		527.56	
GROUND SURFACE	0.0		525.70	
BOTTOM OF PROTECTIVE PIPE	2.5		522.56	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
BENTONITE	TOP 1	BOTTOM 3	TOP 524.70	BOTTOM 522.70
SAND	TOP 3	BOTTOM 25	TOP 522.70	BOTTOM 500.70
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5	BOTTOM 20	TOP 520.70	BOTTOM 505.70
PIEZOMETER TIP	22		503.70	
BOTTOM OF BOREHOLE	25		500.70	
SWL AFTER INSTALLATION	~~was not measured~~ 7.95 on 10-31-91 K.M. 12-5-91		was not measured	

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
IS SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

COMMENTS The casing used was temporary. It was removed once the hole was drilled

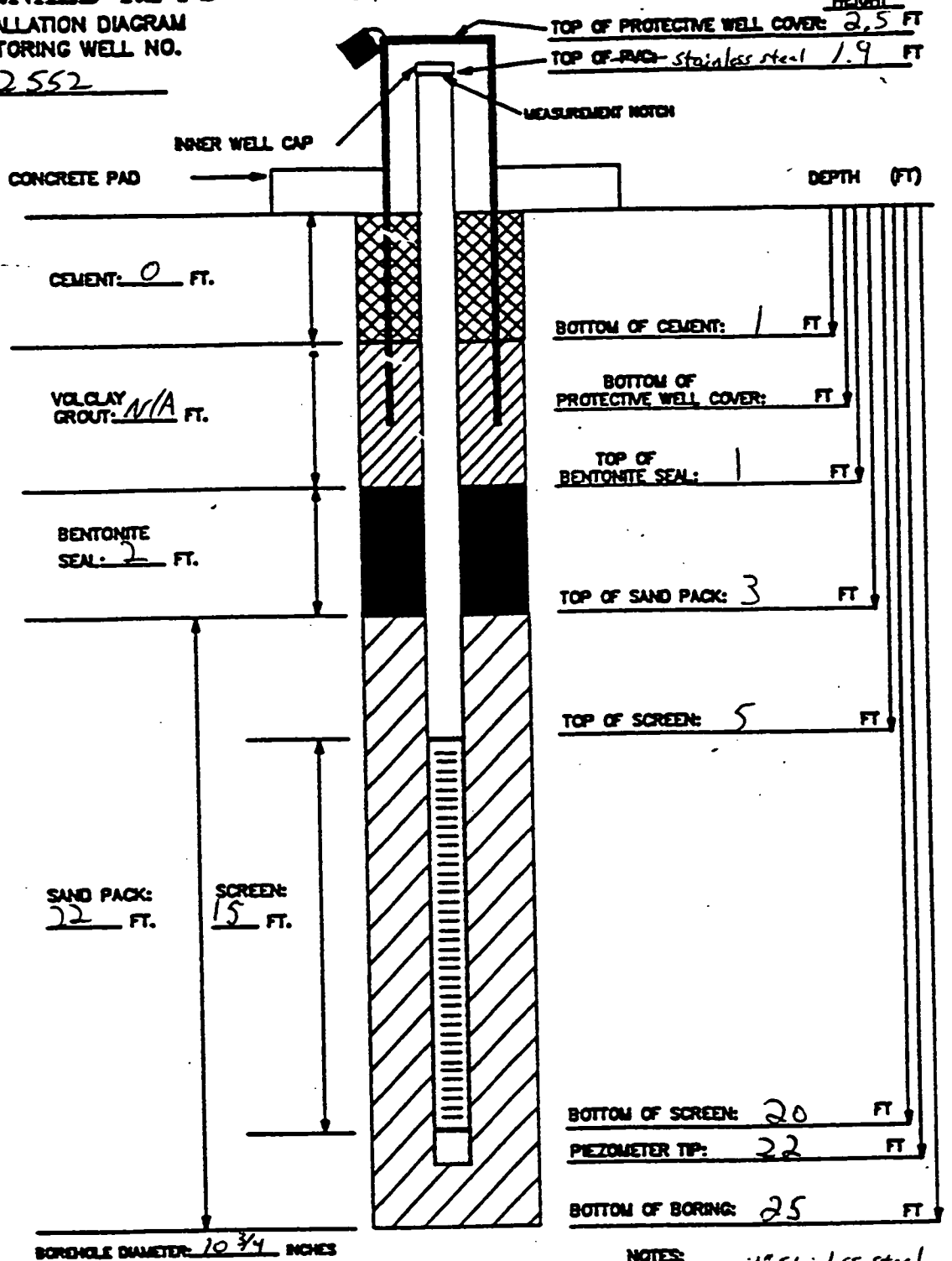
5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
2552

Stickups

INSTALLATION DATE: 10-31-91



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 sand, 13 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 215 gallons
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ 4" Stainless steel PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40~~ 4 in. I.D. PVC PIPE WITH ~~0.020-INCH~~ .010 in. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.11 GEOLOGIST/ENGINEER: Ken Marion

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS		
RING NUMBER: 3552	COORDINATES:	DATE: 3-31-92	
VATION:	GWL: Depth 6.92 Fe Date/Time 4-8-92 / 1000	DATE STARTED: 3-31-92	
GINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92	
LLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 8	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				See the visual classification of soils sheets for boring 2552 for the soil descriptions of the interval between 0 and 25 ft.			
2				▽			The W.L. is 6.92 ft. below the ground surface

TES

Company: Pennsylvania Drilling
iller: Dave Newman
sistant Driller: Bob Johnson

Samples Collected per ASTM Standard Penetration Test
Colors Identified using Munsell color chart.

000871

3-31-92
Hnu S/N: 711111
BG S/N: 50746
S/N: 73918

0 ppm
30 cpm
0 cpm
} Background Levels

RNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS	
ING NUMBER: 3552	COORDINATES:	DATE: 3-31-92
VATION:	GWL: Depth 6.92 ft Date/Time 4-8-92 1600	DATE STARTED: 3-31-92
INEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92
LING METHODS: Cable Tool 10" drill bit		PAGE 2 OF 8

SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
069951 1635 3-31-92	7 12 12	18	Medium dense grayish brown (2.5Y, 5/2) well graded SAND with gravel, wet	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
52 0900 4-1-92	6 10 12	11	Medium dense grayish brown (2.5Y, 5/2) well graded SAND with trace gravel, wet	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
069953 0914 4-1-92	8 9 12	12	Same As Above	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm

...e Page 1

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS		
RING NUMBER: 3552	COORDINATES:	DATE: 4-1-92	
EVATION:	GWL: Depth 6.92 Ft Date/Time 4-8-92 / 1000	DATE STARTED: 3-31-92	
GINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92	
LLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF 8	

Depth (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	069354 1005 4-1-92	13 19 22	13	Dense grayish brown (2.5Y, 5/2) SANDY "PEA" GRAVEL, wet	GP	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
5							
0	9955 1100 4-1-92	7 7 7	18	Medium dense grayish brown (2.5Y, 5/2) SAND and GRAVEL, wet (well graded)	SW/GW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
5							
0	069356 1355 4-1-92	21 21 22	18	Dense grayish brown (2.5Y, 5/2) GRAVELLY SAND, wet (well graded)	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
0							

TES

e Page 1

RNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS	
ING NUMBER: 3552	COORDINATES:	DATE: 4-1-92
VATION:	GWL: Depth 6.92 ft Date/Time 4-8-92 1000	DATE STARTED: 3-31-92
INEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92
LING METHODS: Cable tool 10" drill bit		PAGE 4 OF 8

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	069957 1430 4-1-92	1 1 2	18	Very loose grayish brown (2.5Y, 5/2) SAND with trace gravel, wet (well graded)	SW	N/A	Hnu = 0 ppm BG = 30 cpm α = 0 cpm
	58 1517 4-1-92	1 1 1	0	No Recovery	N/A	N/A	
	069959 1655 4-1-92	2 3 5	0	No Recovery	N/A	N/A	

ES

See Page 1

RNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS	K.M. 4-3-92	
ING NUMBER: 3552	COORDINATES:	DATE ~~3-31-92~~ 4-2-92	
VATION:	GWL: Depth 6.92 ft Date/Time 4-8-92/0900	DATE STARTED: 3-31-92	
INEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92	
LING METHODS: Cable Tool	10" drill bit	PAGE 5 OF 8	

SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
069960 0900 4-2-92	2 7 22	12	Medium dense grayish brown (2.5Y, 5/2) SAND with trace gravel, wet (wellgraded)	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
9961 1019 4-2-92	2 2 7	6	Same As Above	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
069962 1120 4-2-92	7 16 13	10	Medium dense light olive brown (2.5Y, 5/3) SAND with a little gravel, wet (wellgraded)	SW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm

See Page 1

5711

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.50.03.03	PROJECT NAME: FEMP RI/FS		
ING NUMBER: 3552	COORDINATES:	DATE: 4-2-92	
VATION:	GWL: Depth 6.92 ft Date/Time 4-8-92 1000	DATE STARTED: 3-31-92	
GINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 4-8-92	
LLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF 8	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	066963 1430 4-2-92	7 22 10	12	Dense Light Yellowish brown (2.5Y, 6/3) SAND and GRAVEL, Wet (well graded)	SW/GW	N/A	Hnu = 0 ppm Bγ = 30 cpm α = 0 cpm
				Bottom of Bore Hole Drilled to 90.0 ft. Split spoon sampled to 91.5 ft			

ES

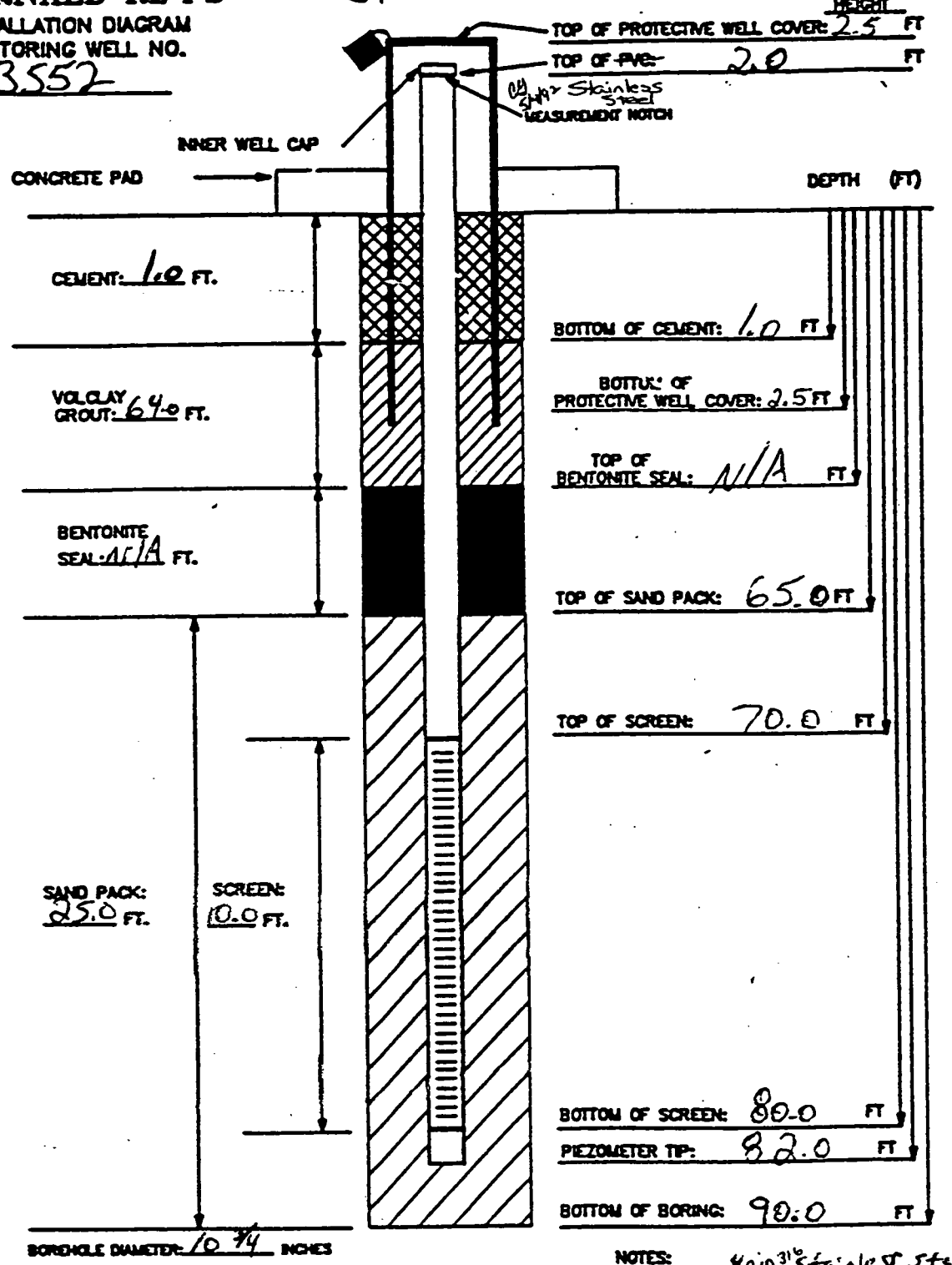
See page 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 3552

Stickups

INSTALLATION DATE: 4-8-92



MATERIALS USED:

SAND TYPE AND QUANTITY: 16 bags -10/20 sand
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 11 sacks
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 500 gallons
OTHER: 15 soil Drums generated

NOTES:

1) RISER PIPE IS ~~2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.~~ 4.0 in 316 Stainless Steel pipe (4) 5/5/92
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.~~ 4 in. I.D. 316 Stainless Steel pipe .010 in. Slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. or welded sump
4) WATER DEPTH/DATE: 6.92 / 4-8-92

TASK: 602.50-03.03 GEOLOGIST/ENGINEER: Ken Marion

ERNALD
RI/FS

Monitoring Well/PIEZOMETER INSTALLATION SHEET

5711

CT NAME FEMP RI/FS
RCJECT NC. 602.50.03.03
ORING NO. 3552
~~IEZOMETER~~ NO. N/A 3552 (monitoring well)

FIELD ENG./GEO. Ken Marion DATE 4-8-92
CHECKED BY C. Grule DATE 5/5/92
DATE OF INSTALLATION 4-8-92

OREHOLE DRILLING (CG 5/5/92)

DRILLING METHOD Cable Tool	TYPE OF BIT 10 in Churn bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0 TO 90.0 ft	SIZE 10 in. FROM 0 TO 90.0 ft.
FLUID N/A FROM — TO —	SIZE N/A FROM — TO —

EZOMETER DESCRIPTION

TYPE Stainless Steel	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 1-2 ft sump 1-10 ft screen 1-2 ft stick-up 7-10 ft. risers
AVERAGE SIZE OF PERFORATIONS .010 in.	JOINING METHOD Threaded flush joints
TOTAL PERFORATED AREA 10.0 ft.	

ROTECTION SYSTEM

ER PROTECTIVE PIPE LENGTH 5.0 ft.	OTHER PROTECTION Steel well cover with lock
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
OP OF RISER PIPE	2.5			
ROUND SURFACE	0.0			
OTTOM OF PROTECTIVE PIPE	2.5			
OREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 65.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
SAND	TOP 65.0	BOTTOM 90.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
ERFORATED SECTION	TOP 70.0	BOTTOM 80.0	TOP	BOTTOM
IEZOMETER TIP	82.0			
OTTOM OF BOREHOLE	90.0			
WL AFTER INSTALLATION	6.92			

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
ENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

The Temporary Casing was removed upon the installation of the well

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2553	COORDINATES: N 473343.11, E 1378885.60'	DATE: 10-29-91
ELEVATION: 524.10 (GR)	GWL: Depth 7.40' Date/Time 10-30-91, 0800	DATE STARTED: 10-29-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 10-30-91
DRILLING METHODS: Cable Tool		PAGE 1 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	33486 1545 10-29-91	2 4 4	8	loose, dark yellowish br. (10yr, 4/4) clayey silt, trace organics, moist	ML	NA	Hnu - 0 ppm; Bd - 50-60 cpm; α - 0 cpm
2 3	33487 1550 10-29-91	5 4 6	12	loose, yellowish brown, (10yr, 5/4) silt, some clay, moist	ML	NA	Hnu - 12 ppm; Bd - 50-60 cpm; α - 0 cpm
4	33488 1555 10-29-91	5 5 6	12	med dense, yellowish brown, (10yr, 5/4) silty ~~some~~ sand, trace clay, sl. moist. DL 10-30-91	SP ~~ML~~ J.L. 12-4-91	NA	Hnu - trace; Bd - 60 cpm; α - 0 cpm
5 6	33489 1600 10-29-91	5 4 6	10	loose, yellowish brown, (10yr, 5/6) well sorted fine sand, trace silt, trace gravel, sl. moist.	~~ML~~ SP DL 12-4-91	NA	Hnu - Trace; Bd - 50 cpm; α - 0 cpm
7 8 9				Aquifer met at 4.5 - 6.0' interval samples will be taken every 5.0 ft			
10 11	33490 1645 10-29-91	6 10 16	7	med. dense, light olive brown, (2.5Y, 5/3) poorly sorted gravelly sand, trace silt, wet	SW	NA	Hnu - 0 ppm; Bd - 50-80 cpm; α - 0 cpm
12 13 14 15							

NOTES:
Drilling contractor - Penn Drilling
Drilling equipment - Cyclone 45 cable tool
Driller - Craig Coulter
Asst. - Gary Dye

Backgrounds
Hnu - 0 ppm
Bd - 40-60 cpm
α - 0 cpm

402-11-88

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

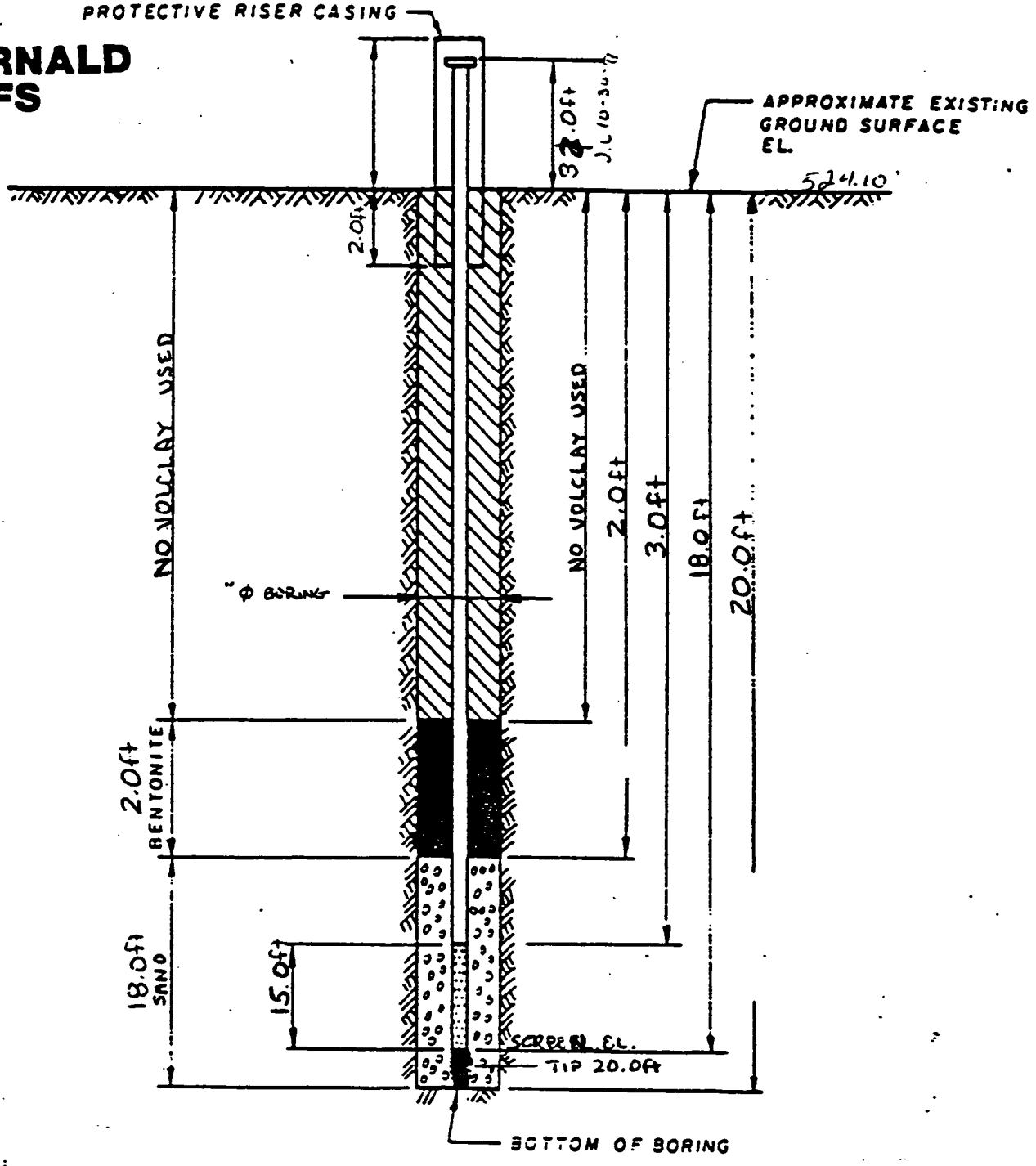
PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2553	COORDINATES: SEE Pg 1	DATE	10-29-91
ELEVATION: SEE Pg-1	GWL: Depth 2.40' Date/Time 10/29/91 0800	DATE STARTED:	10-29-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED:	10-30-91
DRILLING METHODS: Cable Tool		PAGE 2	OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33491 1655 10-29-91	8 21 24	6	Dense, yellowish brown, (10yr. 5/6) Gravelly Poorly Sorted Sand, Trace Clay, wet.	SW	NA	Hnu-0 ppm Bd-50 cpm α - 0 cpm
16							
17							
18							
19							
20	33492 1745 10-29-91	4 9 12	12	med. dense dark grayish brown, (10yr 4/2) wellsorted fine Sand, wet. 21.0'	SP	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
21				med dense, yellowish brown, (10yr. 5/6) Poorly sorted sandy gravel, trace silt, wet	GW	NA	
22				Drilling and Sampling ends at 20.0ft - 21.5 ft interval. Well Set at 20.0 ft.			

NOTES: See page 1

402-11-86

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY | APPROVED BY

DRAWN BY | J.L. 10-30-91

NOTES:

J.L 12-04-91

1. RISER PIPE IS 4.0 IN I.D. SCHEDULE ~~40~~ 316 PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D S.S. PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 9.38 ft 10-30-91
5. WATER LEVEL READING ON 10-30-91

10 - bags of 10/20 80lb Sand

1 - bucket of 5 gal bentonite

100 - gals used in drilling procedures

INSTALLATION DETAILS
MONITORING WELL
2553
PREPARED FOR
Fernald RI/FS

Amount of stainless used
1-2ft sump, 1-15ft screen, 1-5ft riser.

000881

FERNALD
RI/FS

4/4

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 6602.3.11
BORING NO. 2553
PIEZOMETER NO. 2553

FIELD ENG./GEO. J. Lear DATE 10-30-91
CHECKED BY BAM DATE 11/12/91
GH 12/04/91
DATE OF INSTALLATION 10-30-91

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED: H_2O
FLUID H_2O FROM 0.0 TO 20.0 ft
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT Cable Tool
CASING SIZE (S) USED: 8.0 in
SIZE 8.0 in FROM 0.0 TO 20.0 ft
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ slotted SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL Stainless steel-316
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 1-15ft screen 1-5ft Riser
JOINING METHOD Threaded flush joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION hinged hole cover, locked well cap, vented

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	3.0		527.04	
GROUND SURFACE	0.0		524.0	
BOTTOM OF PROTECTIVE PIPE	2.0		522.0'	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
BENTONITE	TOP 0.0	BOTTOM 2.0	TOP 524.1	BOTTOM 522.1
SAND	TOP 2.0	BOTTOM 20.0	TOP 522.1	BOTTOM 504.10
GRAVEL	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 3.0	BOTTOM 18.0	TOP 521.10	BOTTOM 506.1
PIEZOMETER TIP	20.0		504.10'	
BOTTOM OF BOREHOLE	20.0		504.10'	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS Hole cover put at 3.0 ft below surface due to lack of bentonite in hole.

429-...-36

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2554	COORDINATES:	DATE: 11-17-90	
ELEVATION:	GWL: Depth 9.4 ft Date/Time 11-18-90 @ 1100	DATE STARTED: 11-17-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth 7.8 ft Date/Time 11-19-90 @ 0900	DATE COMPLETED: 11-19-90	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33333 1430 11-17-90	1 2 4	18	FIRM, DARK YELLOWISH BROWN (10YR 3/4), ORGANIC CLAYEY SILT, TRACE OF SAND, SLIGHT PLASTICITY, SLIGHTLY MOIST 1.7	OL	.75	Hnu = 0.0 ppm α = 0 cpm βγ = 30-60 cpm
2	33334 1436 11-17	3 3 6	18	FIRM, DARK YELLOWISH BROWN (10YR 4/6), ORGANIC SILTY CLAY, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST 3.5	CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 30-60 cpm
4	33335 1441 11-17	5 5 5	18	FIRM, MOTTLED DARK BROWN (10YR 3/3) SILTY CLAY, SOME SAND, LOW PLASTICITY, MOIST 4.4	CL	1.25	Hnu = 0.0 ppm α = 0 cpm βγ = 40-60 cpm
5	33336 1445 11-17	3 5 9	18	FIRM, GRAY (10YR 5/1), SAND-CLAY MIXTURE, SOME SILT, SLIGHT PLASTICITY, MOIST 5.2	SC	1.80	Hnu = 2.0 unsustained ppm α = 0 cpm βγ = 40-70 cpm
6				MEDIUM DENSE, GRAY (10YR 5/1), SAND-GRAVEL MIXTURE, SOME SILT, SLIGHTLY MOIST 6.4	GM	N/A	
7	33337 1449 11-17	10 12 25	18	MEDIUM DENSE, VERY DARK GRAY (10YR 3/1) GRAVEL-SAND-SILT MIXTURE, MOIST 6.9	GM	N/A	Hnu = 5.0 unsustained ppm α = 0 cpm βγ = 40-80 cpm
				MEDIUM DENSE, STRONG BROWN (7.5YR 4/6) SAND-GRAVEL MIXTURE, SOME SILT, TRACE OF CLAY, MOIST 7.5	GM	N/A	
8				AQUIFER WILL BE SAMPLED EVERY 5 FT, STARTING AT 10.0 FT UNTIL SATURATED ZONE IS ENCOUNTERED, 15 MORE FEET WILL THEN BE SAMPLED.			Hnu: α: βγ:
9							Hnu = 1.0-1.5 unsustained ppm α = 0 βγ = 40-80 cpm READINGS FOR 10.0 - 11.5 FT
10	33338 1612 11-17	13 17 23	18	DENSE, YELLOWISH BROWN (10YR 5/4) GRAVEL, SAND, SILT MIXTURE, TRACE CLAY, WET. SOME COBBLES 10.9	GM	N/A	
11				DENSE, YELLOWISH BROWN (10YR 5/8) GRAVEL SAND SILT MIXTURE, WET.	GM	N/A	
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: S. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL NUMBER	BACKGROUND READINGS
Hnu	A01344	0.0 ppm
α	ASI #3	0 cpm
βγ	ASI #10	20-100 cpm

000883

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2554	COORDINATES		DATE 11-18-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11-17-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 11-19-90
DRILLING METHODS. CABLE TOOLS			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible] (FT)	REMARKS
15	33339 1038 11-18-90	9 17 26	16	DENSE, YELLOWISH BROWN (10YR 5/6). GRAVEL - SAND - COBBLE MIXTURE, SOME SILT, WET	GM	N/A	H_{AV} = 1.0 ppm UNSUSTAINED α: 0 cpm $\beta\gamma$ = 40-80 cpm
16							
17							
18							
19							
20	33340 1318 11-18-90	4 9 13	18	MEDIUM DENSE, DARK GRAY (10YR 4/1), WELL GRADED COARSE SAND, TRACE OF SILT AND PEBBLES, WET	SW	N/A	H_{AV} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40-70 cpm
21							
22							
23							
24							
25	33341 1410 11-18-90	10 12 18	16	MEDIUM DENSE, DARK GRAY (10YR 4/1), POORLY GRADED FINE SAND, TRACE OF SILT, WET	SP	N/A	H_{AV} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 20-60 cpm
26							
27							
28							
29							
30							

NOTES

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{AV}: 0.0 ppm

α: 0 cpm

$\beta\gamma$ - 20-80 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2554	COORDINATES:		DATE: 11-18-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11-17-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 11-19-90
DRILLING METHODS: CABLE TOOLS			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible]	REMARKS
30	33342	9		MEDIUM DENSE, DARK GRAY (10YR 4/1), POORLY GRADED FINE SAND, TRACE OF SILT AND GRAVEL, WET	SP	N/A	H_{AV} = 0.0 PPM
31	1445	12	16				α = 0 CPM
	11-18-90	23		30.9 MEDIUM DENSE, DARK GRAY (10YR 4/1), POORLY GRADED FINE SAND, TRACE OF SILT, WET 30.9	SP	N/A	$\beta\gamma$ = 40-80 CPM
32				BOTTOM OF BORING = 31.5 FT, DRILLED & SAMPLED TO 31.5 FT.			

NOTES

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS ERIE

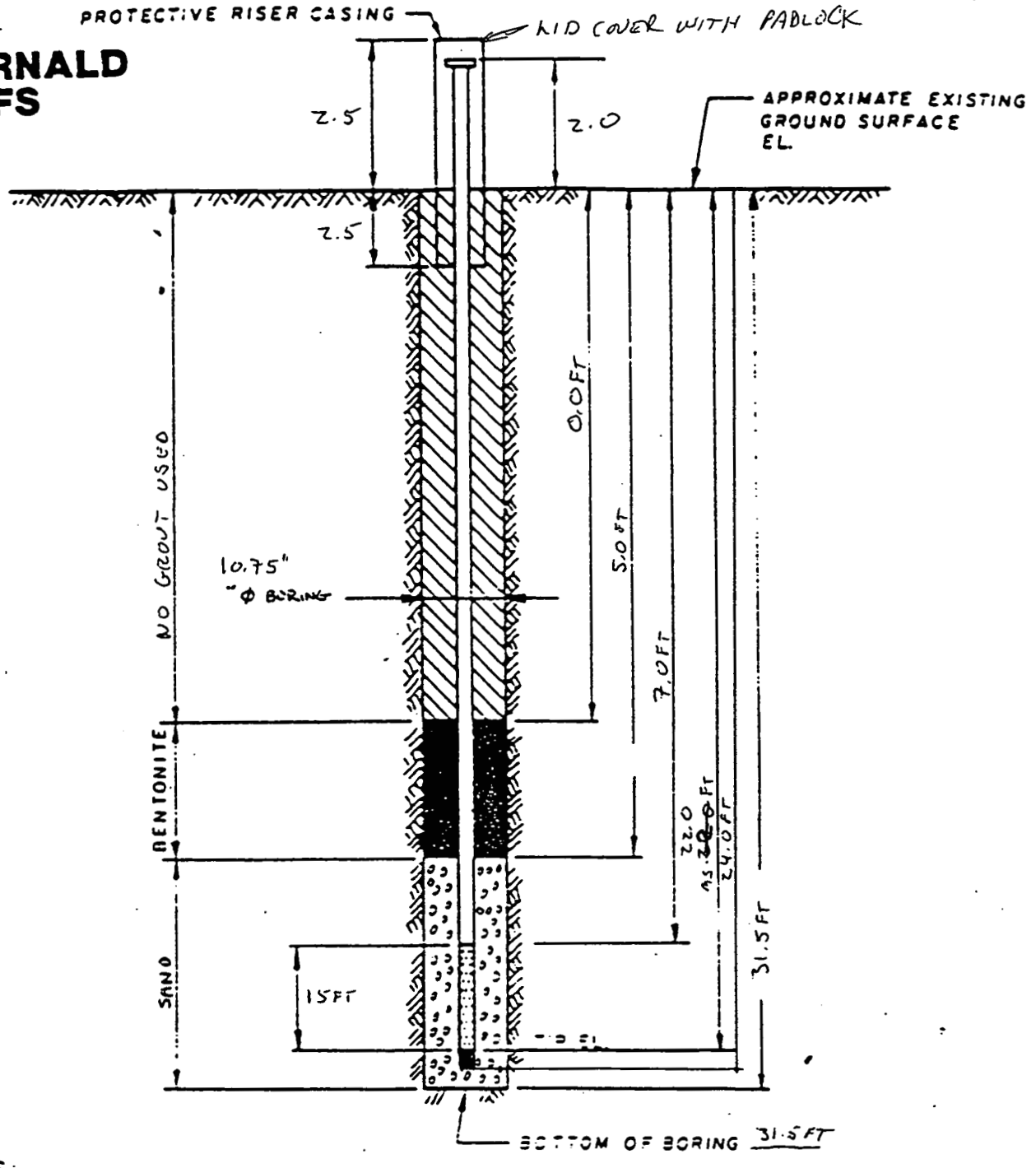
Driller: D. NEWMAN

ASST.: B JOHNSON

BACKGROUND
H_{AV}: 0.0 PPM
α: 0 CPM
$\beta\gamma$: 40-80 CPM

000885

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (W/ WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 9.4 FT ; 7.8 FT.
5. WATER LEVEL READING ON 11-18-90 ; 11-19-90

MATERIALS USED DURING WELL INSTALLATION:

14 80 LB BAGS OF 10/20 SAND
0 50 LB BAGS OF VOLCLAY GROUT
7 5 GAL. BUCKETS OF BENTONITE PELLETS
200 GALLONS OF WATER USED DURING GROUTING & DRILLING PROCEDURES
25 PIPE SECTIONS 11-15 FT SCREEN W/ 2 FT WELDED SILTTRAP ; 1-5 FT RISER ; 2-2 FT RISER

INSTALLATION DETAILS
MONITORING WELL 2554

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER

CHECKED BY
APPROVED BY

DRAWN BY
11-19-90

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 11-18-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger DATE 12-1-90
BORING NO. 2554
PIEZOMETER NO. 2554
DATE OF INSTALLATION 11-19-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 31.5 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0 FT TO 31.5 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL PERFORATED AREA 15 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4 in.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 in.
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 31.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 7.0	BOTTOM 22.0	TOP	BOTTOM
PIEZOMETER TIP	24.0 FT			
BOTTOM OF BOREHOLE	31.5 FT			
GWL AFTER INSTALLATION	7.8 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD
RI/FS

Date	12/19/90			
Inits!	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2555	COORDINATES:	DATE: 12-1-90
ELEVATION:	GWL: Depth 20.8 FT Date/Time 12-02-90 @ 1300	DATE STARTED: 12-01-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth 18.2 FT Date/Time 12-03-90 @ 1400	DATE COMPLETED: 12-02-90
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33357 1406 12-01-90	1 6 2	6	SOFT, VERY DARK GRAY (10YR 3/1) ORGANIC SILT-CLAY MIXTURE, SOME PEBBLES, LOW PLASTICITY, MOIST 1.5	OL	.40	Hnu = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
2	33358 1411 12-01	3 5 5	7	FIRM, YELLOWISH BROWN (10YR 5/4), CLAY, SILT, SAND MIXTURE, LOW PLASTICITY, DRY	CL	.75	Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
4	33359 1417 12-01	4 4 4	18	SOFT, YELLOWISH BROWN (10YR 5/4), SANDY CLAY, SOME SILT, TRACE OF PEBBLES, LOW TO MEDIUM PLASTICITY, MOIST 4.0	CL	.30	Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
5	33360 1424 12-01	3 5 6	18	SOFT, GRAYISH BROWN (10YR 5/2), SILTY CLAY, SOME SAND AND GRAVEL, LOW PLASTICITY, MOIST 6.9	CL	.50	Hnu = 0.0 PPM α = 0 CPM βγ = 20-30 CPM
7	33361 1433 12-01	5 4 4	18	VERY SOFT, GRAYISH BROWN (10YR 5/2), SAND-CLAY MIXTURE, SOME SILT AND PEBBLES, MOIST TO WET 9.5	SC	0.25	Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
9	33362 1442 12-01	4 5 5	18				Hnu = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
10	33363 1450 12-01	5 3 3	18	FIRM, YELLOWISH BROWN (10YR 5/4), SILTY CLAY TRACE OF SAND AND GRAVEL, SLIGHTLY MOIST 11.0	CL	1.25	Hnu = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
11	33364 1608 12-01	1 1 1	18	FIRM, BROWN (10YR 5/3), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST TO MOIST 11.7	CL	1.0	Hnu = 0.0 PPM α = 0 CPM βγ = 40-80 CPM
12	33365 1615 12-01	3 4 5	18	FIRM, BROWN (10YR 5/3), SANDY SILT, SOME CLAY, LOW PLASTICITY, SLIGHTLY MOIST 12.5			Hnu = 0.0 PPM α = 0 CPM βγ = 40-80 CPM
13				FIRM, YELLOWISH BROWN (10YR 5/4), SANDY-SILTY, CLAY, TRACE OF PEBBLES VERY SLIGHT PLASTICITY, MOIST TO WET	SM	1.5	
14	33366 0755 12-02-90	2 3 2	18			1.20	Hnu = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. SCHUSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
Hnu	A01344	0.0 PPM
α	ASI #5	0 CPM
βγ	ASI #6	20-80 CPM

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2555	COORDINATES:		DATE: 12-02-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-01-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 12-02-90
DRILLING METHODS: CABLE TOOLS			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (PPM)	REMARKS
15	33367 0805 12-02	1 2 2	18	FIRM, YELLOWISH BROWN (10YR 5/6) SAND-SILT-CLAY MIXTURE, LOW PLASTICITY, MOIST TO WET 16.0	CL	1.0	Hnu = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
16				SOFT, DARK GRAY (2.5Y 4/0) SILT, SOME SAND AND CLAY, NO PLASTICITY, SLIGHTLY MOIST 16.9	ML	0.5	
17	33368 0820 12-02	1 3 3	15	LOOSE, DARK GRAY (2.5Y 4/0), SAND-CLAY MIXTURE, SOME SILT, WET	SC	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 40-80 CPM
18	33369 0834 12-02	2 4 5	12	LOOSE, DARK GRAY (2.5Y 4/0), SAND-CLAY-SILT MIXTURE, TRACE OF PEBBLES, WET 19.5	SC	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
20	33370 0918 12-02	1 3 5	8	LOOSE, VERY DARK GRAY (2.5Y 3/0) SAND-SILT MIXTURE, COARSE GRAINED, WET	SM	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 20-60
21	33371 0937 12-02	2 6 7	10	MEDIUM DENSE, VERY DARK GRAY (2.5Y 3/0), SILTY SAND, FINER GRAINED, WET	SM	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
23				AQUIFER WILL BE SAMPLED EVERY 5 FT STARTING AT 25.0 FT. TILL SATURATED ZONE IS ENCOUNTERED.			
25	33372 1000 12-02	6 9 7	12	MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 4/2) POORLY GRADED FINE SAND, SOME SILT, WET	SP	N/A	Hnu = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
27							
29							
30							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
Hnu = 0.0 PPM
α = 0 CPM
βγ = 20-80 CPM

000889

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2555	COORDINATES		DATE 12-02-90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 12-01-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 12-02-90
DRILLING METHODS CABLE TOOLS			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	WELL CONSTRUCTION	REMARKS
30	33373	5		MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6); POORLY GRADED FINE SAND, SOME SILT, WET	SP	N/A	N/A	Hnu = 0.0 PPM
	1040	7	14					α : 0 cpm
31	12-02	8						βγ : 40-60 cpm
32								Hnu : α : βγ :
33								Hnu : α : βγ :
34								Hnu : α : βγ :
35	33374	8		MEDIUM DENSE, DARK GRAY (10YR 4/1), WELL GRADED COARSE SAND, TRACE OF SILT, PEBBLES, WET	SW	N/A		Hnu : 0.0 PPM α : 0 cpm βγ : 20-40 cpm READINGS FOR 35.0-36.5 FT
	1135	8	13					
36	12-02	9						Hnu : α : βγ :
37				BOTTOM OF BORING = 36.5 FT. DRILLED, SAMPLED TO 36.5 FT.				Hnu : α : βγ :
								Hnu : α : βγ :
								Hnu : α : βγ :
								Hnu : α : βγ :
								Hnu : α : βγ :
							N/A	Hnu : α : βγ :

NOTES

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

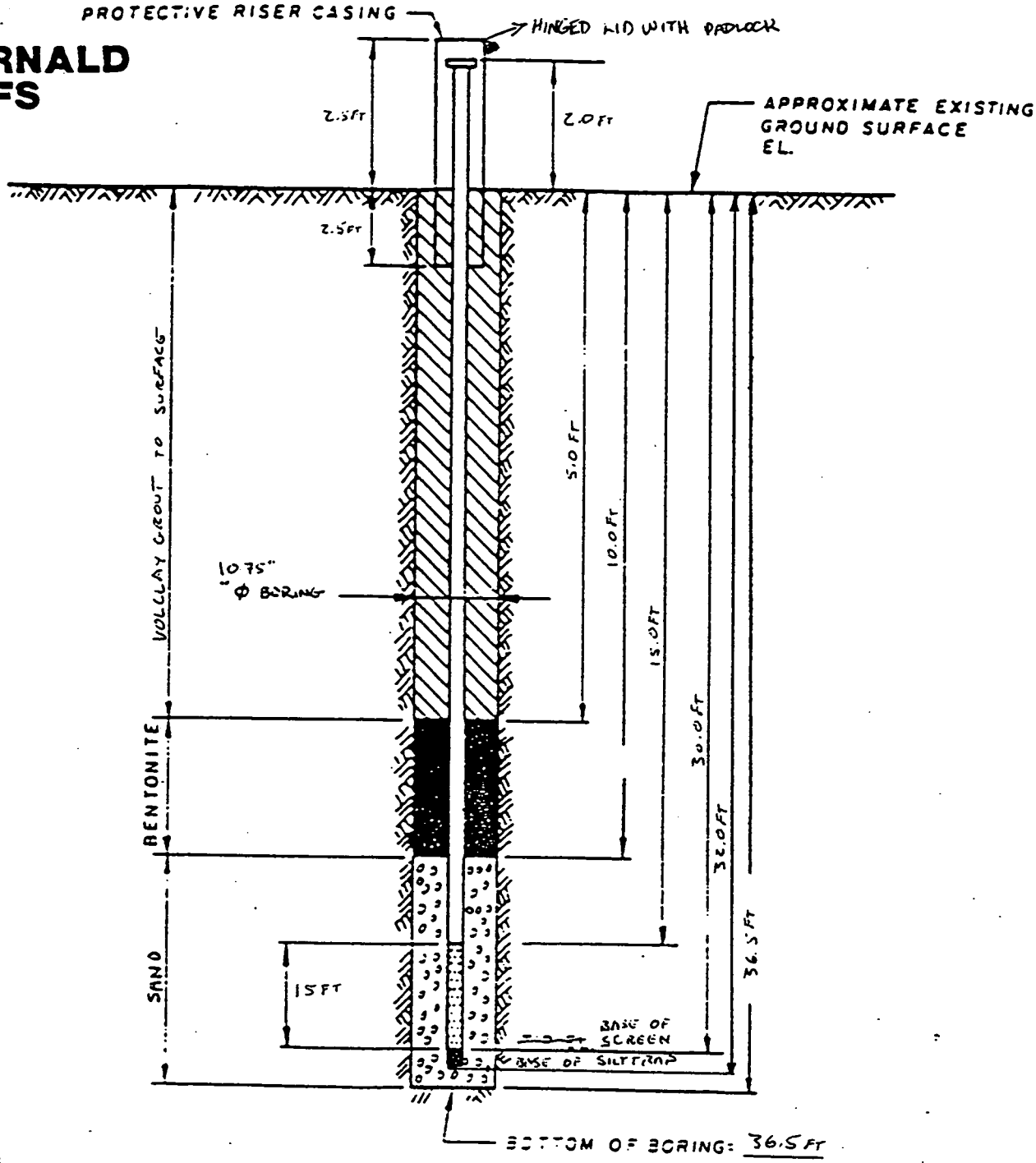
Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
Hnu = 0.0 PPM
α : 0 cpm
βγ : 40-60 cpm

000890

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN 10 SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 20.8 FT ; 18.2 FT
5. WATER LEVEL READING ON 12-02-90 ; 12-03-90

MATERIALS USED DURING WELL INSTALLATION:

15 80 LB. BAGS OF 10/20 SAND
2 50 LB. BAGS OF VOLCLAY GROUT
9 5 GALLON BUCKETS OF BENTONITE PELLETS
300 GALLONS OF WATER USED DURING DRILLING AND GROUTING PROCEDURES
SS SECTIONS: 1-15 FT SCREEN w/ 2 FT WELDED SILTTRAP ; 1-10 FT ; 1-5 FT ; 1-2 FT RISERS

INSTALLATION DETAILS
MONITORING WELL # 2555

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DR. BY	12-04-90

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 12-02-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger DATE 12-13-90
BORING NO. 2556
PIEZOMETER NO. 2555
DATE OF INSTALLATION 12-02-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 FT TO 36.5 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0.0 FT TO 36.5 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 15 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4 in
LENGTH OF PIPE SECTIONS
JOINING METHOD THREADED, FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 in
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 5.0	TOP	BOTTOM
BENTONITE	TOP 5.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP 10.0	BOTTOM 36.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 15.0	BOTTOM 30.0	TOP	BOTTOM
PIEZOMETER TIP	32.0 FT			
BOTTOM OF BOREHOLE	36.5 FT			
GWL AFTER INSTALLATION	18.2 FT BELOW GROUND			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2556	COORDINATES: N 471263.84, E 1379642.75	DATE: 11-07-90	
ELEVATION: 519.2 GROUND	GWL: Depth 7.48 FT Date/Time 11-08-90@0800	DATE STARTED: 11-07-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth 6.82 FT Date/Time 11-13-90@1000	DATE COMPLETED: 11-13-90	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33270 1350 11-07-90	3 3 4	18	SOFT, DARK GRAYISH BROWN (10YR 4/2) ORGANIC SILT, SOME SAND, LOW PLASTICITY, MOIST 0.7	OL	0.50	H_{av} = 0.0 α = 0 Pγ = 20-80 CPM
1				SOFT, VERY DARK GRAYISH BROWN (10YR 3/2) CLAYEY SILT, LOW TO MEDIUM PLASTICITY, DRY 2.5	ML	0.50	
2	33271 1356 11-07	6 6 5	18	FIRM, DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY, LOW TO MEDIUM PLASTICITY, DRY TO MOIST 3.6	CL	1.0	H_{av} = 0.0 α = 0 Pγ = 20-60 CPM
3	33272 1401 11-07	8 10 8	18	FIRM, MOTTLED DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY SOME SAND, TRACE OF PEBBLES, LOW PLASTICITY, MOIST 5.0	CL	1.20	H_{av} = 0.0 α = 0 Pγ = 40-80 CPM
5	33273 1406 11-07	11 11 11	16	VERY SOFT, MOTTLED GRAY (10YR 5/1), CLAYEY SILT SOME SAND AND PEBBLES, TRACE OF GRAVEL, DRY 5.2	ML	0.25	H_{av} = 0.0 α = 0 Pγ = 40-80 CPM
6	33274 1412 11-07	11 13 14	18	MEDIUM DENSE, DULL YELLOW (2.5Y 6/6), MIXED WITH GRAY (2.5Y 5/0), GRAVEL-SAND-SILT MIXTURE, SOME CLAY, COBBLES, BECAME WET AT 6.6 FT 7.3	GM	N/A	H_{av} = 0.0 α = 0 Pγ = 40-80 CPM
8	33275 1435 11-07	1 2 12	16	VERY SOFT, DARK GRAY (2.5Y 4/0) CLAY, SOME SILT, MEDIUM TO HIGH PLASTICITY, MOIST TO WET 8.4	CH	0.25	H_{av} = 0.0 α = 0 Pγ = 40-100 CPM
9				MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 4/6), SILTY CLAYEY GRAVEL, TRACE OF COBBLES, WET 9.0	GC	N/A	
			9.0	AQUIFER WILL BE SAMPLED EVERY 5.0 FT, STARTING AT 15.0 FT TILL SATURATED ZONE IS ENCOUNTERED. 15 MORE FEET WILL THEN BE SAMPLED.			
10							
11							
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CORESTAR 1800

Driller: CRAIG COULTER

ASST.: CHRIS COULTER

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	#	BACKGROUND READINGS
H_{av}	AO344	0.0 ppm
α	ASI #3	0 CPM
Pγ	ASI #10	20-100 CPM

243B-3-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2556	COORDINATES:		DATE: 11-08-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11-07-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 11-13-90
DRILLING METHODS: CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONDUCTIVITY (mS)	REMARKS
11	33276 1012 11-08-90	3 5 8	11	MEDIUM DENSE, DARK BROWN (10YR 4/3) CLAYEY SAND, SOME SILT AND PEBBLES, SLIGHT PLASTICITY IN CLAY, WET	SC	.25	H_{av}: 0.0 ppm α: 0 cpm $\beta\gamma$: 20-60 cpm
17							
18							
19							
20	33277 1343 11-08	6 7 9	9	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED COARSE SAND, SOME SILT, WET	SP	N/A	H_{av}: 0.0 ppm α: 0 cpm $\beta\gamma$: 40-80 cpm
22							
23							
24							
25	33278 1456 11-08	11 15 22	15	DENSE, DARK GRAY (10YR 4/1), WELL-GRADED SILTY FINE SAND, WET	SM	N/A	H_{av}: 0.0 ppm α: 0 cpm $\beta\gamma$: 40-85 cpm
27							
28							
29	33279 1524 11-08	9 10 13	7	MEDIUM DENSE, GRAY (10YR 4/0) POORLY GRADED FINE TO COARSE SAND, TRACE OF PEBBLES, WET	SP	N/A	H_{av}: 0.0 ppm α: 0 cpm $\beta\gamma$: 30-60 cpm
30				BOTTOM OF BORING @ 30.0 FT.			

NOTES: SAMPLING ENDED @ 30.0 FT.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: LOADSTAR 1800

Driller: CRAIG COULTER

ASST.: CHRIS COULTER

* SAMPLING, DRILLING TERMINATED @ 30.0 FT.

BACKGROUND
H_{av}: 0.0 ppm
α: 0 cpm
$\beta\gamma$: 20-100 cpm

000894

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 11-08-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger DATE 12-1-90
BORING NO. 2556
PIEZOMETER NO. 2556
DATE OF INSTALLATION 11-13-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 30.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 30.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 15 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

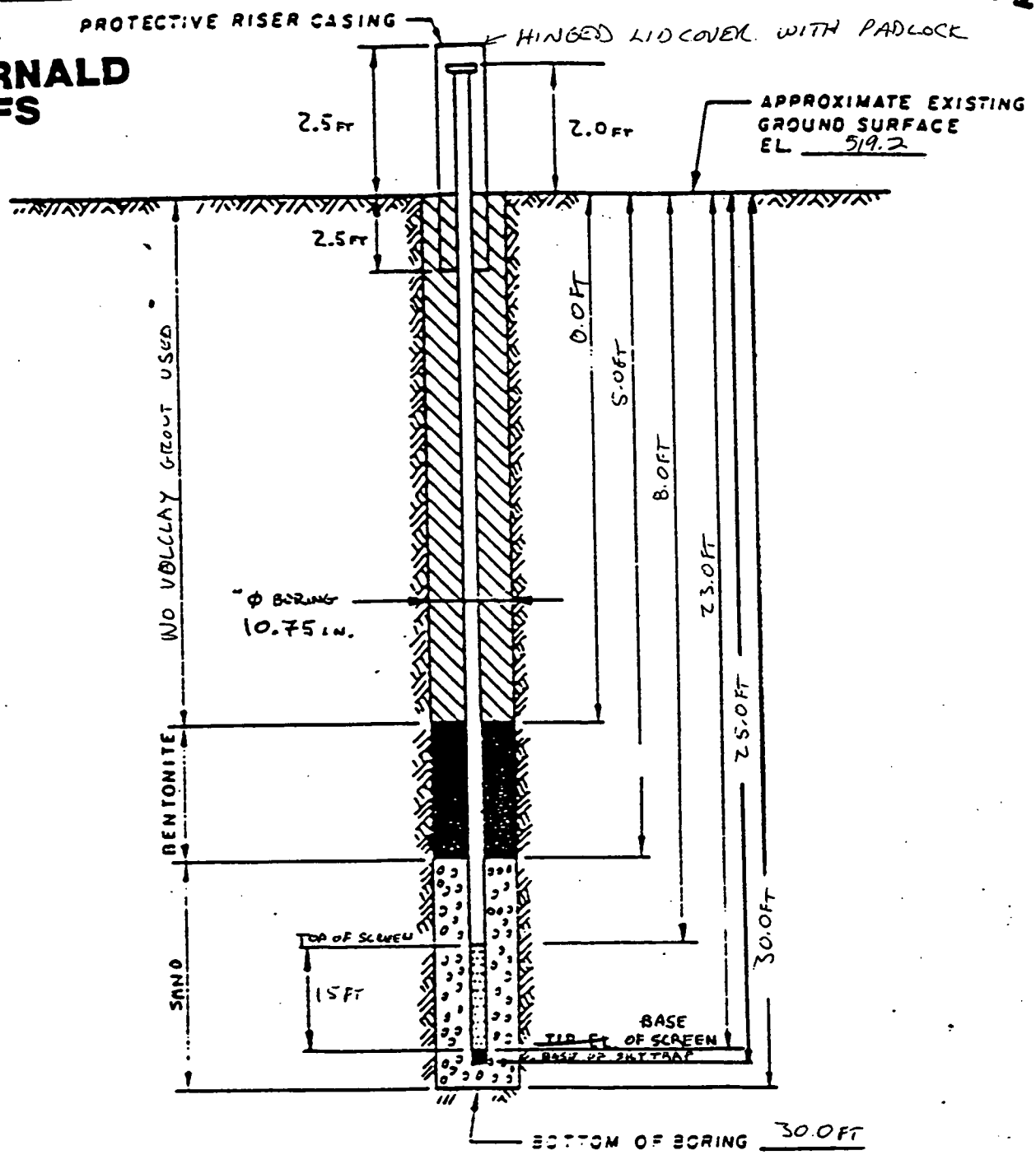
RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.)	
TOP OF RISER PIPE	+ 2.0		521.2	
GROUND SURFACE	0.0		519.2	
BOTTOM OF PROTECTIVE PIPE	- 2.5		516.7	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP 519.2	BOTTOM 514.2
SAND	TOP 5.0	BOTTOM 30.0	TOP 514.2	BOTTOM 489.2
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.0 FT	BOTTOM 23.0	TOP 511.2	BOTTOM 496.2
PIEZOMETER TIP	25.0 FT		494.2	
BOTTOM OF BOREHOLE	30.0 FT		489.2	
GWL AFTER INSTALLATION	6.82 FT BELOW GROUND		VARIABLE	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY / APPROVED BY

DRAWN BY / DATE 11-13-90

NOTES:

1. RISER PIPE IS 4.0 IN ID SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 6.82 FT ; 7.48 FT
5. WATER LEVEL READING ON 11-13-90 ; 11-08-90

MATERIALS USED DURING WELL INSTALLATION:

13 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
2 5 GAL. BUCKETS OF BENTONITE PELLETS
100 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-15 FT SCREEN W/ 2 FT WELDED SILTTRAP, 1-10 FT RISER

INSTALLATION DETAILS
MONITORING WELL #2556

PREPARED FOR
FERNALD RI/FS

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.11	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2557	COORDINATES: N470857.04, E1379674.16	DATE: 10-21-91	
ELEVATION: 518.90' (GR)	GWL: Depth 13.2 Date/Time 10-22, 1400	DATE STARTED: 10-21-91	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 10-22-91	
DRILLING METHODS: Cable Tool		PAGE 1 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	33456 1530 10-21-91	3 6 9	6	m. dense, brown, (10yr 5/3 to 10yr 4/3) clayey silt, trace gravel, trace sand, dry	ML	NA	Hnu - 0 ppm Bγ - 50 cpm α - 0 cpm
2	33457 1535 10-21-91	5 9 9	8	m, dense pale brown (10yr, 6/3) clayey silt, trace sand, dry	ML	NA	Hnu - 0 ppm Bγ - 60 cpm α - 0 cpm
3 4	33458 1540 10-21-91	9 11 11	7	S.A.A.	ML	NA	Hnu - 0 ppm Bγ - 50 cpm α - 0 cpm
5	33459 1555 10-21-91	50/4	3	V. dense, Dark grayish brown to grayish brown clayey silt, (10yr, 4/2 to 10yr 5/2) some sand, moist to dry. 5.0' Drill to 6.0'	ML	NA	Hnu - 0 ppm Bγ - 50 cpm α - 0 cpm
6 7	33460 1600 10-21-91	50/5	4	V dense, brown (10yr, 4/3) sandy silt, moist 6.5' Drill to 7.5'	ML	NA	Hnu - 0 ppm Bγ - 50 cpm α - 0 cpm
8 9	33461 1610 10-21-91	17 50/4	7	V. dense, very pale brown (10yr, 7/3) fine gravel, sand, clay mixture, dry. Drill to 9.0'	GC	NA	Hnu - 0 ppm Bγ - 60 cpm α - 0 cpm
10	33462 1620 10-21-91	32 42 50	10	V. dense brown, (10yr, 5/3) Gravelly silt some sand, moist to dry	ML	NA	Hnu - 0 ppm Bγ - 50 cpm α - 0 cpm
11 12	33463 1645 10-21-91	50 32 36	16	V. dense brown, (10yr, 5/3) Poorly sorted sandy gravel, some silt, moist. V. dense, dark yellowish brown (10yr 4/4) silty gravel moist.	GW GM	NA NA	Hnu - Trace Bγ - 50 cpm α - 0 cpm
13 14				Aquifer met at 10.5 - 12.0 ft Sampling every 5.0 ft begins			

NOTES
Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 45
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A - Same As Above
N.R - No Recovery

Background
Hnu - 0 ppm
Bγ - 40-60 cpm
α - 0 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.11	PROJECT NAME FEMP RI/FS	
BORING NUMBER 2557	COORDINATES SEE Pg 1	DATE 10-21-91
ELEVATION: SEE Pg 1	GWL: Depth N/A Date/Time N/A	DATE STARTED 10-21-91
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10-22-91
DRILLING METHODS Cable Tool		PAGE 2 OF ~~16~~ 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (J.L 10-25-91)
15							
16	33464 1710 10-21-91	27 50 21	8	Very dense, brown (10yr 5/3) Poorly sorted Sandy gravel, Trace clay, moist to wet.	GW ~~GC~~ JL 12-04-91	ML	Hnu - 0 ppm Bd - 60 cpm α - 0 cpm
17							
18							
19							
20	33465 0945 10-22-91	5 8 8	8	m. dense, dark gray, (10yr. 4/1) sandy gravel, Trace silt, Trace clay wet. Poorly sorted	GW	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm J.L 12-04-91
21							
22							
23							
24							
25	33466 1045 10-22-91	42 26	8	V. dense, gray, (10yr, 5/1) Poorly sorted coarse gravelly sand, Trace clay, wet	SW ~~GW~~ J.L 12-04-91	NA	Hnu - 0 ppm Bd - 50 cpm α - 0 cpm
26							
27							
28							
29							
30							

NOTES See Pg 1

402-11-66

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

602.3.11

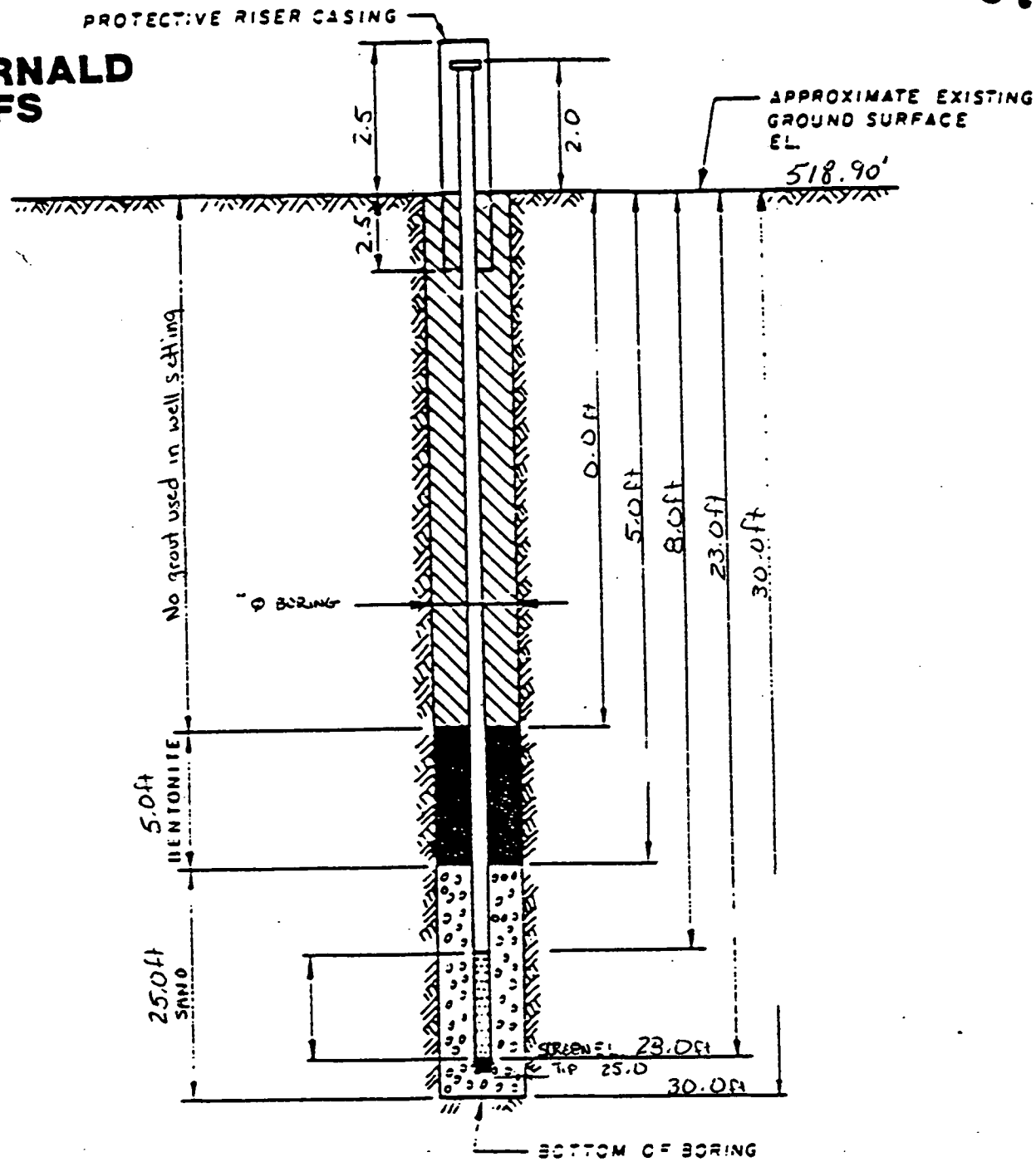
PROJECT NUMBER: FEMP RI/FS	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2557	COORDINATES: See Pg-1	DATE 10-22-91
ELEVATION: See Pg-1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10-21-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: cable tool		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	33467 1135 10-22-91	50/2	2	v. dense, gray (10yr. 5/1) large gravelly poorly sorted sand, trace clay, wet.	SW	NA	Hnu - 0 ppm βγ - 50 cpm α - 0 cpm
32				Drilling Ends at 30.0ft. Sampling ends at 31.5ft well set from 8.0ft to 23.0ft			

NOTES: See Pg. 1

402-11-86

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY / APPROVED BY

J. Lear 10-22-91

DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN ID SCHEDULE ~~40~~ 316 (J.L 12-04-91) PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 13.20 FT
5. WATER LEVEL READING ON 10-22-91

14 bags of 80lb 20x20 sand (J.L 12-04-91)
3 buckets of bentonite (5 gal)
100 gals of H_2O used in drilling

INSTALLATION DETAILS
MONITORING WELL
2557
PREPARED FOR
Fernald RI/FS

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 602.3.11
BORING NO. 2557
PIEZOMETER NO. 2557

FIELD ENG./GEO. J. Lear DATE 10-22-91
CHECKED BY R.S. MYERS DATE 11/12/91
CR 12/04/91
DATE OF INSTALLATION 10-22-91

BOREHOLE DRILLING

DRILLING METHOD cable tool
DRILLING FLUID (S) USED: H_2O
FLUID H_2O FROM 0.0 FT TO 3.0 FT
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT cable tool
CASING SIZE (S) USED: 8 in
SIZE 8 in FROM 0.0 FT TO 30.0 FT
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE Stainless Steel MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ slotted SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.01 in
TOTAL PERFORATED AREA 15 ft

RISER PIPE MATERIAL Stainless Steel - 316
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10ft, 2ft 15ft screen
JOINING METHOD Threaded flush joined

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION Hinged well cap, locked. Vented well cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0 ft		520.90	
GROUND SURFACE	0.0		518.90	
BOTTOM OF PROTECTIVE PIPE	2.5		516.40	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ J.L 10-22-91	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP 518.90	BOTTOM 513.90
SAND	TOP 5.0	BOTTOM 30.0	TOP 513.90	BOTTOM 488.90
~~GRAVEL~~ J.L 10-22-91	TOP NA	BOTTOM NA	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 8.0	BOTTOM 23.0	TOP 510.90	BOTTOM 495.90
PIEZOMETER TIP	25.0		493.90	
BOTTOM OF BOREHOLE	30.0		488.90	
GWL AFTER INSTALLATION	13.2 on 10-22-91			

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
..AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

NALD
'S

5711

VISUAL CLASSIFICATION OF SOILS

.T NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
.NG NUMBER: 2558	COORDINATES: N.469,183.69, E.1,379,930.77	DATE: 1-10-91	
.EVATION: 5440 GROUND	GWL: Depth 9.6 FT Date/Time 1-16-91 @ 0800	DATE STARTED: 1-10-91	
ENGINEER/GEOLOGIST: M. SWANSON	Depth Date/Time	DATE COMPLETED: 1-15-91	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33391 0740 1-10-91	1 2 3	18	VERY SOFT, VERY DARK GRAY (10YR 3/1), ORGANIC SILT, TRACE OF CLAY, SAND, SLIGHTLY MOIST	OL	L.25	Hnu = 0.0 PPM; α = 0 CPM; βγ = 20-40 CPM
2	33392 0743 1-10	2 3 3	18	2.6			Hnu = 0.0 PPM; α = 0 CPM; βγ = 20-30 CPM
3	33393 0748 1-10	3 4 5	12	FIRM, DARK YELLOWISH BROWN (10YR 4/4), SILTY CLAY, LOW PLASTICITY, TRACE OF SAND, DRY	CL	.75	Hnu = 0.0 PPM; α = 0 CPM; βγ = 20-50 CPM
5	33394 0754 1-10	3 5 5	18	5.6			Hnu = 0.0 PPM; α = 0 CPM; βγ = 30-40 CPM
6	33395 0759 1-10	3 9 8	15	LOOSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED FINE SAND TRACE OF SILT, DRY 6.6	SP	N/A	Hnu = 0.0 PPM; α = 0 CPM; βγ = 40 CPM
7				6.6 SOFT, LIGHT YELLOWISH BROWN (10YR 6/4), SAND-CLAY MIXTURE, SOME SILT, LOW PLASTICITY IN CLAY, DRY	SC	.50	
8	33396 0806 1-10	8 9 11	18	8.3			Hnu = 0.0; α = 0; βγ = 20-60 CPM
9				MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4) WELL GRADED COARSER SAND, SOME SILT, DRY 9.0	SW	N/A	
10				9.0			
11	33397 0940 1-10	14 40 22	8	VERY DENSE, VERY DARK GRAY (2.5Y 3/0) GRAVEL-SAND-SILT-COBBLE MIXTURE, WET LIMESTONE	GM	N/A	Hnu = 0.0 PPM; α = 0 CPM; βγ = 30 CPM; READINGS FOR 10.0-11.5 FT
12							
13							
14	33398 1115 1-10	19 45 33	10	VERY DENSE, VERY DARK GRAY (2.5Y 3/0) TO YELLOW (10YR 7/8), GRAVEL-SAND-SILT MIXTURE, SOME LIMESTONE COBBLES, WET	GM	N/A	Hnu = 0.0; α = 0; βγ = 40-60 CPM
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. OLDMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
Hnu	1104	0.0 PPM
α	ASI #3	0 CPM
βγ	ASI #19	20-90 CPM

000902

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2558	COORDINATES		DATE 1-10-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 1-10-91
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 1-15-91
DRILLING METHODS CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible] (PPM)	REMARKS
15							
16							
17							
18				BEDROCK ENCOUNTERED AT 18.5 FT.			
19	33399	38		VERY DENSE, VERY DARK GRAY (5Y 3/1), FOSSILIFEROUS SHALE	N/A	>4	H_{no} = 0.0
20	1415	50/2in	8				α = 0
	1-10-91						$\beta\gamma$ = 50 cpm
21				BOTTOM OF BORING = 20.5 FT. DRILLED, SAMPLED TO 20.5 FT			

NOTES

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D NEWMAN

ASST.: S JOHNSON

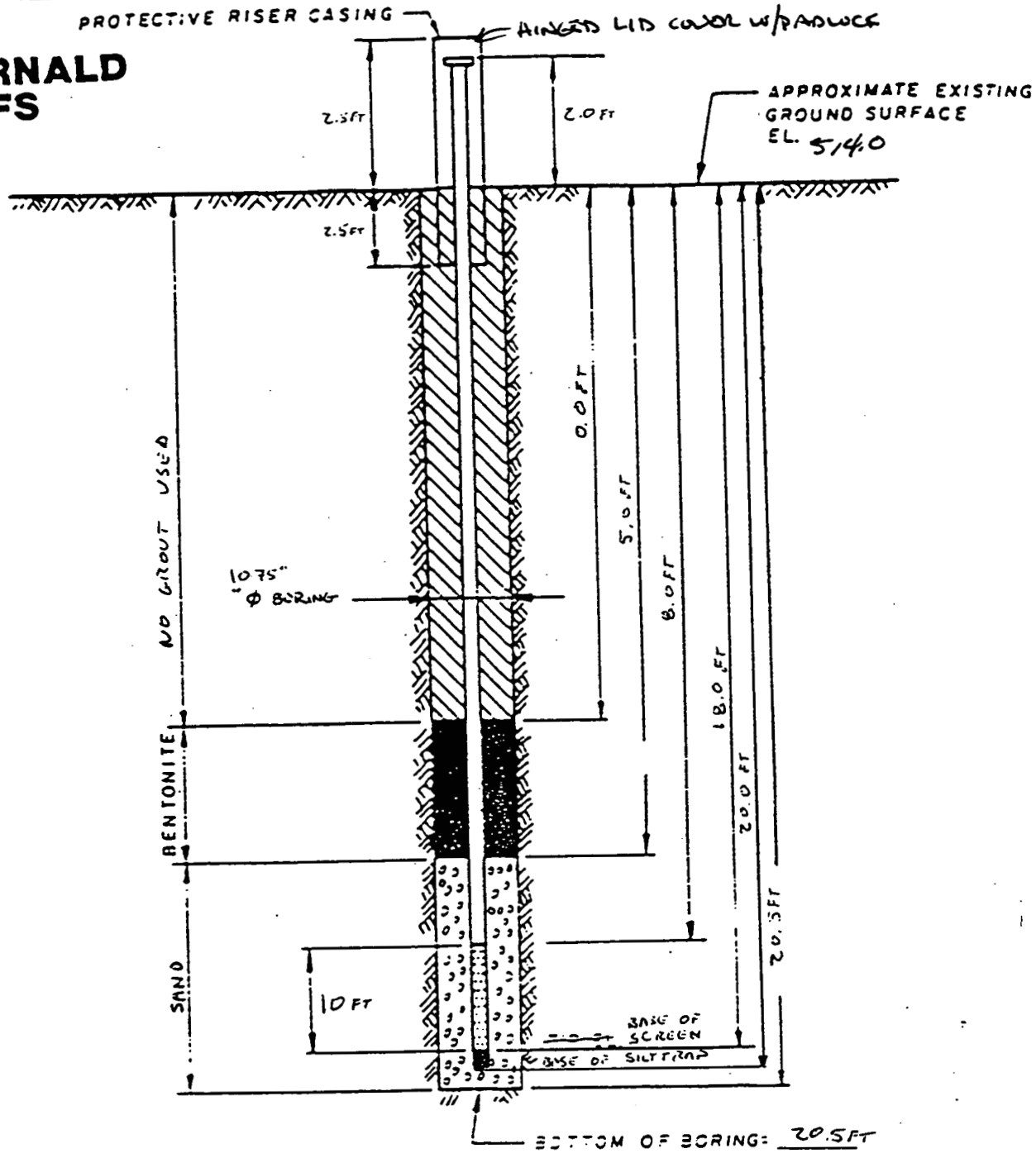
BACKGROUND

H_{no} = 0.0

α = 0

$\beta\gamma$ = 40-60 cpm

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED w/ WELDED SILTTRAP
4. ELEVATION OF WATER LEVEL 9.6 FT
5. WATER LEVEL READING ON 1-16-91

INSTALLATION DETAILS
MONITORING WELL #2556

PREPARED FOR
FERNALD RI/FS

MATERIALS USED DURING WELL INSTALLATION:

11 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
6 5 GALLON BUCKETS OF BENTONITE PELLETS
240 GALLONS OF WATER USED DURING DRILLING AND GROUTING PROCEDURES
SS SECTIONS: 1-10FT SCREEN w/ 2FT WELDED SILTTRAP; 1-10FT RISER

DRAWING NUMBER
CHECKED BY
APPROVED BY
MGH 1-16-91

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 1-15-91
PROJECT NO. 602 3.2.1
CHECKED BY S.T. DATE 1-18-91
BORING NO. 2558
PIEZOMETER NO. 2558
DATE OF INSTALLATION 1-15-91

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 FT TO 20.5
FLUID – FROM – TO –
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0.0 FT TO 25.0 FT
SIZE – FROM – TO –

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 10 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED, FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.)	
TOP OF RISER PIPE	+2.0		516.0	
GROUND SURFACE	0.0		514.0	
BOTTOM OF PROTECTIVE PIPE	-2.5		511.5	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP 514.0	BOTTOM 509.0
SAND	TOP 5.0	BOTTOM 20.5	TOP 509.0	BOTTOM 493.5
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.0 FT	BOTTOM 18.0 FT	TOP 506.0	BOTTOM 496.0
PIEZOMETER TIP	20.0 FT		494.0	
BOTTOM OF BOREHOLE	20.5 FT		493.5	
GWL AFTER INSTALLATION	9.6 FT		504.4	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 1.5 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

000905

FERNALD RI/FS

Date				
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

5211

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2559	COORDINATES: N 469,960.98, E 1,382,593.38	DATE: 1-17-91	
ELEVATION: 516.2 GROUND	GWL: Depth 9.6 FT Date/Time 1-18-91 @ 0830	DATE STARTED: 1-17-91	
ENGINEER/GEOLOGIST: M. SWANSON	Depth 9.3 FT Date/Time 1-19-91 @ 0830	DATE COMPLETED: 1-19-91	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33402 0945 1-17-91	1 4 6	18	SOFT, VERY DARK GRAY (10YR 3/1) ORGANIC SANDY CLAYEY SILT, TRACE OF PEBBLES, NO PLASTICITY, MOIST 0.8	OL	.25	HNU = 0.0 PPM α = 0 CPM βγ = 30 CPM
1				VERY SOFT, VERY DARK GRAYISH BROWN (10YR 3/2) SANDY SILT, TRACE OF CLAY, SLIGHTLY MOIST 1.7	SM	0.25	
2	33403 0949 1-17	10 12 16	18	HARD GRAYISH BROWN (10YR 5/2), SILTY CLAY, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	2.0	HNU = 0.0 PPM α = 0 CPM βγ = 40 CPM
3	33404 0957 1-17	15 16 13	10	4.5			HNU = 0.0 PPM α = 0 CPM βγ = 40 CPM
5	33405 1003 1-17	5 4 9	12	SOFT, GRAYISH BROWN (10YR 5/2), SAND - SILT MIXTURE, NO PLASTICITY, DRY 6.0	SM	.40	HNU = 0.0 PPM α = 0 CPM βγ = 40 CPM
6	33406 1008 1-17	6 8 11	18	HARD, MOTTLED GRAY (10YR 5/1), CLAY, SOME SILT, TRACE OF SAND, LOW PLASTICITY, DRY 7.8	CL	2.5	HNU = 0.0 PPM α = 0 CPM βγ = 40-50 CPM
8	33407 1016 1-17	12 22 30	18	VERY DENSE, BROWN (10YR 5/3), POORLY GRADED COARSE SAND, SOME SILT, DRY 9.2	SP	N/A	HNU = 0.0 PPM α = 0 CPM βγ = 30-50 CPM
9	33408 1022 1-17	10 12 15	18	MEDIUM DENSE, GRAYISH BROWN (10YR 5/2), MEDIUM GRADED COARSE SAND, SOME PEBBLES, TRACE OF SILT, MOIST 10.5	SP	N/A	HNU = 0.0 PPM α = 0 CPM βγ = 40 CPM
11				AQUIFER WILL BE SAMPLED EVERY 5.0 FT HEREAFTER TILL SATURATED ZONE IS ENCOUNTERED. 15 ADDITIONAL FEET WILL THEN BE DRILLED.			
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
HNU	A01345	0.0
α	ASI #3	0
βγ	ASI #21	20-50 CPM

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2559	COORDINATES:		DATE: 1-17-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-17-91
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 1-19-91
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT LEVEL	REMARKS
15 16	33409 1545 1-17-91	12 22 28	15	DENSE, GRAYISH BROWN (10YR 5/2). WELL SORTED GRAVEL, SAND, SILT MIXTURE, SOME PEBBLES, TRACE OF LIMESTONE COBBLES, WET	GM	N/A	Hav = 0.0 α = 0 βγ = 30 cpm
17 18 19 20							
21	33410 0950 1-18-91	8 16 24	13	DENSE, BROWN (10YR 5/3), WELL-GRADED COARSE SAND, TRACE OF SILT, WET.	SW	N/A	Hav = 0.0 α = 0 βγ = 40 cpm
22 23 24 25							
26	33411 1020 1-18-91	7 11 19	10	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED FINER SAND, SOME SILT, TRACE OF PEBBLES, WET	SP	N/A	Hav: 0.3 UNSUSTAINED α: 0 βγ: 40 cpm
27 28 29 30							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: D. JOHNSON

BACKGROUND:
Hav = 0.0
α = 0
βγ = 20-80 cpm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6023.2	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2559	COORDINATES		DATE 1-18-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 1-17-91
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 1-19-91
DRILLING METHODS CABLE TOOL			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible] (FT)	REMARKS
30 31	33412 1140 1-18-91	10 22 26	8	DENSE, YELLOWISH BROWN (10YR 5/6), POORLY GRADED COARSE SAND, TRACE OF SILT, PEBBLES, WET	SP	N/A	H_{AV}: 0.0 α: 0 $\beta\gamma$: 40 ppm
32				BOTTOM OF BORING: 31.5 FT. DRILLED, SAMPLED TO 31.5 FT.			

NOTES

Drilling Contractor PENN DRILL CO.

Drilling Equipment BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND:

H_{AV}: 0.0 ppm

α: 0 ppm

$\beta\gamma$: 20-60 ppm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 1-18-91
PROJECT NO. 602 3.2.1
CHECKED BY E.T. DATE [illegible]
BORING NO. 2559
PIEZOMETER NO. 2559
DATE OF INSTALLATION 1-19-91

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 FT TO 31.5 FT
FLUID – FROM – TO –
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0.0 FT TO 30.0 FT
SIZE – FROM – TO –

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 15 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED, FLUSH JOINTED

PROTECTION SYSTEM

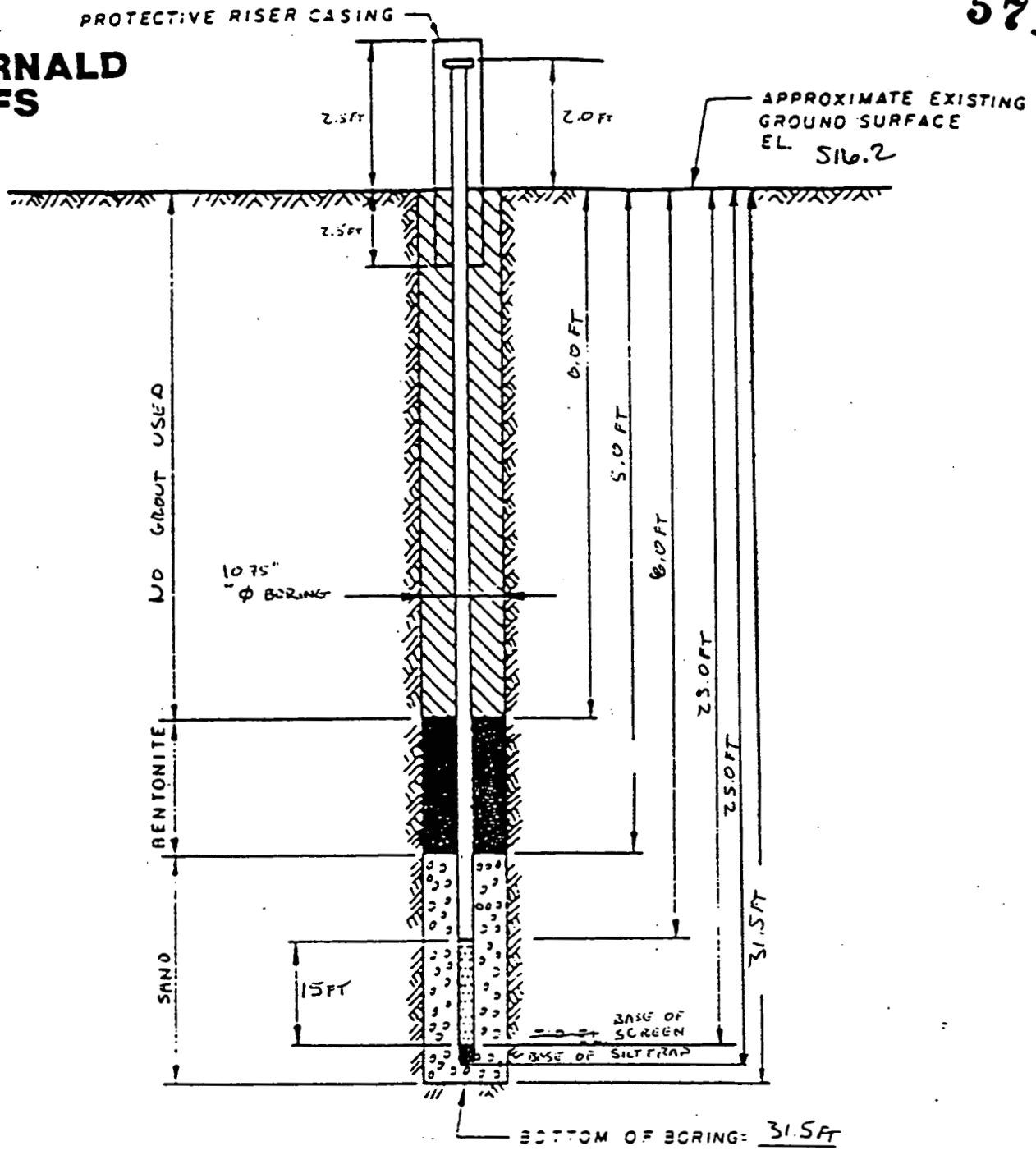
RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN
OTHER PROTECTION HINGED, LOCKING LID COVER

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	+2.0		518.2	
GROUND SURFACE	0.0		516.2	
BOTTOM OF PROTECTIVE PIPE	-2.5		513.7	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP 516.2	BOTTOM 511.2
SAND	TOP 5.0	BOTTOM 31.5	TOP 511.2	BOTTOM 484.7
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.0	BOTTOM 23.0	TOP 508.2	BOTTOM 493.2
PIEZOMETER TIP	25.0 FT		514.2	
BOTTOM OF BOREHOLE	31.5 FT		507.7	
GWL AFTER INSTALLATION	9.3 FT BELOW GROUND		506.9	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 1 BUCKET BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

5711

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED w/ WELDED SILTTRAP.
4. ELEVATION OF WATER LEVEL 9.6 FT ; 9.3 FT
5. WATER LEVEL READING ON 1-18-91 ; 1-19-91

MATERIALS USED DURING WELL INSTALLATION:

1B 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
6 5 GALLON BUCKETS OF BENTONITE PELLETS
200 GALLONS OF WATER USED DURING DRILLING AND GROUTING PROCEDURES
SS SECTIONS: 1-15 FT SCREEN w/ 2 FT WELDED SILTTRAP ; 1-10 FT RISER

INSTALLATION DETAILS
MONITORING WELL #2559

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

1-19-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2560	COORDINATES: N 468758A, E 1319 7138A	DATE: 11-15-90	
ELEVATION: 520.5	GWL: Depth 18.6 FT Date/Time 11-19-90 @ 1500	DATE STARTED: 11-15-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth Date/Time	DATE COMPLETED: 11-16-90	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33322 0858 11-15-90	2 9 14	18	FIRM, DARK GRAYISH BROWN (10YR 4/2), ORGANIC CLAYEY SILT, TRACE OF SAND, LOW PLASTICITY, MOIST	OL	1.0	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-80 CPM
2	33323 0902 11-15	6 6 6	6	FIRM, DARK GRAYISH BROWN (10YR 4/2), CLAYEY SILT, SOME ORGANICS, SLIGHT PLASTICITY, SLIGHTLY MOIST	OL	1.0	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-60 CPM
3 4	33324 0908 11-15	4 5 5	12	FIRM, YELLOWISH BROWN (10YR 5/4), SILTY CLAY, TRACE OF PEBBLES, LOW TO MEDIUM PLASTICITY, MOIST	CL	1.5	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 20-60 CPM
5 6	33325 0915 11-15	5 6 6	14	SOFT, DARK YELLOWISH BROWN (10YR 4/4), SANDY CLAY, SOME SILT, LOW PLASTICITY, MOIST TO WET	CS ~~SC~~ 11-15-90	0.50	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-60 CPM
7	33326 0922 11-15	6 6 12	12	SOFT, YELLOWISH BROWN (10YR 5/6), SILT-SAND-CLAY MIXTURE, LOW PLASTICITY, MOIST TO WET	CL	0.40	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-80 CPM
8 9	33327 0949 11-15	5 20 22	18	SOFT, BROWNISH YELLOW (10YR 6/8), SILTY CLAY, MEDIUM PLASTICITY, MOIST TO WET 8.8 8.8	CL	0.25	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-90 CPM
10	33328 1011 11-15	20 23 25	9	DENSE, YELLOWISH BROWN (10YR 5/6) SILT-CLAY GRAVEL MIXTURE, SOME COBBLES, SAND, WET	GC	N/A	H_{AU}: 0.0 PPM α: 0 CPM $\beta\gamma$: 40-100 CPM
11				NEXT SAMPLE WILL BE @ 15.0 FT.			
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: LONSTAR 1800

Driller: C. COULTER

ASST.: C. COULTER

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHART.

INSTRUMENT	SERIAL NUMBER	BACKGROUND READINGS
H_{AU}	A01344	0.0 PPM
α	ASI #3	0 CPM
$\beta\gamma$	ASI #10	20-100 CPM

000911

243B-3-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2560	COORDINATES:		DATE: 11-16-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11-15-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 11-16-90
DRILLING METHODS: CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	REMARKS
15	33329 0855 11-16-90	50/5IN	4	SHALE, GRAY (2.5Y 5/0), SOFT, ASSUMED MASSIVE, MODERATELY SEVERE WEATHERING, DRY	N/A	N/A	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40-60 cpm
16							
17				*BEDROCK ENCOUNTERED HERE, OUTCROP SHALLOW.			
18							
19	33330 1020 11-16	50/3IN	3	SHALE, GRAY (2.5Y 5/0), AVERAGE HARDNESS, ASSUMED MASSIVE, SLIGHT WEATHERING. DRY	M/K	N/A	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 40-80 cpm
20				BOTTOM OF BORING = 20.0 FT.			

NOTES:

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: LOADSTAR 1800

Driller: C. COULTER

ASST.: C. COULTER

BACKGROUND

H_{nu} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 40-80 cpm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 3.2.1
BORING NO. 2560
PIEZOMETER NO. 2560

FIELD ENG./GEO. M. SWANSON DATE 11-16-90
CHECKED BY E. Trollinger DATE 12-1-90
DATE OF INSTALLATION 11-16-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 20.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 20.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 10 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

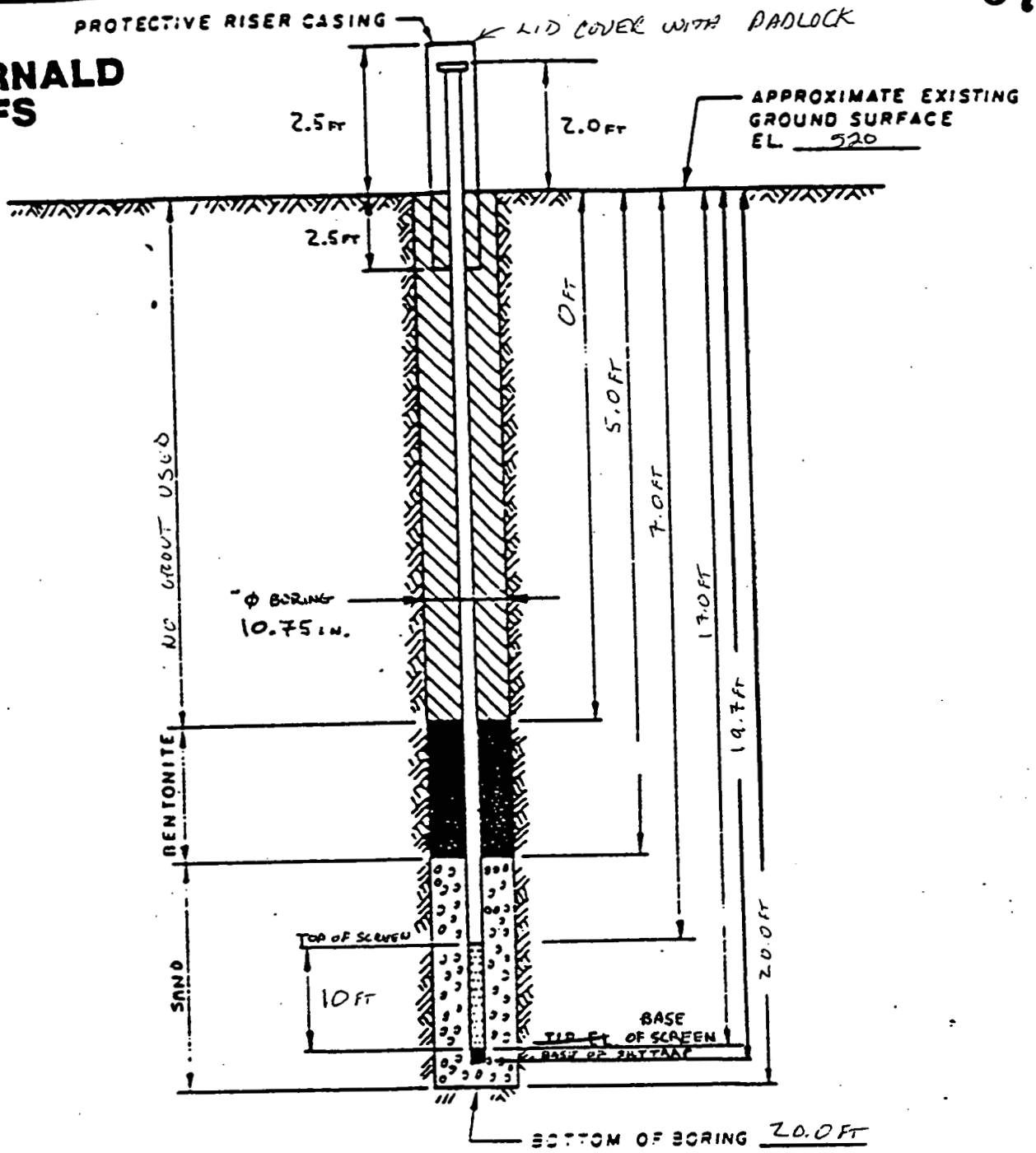
RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.)	
TOP OF RISER PIPE	+ 2.0		522.5	
GROUND SURFACE	0.0		520.5	
BOTTOM OF PROTECTIVE PIPE	- 2.5		518.0	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 0 FT	BOTTOM 5 FT	TOP 520.5	BOTTOM 515.5
SAND	TOP 5 FT	BOTTOM 20 FT	TOP 515.5	BOTTOM 510.5
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 7 FT	BOTTOM 17 FT	TOP 513.5	BOTTOM 503.5
PIEZOMETER TIP	19.7 FT		500.8	
BOTTOM OF BOREHOLE	20.0 FT		510.5	
GWL AFTER INSTALLATION	18.6 FT		VARIABLE	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS ONE (1) BUCKET BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY | APPROVED BY

DRAWN BY MBG 11-16-90

NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 18.6 FT BELOW GROUND
5. WATER LEVEL READING ON 11-19-90

MATERIALS USED DURING WELL INSTALLATION:

7 80 LB. BAGS OF 10/20 SAND
~~6~~ 50 LB. BAGS OF VOLCLAY GROUT
3 5 GAL. BUCKETS OF BENTONITE PELLETS
150 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-1.0 FT SCREEN W/ 2.7 FT WELDED SILTTRAP, 1-5 FT, 2-2 FT RISER PIPE

INSTALLATION DETAILS
MONITORING WELL #2560

PREPARED FOR
FERNALD RI/FS

FERNALD
RI/FS

	Field Check	1st Key In	2nd Key In	Final QC Verification
Date	1/8/91			
Initial	S.T.			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2561	COORDINATES:	DATE: 1-04-91
ELEVATION:	GWL: Depth 14.8 ft Date/Time 1-05-91 @ 1600	DATE STARTED: 1-04-91
ENGINEER/GEOLOGIST: M. SWANSON	Depth 14.3 ft Date/Time 1-08-91 @ 0900	DATE COMPLETED: 1-07-91
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33377 0910 1-04-91	3 3 3	18	VERY SOFT, VERY DARK GRAY (10YR 3/1), ORGANIC SILT, TRACE OF CLAY, SLIGHTLY MOIST 0.6	OL	N/A	HNU = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
1				VERY SOFT, DARK YELLOWISH BROWN (10YR 3/4), CLAYEY SILT, TRACE OF FINE SAND, DRY 1.7	ML	N/A	
2	33378 0914 1-04	2 3 3	18	VERY SOFT, VERY DARK GRAY (5Y 3/1), SAND-SILT MIXTURE, SOME CLAY, VERY LOW PLASTICITY, DRY 2.8	SM	<.25	HNU = 0.0 PPM α = 0 CPM βγ = 20-60 CPM
3	33379 0921 1-04	3 2 3	7	FIRM, DARK GRAY (10YR 4/1), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, DRY 4.5	CL	0.5	HNU = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
5	33380 0926 1-04	2 3 4	18	VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6), SILT, TRACE OF SAND, SLIGHTLY MOIST	ML	<.25	HNU = 0.0 PPM α = 0 CPM βγ = 20-40 CPM
6	33381 0933 1-04	2 3 5	18	7.3			HNU = 0.0 PPM α = 0 CPM βγ = 40 CPM
8	33382 0949 1-04	15 20 20	14	DENSE, BROWN (10YR 5/3), GRAVEL-SAND-SILT MIXTURE, SOME COBBLES, DRY 9.0	GM	N/A	HNU = 0.0 PPM α = 0 CPM βγ = 40-60 CPM
9	33383 1007 1-04	20 55 36	15	VERY DENSE, GRAYISH BROWN (10YR 5/2), WELL GRADED SANDY GRAVEL, SOME COBBLES, SILT, DRY TO MOIST 10.5	GW	N/A	HNU = 3PPM UNSATURATED α = 0 CPM βγ = 20-60 CPM
11				AQUIFER WILL BE SAMPLED EVERY 5.0 FT. STARTING AT 15.0 FT. ONCE SATURATED ZONE IS ENCOUNTERED, 15 FT. MORE WILL BE SAMPLED.			
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
HNU	1104	0.0 PPM
α	ASI 23	0 CPM
βγ	ASI 019	20-60 CPM

2438-3-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2561	COORDINATES:		DATE 1-04-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-04-91
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 1-07-91
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	REMARKS
				VERIFY AS 1-04-90			
15	33384	10		DENSE, GRAYISH BROWN (10YR 5/2), WELL-GRADED GRAVEL-SAND MIXTURE, SOME SILT, TRACE OF COBBLES, WET	GW	N/A	H_{AV}: 0.1 ppm
	1330	39	13				α: 0 cpm
16	1-04	21					$\beta\gamma$: 20-40 cpm
17							
18							
19							
20	33385	45		VERY DENSE, BROWN (10YR 5/3), WELL-GRADED GRAVELLY SAND, SOME SILT, WET	SW	N/A	H_{AV}: 0.0 ppm
	1420	39	14				α: 0 cpm
21	1-04	43					$\beta\gamma$: 40-60 cpm
22							
23							
24							
25	33386	5		DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED GRAVEL-COARSE SAND MIXTURE, SOME SILT, WET	GP	N/A	H_{AV}: 0.0 ppm
	1554	15	8				α: 0 cpm
26	1-04	18					$\beta\gamma$: 20-50 cpm
27							
28							
29							
30							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{AV} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 20-60 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC R/FS		
BORING NUMBER: 2561	COORDINATES:		DATE: 1-05-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-04-91
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 1-07-91
DRILLING METHODS: CABLE TOOLS			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GRADIENT (FT)	REMARKS
30	33387	9		MEDIUM DENSE, DARK YELLOWISH BROWN (10YR 4/6) WELL GRADED COARSE SAND, SOME GRAVEL, SILT, WET	SW	N/A	H_{AV} = 0.0 ppm
31	1050	9	11				α = 0 cpm
	1-05-91	9					$\beta\gamma$ = 30-40 cpm
32							
33							
34							
35	33388	13		DENSE, DARK YELLOWISH BROWN (10YR 4/6) POORLY GRADED COARSE SAND, SOME PEBBLES, SILT, WET.	SP	N/A	H_{AV} = 0.0 ppm
36	1140	15	8				α = 0 cpm
	1-05	16					$\beta\gamma$ = 20-40 cpm
37				BOTTOM OF BORING = 36.5 FT DRILLED, SAMPLED TO 36.5 FT			

NOTES

Drilling Contractor: PENN. DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{AV} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 20-40 cpm

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 1-05-91
PROJECT NO. 602 3.2.1
CHECKED BY E.T. DATE 1-14-91
BORING NO. 2561
PIEZOMETER NO. 2561
DATE OF INSTALLATION 1-07-91 @ 1745

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 FT TO 36.5 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0.0 FT TO 35.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 15 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4 in
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED, FLUSH JOINTED

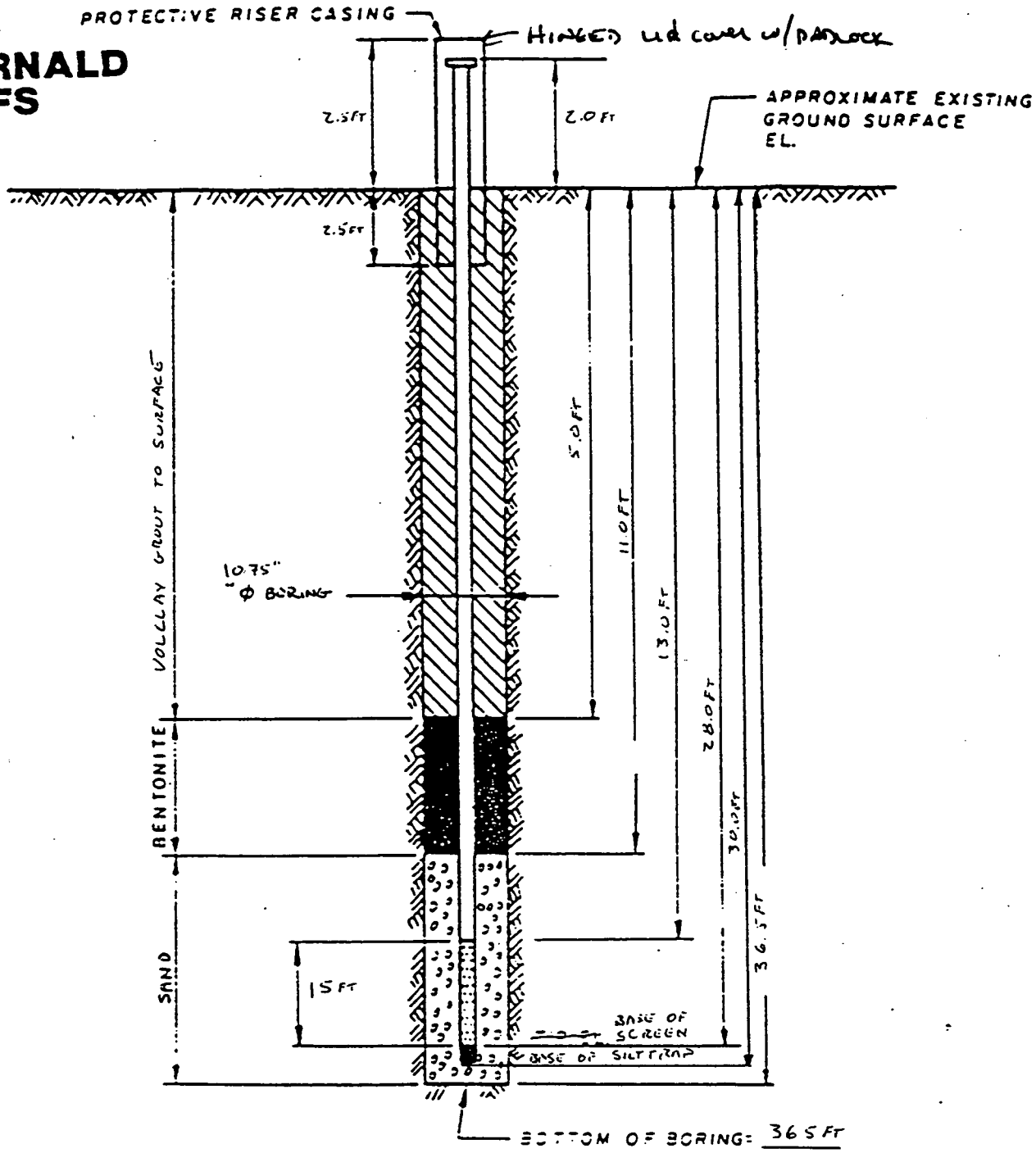
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 in
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0 FT	BOTTOM 5 FT	TOP	BOTTOM
BENTONITE	TOP 5 FT	BOTTOM 11 FT	TOP	BOTTOM
SAND	TOP 11 FT	BOTTOM 36.5 FT	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 13.0 FT	BOTTOM 28.0 FT	TOP	BOTTOM
PIEZOMETER TIP	30.0 FT			
BOTTOM OF BOREHOLE	36.5 FT			
GWL AFTER INSTALLATION	14.3 FT BELOW GROUND			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN 10 SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. w/welded SILT TRAP
4. ELEVATION OF WATER LEVEL 14.8 FT ; 14.3 FT
5. WATER LEVEL READING ON 1-05-91 ; 1-08-91

MATERIALS USED DURING WELL INSTALLATION:

15	80 LB. BAGS OF 10/20 SAND
5	50 LB. BAGS OF VOLCLAY GROUT
10	5 GALLON BUCKETS OF BENTONITE PELLETS
280	GALLONS OF WATER USED DURING DRILLING AND GROUTING PROCEDURES

SS SECTIONS: 1-15 FT SCREEN w/2 FT. WELDED SILT TRAP ; 1-10 FT SS RISER ; 1-5 FT SS RISER

INSTALLATION DETAILS
MONITORING WELL # 2561

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

DR. BY

1-07-91

FERNALD RI/FS

	Date			
	Initial	ET		
		Field Check	1st Key In	2nd Key In	Hand Copy Validation

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1562	COORDINATES	DATE 8-9-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/8/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/9/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	8-8-90 ~~0830~~			FIRST FOOT IS CONCRETE	NA	NA	Hnu = 0
JCM 8-9-90	8-8-90				NA	NA	α = 1 cpm; βγ = 800 cpm
1	~~56020~~ 8-9-90 0830	56064 5	6	medium dense 10yr 6/8 to 10yr 6/1 brownish yellow to gray clayey silt, trace gravel, dry SAMPLE FROM THIS INTERVAL SENT IN FOR FULL HSL ANALYSIS	ML	NA	
	~~56021~~ 8-9-90 0830	56065 10	6	SAA			Hnu = .5
2	~~56022~~ (VOC) & ~~56023~~ (TOTAL U) 8-9-90 0830	56066 56067 9	6	2 SEPARATE SPECIAL ANALYSES REQUIRED FOR THIS INTERVAL; LAB REQUIRES THAT EACH (VOC & TOTAL U) HAS IT'S OWN SAMPLE NUMBER SAA			α = 0; βγ = 450
	~~56024~~ 8-9-90 0830	56068 13	6	medium dense 10yr 6/8 brownish yellow clayey silt, dry			
3	~~56025~~ 8-9-90 0904	56069 15	6	dense 10yr 6/4 light yellowish brown clayey silt, dry	ML	NA	Hnu = 0
	~~56026~~ 8-9-90 0904	56070 18	6	dense 10yr 6/4 to 10yr 5/4 light yellowish brown to yellowish brown (intermixed) clayey silt, dry			α = 0; βγ = 400 cpm
4	~~56027~~ 8-9-90 0904	56071 27	6	dense 10yr 5/4 ~~light y~~ JCM 8-9-90 yellowish brown clayey silt, dry			
	~~56028~~ 8-9-90 0939	56072 8	6	medium dense 10yr 5/6 to 10yr 5/1 yellowish brown to gray (intermixed) clayey silt, dry	ML	NA	Hnu = 0
5	~~56029~~ 8-9-90 0939	56073 11	6	SAA			α = 0; βγ = 400 cpm
	~~56030~~ 8-9-90 0939	56074 13	5	SAA			
6	~~56031~~ 8-9-90 0952	56075 8	6	medium dense 10yr 4/6 to 10yr 5/1 dark yellowish brown to gray (intermixed) clayey silt, dry	ML	NA	Hnu = 0
	~~56032~~ 8-9-90 0952	56076 10	6	medium dense 10yr 4/6 to 10yr 5/1 dark yellowish brown to gray (intermixed); 75% gray, 25% (d.y.b.) clayey silt, dry	ML		α = 0; βγ = 300 cpm
7	~~56033~~ 8-9-90 0952	56077 13	6	medium dense 10yr 5/1 gray clayey silt, dry	ML		

NOTES: CONTRACTOR: PENNDRILL
DRILLER: JOE BARILE
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 400 cpm

Hnu: SN A0 1345
α: ASI # 6
βγ: ASI # 11

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1562	COORDINATES	DATE 8-9-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8/8/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED: 8/9/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	~~56034~~ 8-9-90 1005	56078 4	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, dry	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56035~~ 8-9-90 1005	56079 7	6	SAA			
	~~56036~~ 8-9-90 1005	56080 9	6	SAA			
9	~~56037~~ 8-9-90 1020	56081 5	6	medium dense, 10yr 5/1 gray clayey silt, trace gravel, dry	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56038~~ 8-9-90 1020	56082 6	6	SAA			
10	~~56039~~ 8-9-90 1020	56083 10	6	SAA			
11	~~56040~~ 8-9-90 1049	56084 5	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, dry	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56041~~ 8-9-90 1049	56085 10	6	SAA	ML	NA	
	~~56042~~ 8-9-90 1049	56086 18	0	NR	NA	NA	
12	~~56043~~ 8-9-90 1055	56087 13	5	medium dense 10yr 5/1 gray clayey silt, trace gravel, dry	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56044~~ 8-9-90 1055	56088 21	0	NR	NA	NA	
13	~~56045~~ 8-9-90 1055	56089 21	0	NR	NA	NA	
14	~~56046~~ 8-9-90 1110	56090 5	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56047~~ 8-9-90 1110	56091 8	6	SAA			
	~~56048~~ 8-9-90 1110	56092 13	6	SAA			

SAMPLE NUMBER CORRECT. 8-14-90

NOTES: CONTRACTOR: PENNDRILL
DRILLER: JOE BARILE
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN A0 1345
α: ASI # 6
βγ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 400 cpm

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1562	COORDINATES	DATE 8-9-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8/8/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/9/90	
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	~~56049~~ 8-9-90 1120	56093 9	6	medium dense 10yr 5/1 clayey silt, trace gravel, moist	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	~~56050~~ 8-9-90 1120	56094 11/13	6	SAA	ML	NA	
16				DRILLING/SAMPLING STOPPED AT 16 FT.; BORING FILLED WITH BENTONITE AND PLUGGED WITH CEMENT. 7 BUCKETS BENTONITE, 5 GALLONS WATER, 1/2 BAG CEMENT			
17							Hnu = α = βγ =
18							Hnu = α = βγ =
19							
20							Hnu = α = βγ =
							Hnu = α = βγ =

SAMPLE NUMBER CORRECTIONS 20E 4-90 BA

NOTES: CONTRACTOR: PENNDRILL
DRILLER: JOE BARILE
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN AO 1345
α: ASI # 6
βγ: ASI # 11

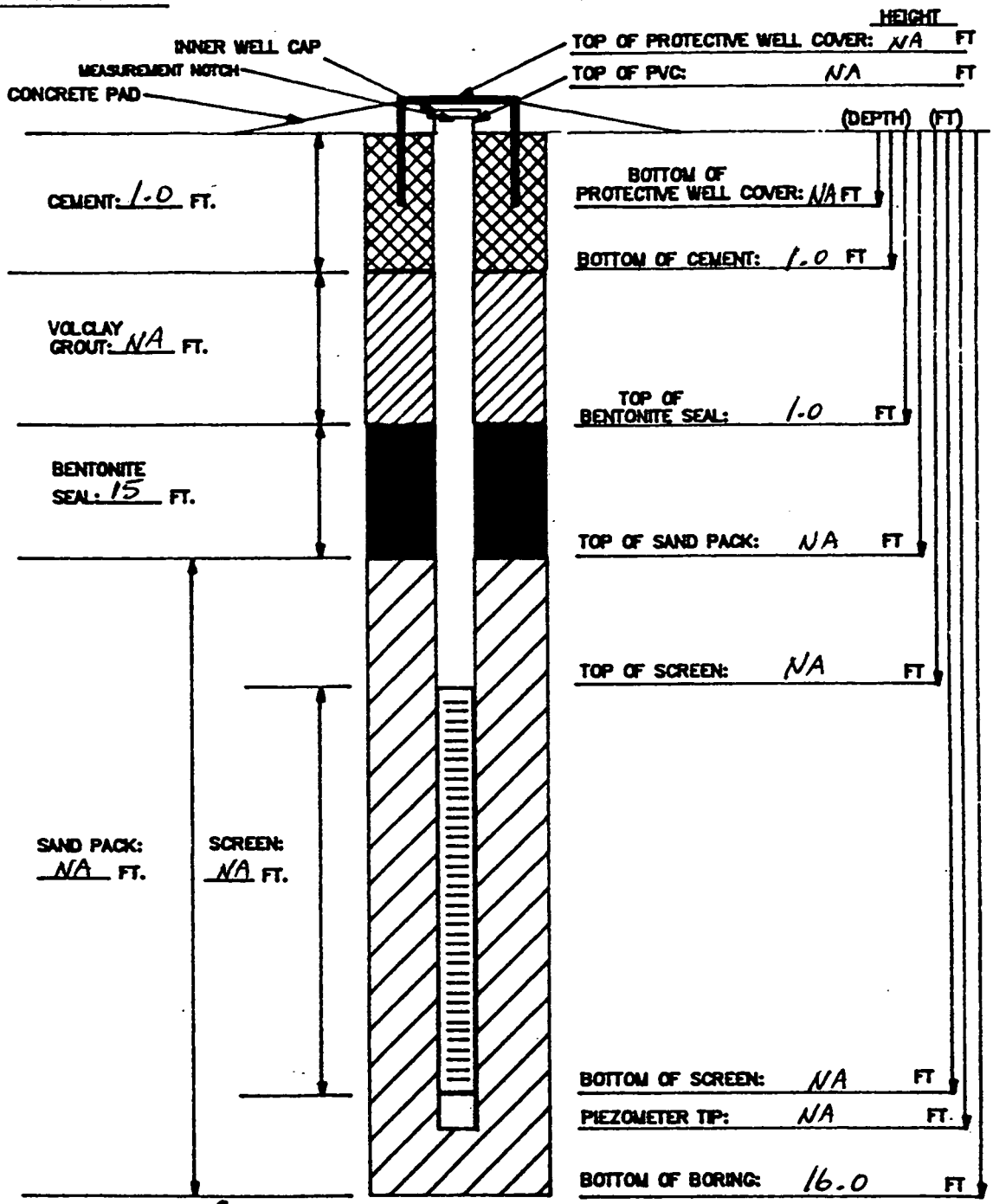
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 400 cpm

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1562

PLUGGING ~~INSTALLATION~~ DATE: 8-9-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA

NOTES:
1) [illegible]ER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602 3.7 GEOLOGIST/ENGINEER: J MASON, M GARMAN

FERNALD RI/FS

PIEZOMETER ~~INSTALLATION~~ PLUGGING SHEET

PROJECT NAME FMPC RI\FS FIELD ENG./GEO. J. MASON DATE 8-9-90
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 8-23-90
BORING NO. 1562
PIEZOMETER NO. ~~1567~~ NA ~~KG-8-9-90~~ DATE OF ~~INSTALLATION~~ PLUGGING 8-9-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE ~~FROM~~ ~~TO~~	SIZE NONE ~~FROM~~ ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~	SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 16.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS BORING FOR SOILS INVESTIGATION PURPOSES ONLY - NO PIEZOMETER INSTALLED. BORING FILLED WITH BENTONITE AND PLUGGED WITH CEMENT.

4C9-11-86

RI/FS

TRAILER Dec. 90

VISUAL CLASSIFICATION OF SOILS

Date	12/15/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1563	COORDINATES N480839.67, E1381720.59	DATE 11-28-90	
ELEVATION: 580.62	GWL: Depth Date/Time	DATE STARTED 11/28/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 11/30/90	
DRILLING METHODS Auger Drilling 8 in HSA		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (N.R. - No Recovery; SAA - Same as above; 0.0 - 1.0ft is concrete)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56337 0920 11-29-90	12	6	Dense, dark yellowish brown to Gray (10yr, 4/4 to 10yr 5/1) silty sand, poorly graded silty sand some gravel, moist	SM	NA	Hnu = 0
	56338 0920 11-29-90	15	6	very stiff, dark yellowish brown to gray (10yr, 4/4 to 10yr 5/1) clayey silt trace sand & gravel moist	ML	2.25	α = 0 βγ = 800 cpm
2	56339 — VOC 56340 — TOTAL U 0920 11-29-90	17	6	SAA e	ML	2.5	
	56341 1345 11-29-90	18	6	Hard, dark yellowish brown (10yr, 4/4) Silty Clay Trace gravel low plasticity, slightly moist.	CL	4.5	Hnu = 0
3	56342 1345 11-29-90	27	6	S.A.A.	CL	4.5	α = 0 βγ = 1200 cpm
	56343 1345 11-29-90	40	6	S.A.A.	CL	4.5	
4	56344 1425 11-29-90	17	6	Hard E.T. 12-13-90 N.R.	NA	NA	Hnu = 0
	56345 1425 11-29-90	36	6	Hard, grayish brown (2.5y, 5/2) silty clay Trace gravel, low plasticity, slightly moist	CL E.T.	4.5	α = 0 βγ = 1000 cpm
5	56346 1425 11-29-90	50	6	S.A.A. 12-13-90	E.T. CL	4.5	
	56347 1500 11-29-90	18	6	Hard, dark grayish brown to light olive brown silty clay Trace gravel low plasticity, slightly moist. (10yr, 4/2 to 2.5y, 5/2)	CL	4.6	Hnu = 0
6	56348 1500 11-29-90	28	6	Hard gray (2.5y, 5/) silty clay Trace gravel low plasticity, moist.	CL	4.6	α = 0 βγ = 800 - 1000 cpm
	56349 1500 11-29-90	34	6	S.A.A.	CL	4.75	
7	56350 1520 11-29-90	10	0	N.R.	NA	NA	Hnu =
	56351 1520 11-29-90	14	0	N.R.	NA	NA	α = NA βγ =
8	56352 1520 11-29-90	16	0	N.R	NA	NA	

NOTES: CONTRACTOR: Penn Drilling
DRILLER: B. Yost
ASSISTANT: B. Strappazzon

Hnu: 0
α: 0
βγ: 800 - 1200 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 800 - 1200 cpm

402-11-88

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1563	COORDINATES	DATE	11/29/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	11/29/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED	11/30/90
DRILLING METHODS Auger Drilling		PAGE	2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Sample No. 56368 - TCLP " " 56369 - Total U. IT " " 56370 - Total U. WMCD			
9	56353 1535 11-29-90	18	6	Stiff, grayish brown (2.5Y, 5/2) silty clay m Trace gravel, med plasticity, moist.	CL	1.85	Hnu = 0 α = 0
	56354 1535 11-29-90	17	6	S.A.A.	CL	1.75	βγ = 800-1200 cpm
10	56355 1535 11-29-90	23	6	S.A.A.	CL	1.85	
	56356 0900 11-30-90	8	6	Sft. V. Stiff, grayish brown (2.5Y, 5/2) silty clay, some gravel, med plasticity, moist	CL	3.0	Hnu = 0 ppm α = 0
11	56357 0900 11-30-90	12	6	S.A.A	CL	2.75	βγ = 800-1200 cpm
	56358 0900 11-30-90	24	0	NR	NA	NA	
12	56359 0915 11-30-90	18	0	NR	NA	NA	Hnu = 0 ppm α = 0
	56360 0915 11-30-90	24	0	NR	NA	NA	βγ = 800-1200 cpm
13	56361 0915 11-30-90	28	6	V. Stiff, grayish brown (2.5Y, 5/2) silty clay some gravel, med plasticity, moist	CL	3.25	
	56362 0945 11-30-90	21	6	S.A.A with cobbles	CL	3.0	Hnu = 0 α = 0
14	56363 0945 11-30-90	28	6	S.A.A.	CL	2.75	βγ = 800-1200 cpm
	56364 0945 11-30-90	30	6	S.A.A.	CL	2.75	
15	56365 1000 11-30-90	12	6	SAA	CL	2.8	Hnu = 0 α = 0
	56366 1000 11-30-90	24	6	SAA	CL	3.25	βγ = 800-1200 cpm
16	56367 1000 11-30-90	28	6	very stiff, grayish brown (2.5Y, 5/2) silty clay, some gravel. Trace fine sand med plasticity moist	CL	3.25	

NOTES: CONTRACTOR: Penn Drilling
DRILLER: B. Yost
ASSISTANT: B. Strappazzon

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 800-1200 cpm

Hnu: 0
α: 0
βγ: 800-1200 cpm IT

402

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear
DATE 11-30-90
PROJECT NO. 602.3.7
CHECKED BY E. Trommer
DATE 12-15-90
BORING NO. 1563
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging 11-30-90

BOREHOLE DRILLING

DRILLING METHOD Auger drilling	TYPE OF BIT 6in Hollow Stem
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA		~~580.62~~ ET 12-13-90 NA	
GROUND SURFACE	0.0		580.62	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
Valcay GROUT/SLURRY	TOP 1.5	BOTTOM 16.0	TOP 579.12	BOTTOM 564.62
BENTONITE JL 11-30-90	TOP 1.0	BOTTOM 1.5	TOP 579.62	BOTTOM 579.12
~~SAND~~ cement	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
~~GRAVEL~~ JL 11-30-90	TOP 0.0	BOTTOM 1.0	TOP 580.62	BOTTOM 579.62
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	16.0 FT.		564.62	
GWL AFTER INSTALLATION	NA		NA	

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000927

5711

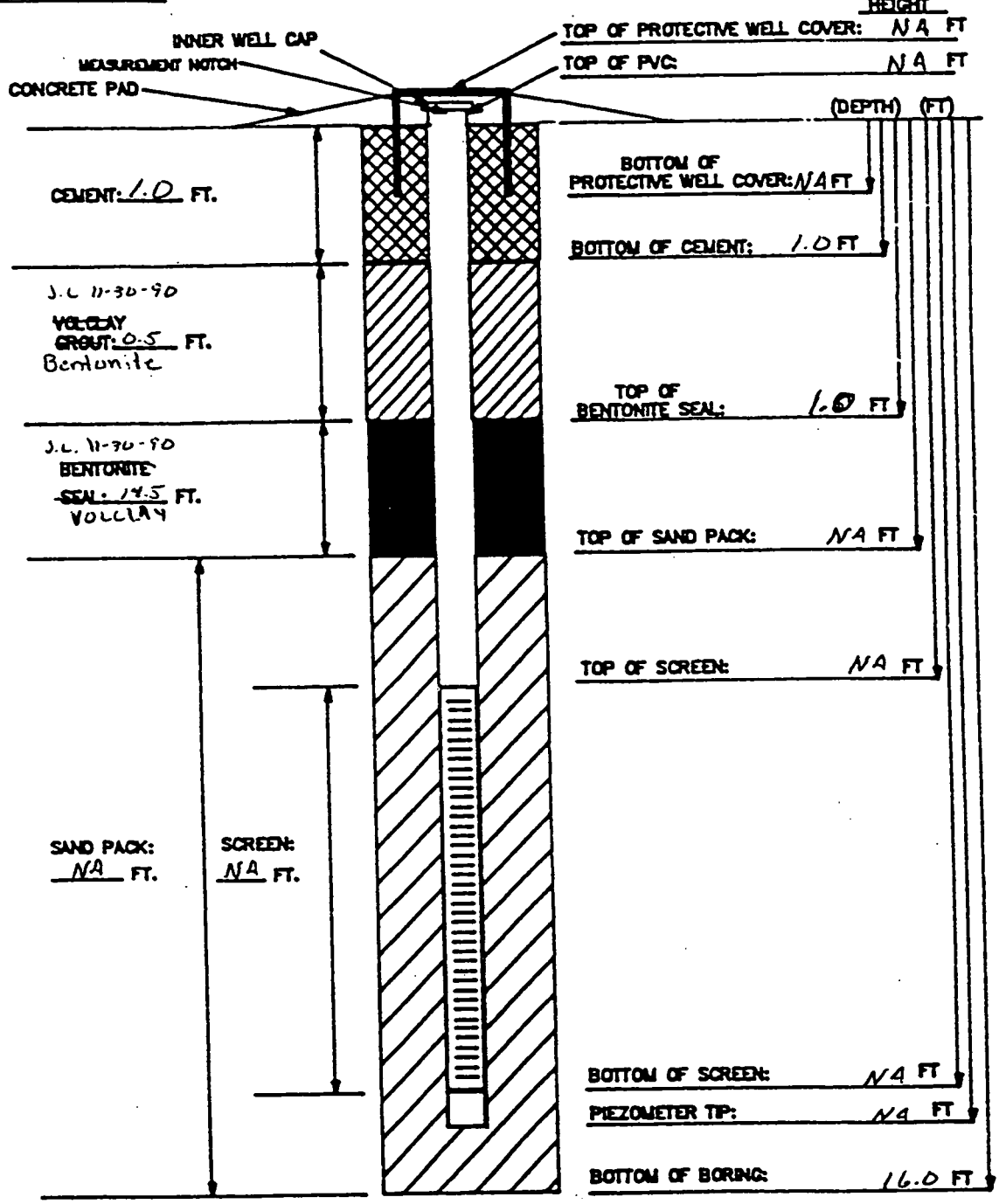
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. plugged 1563

J.L. 11-30-90

~~INSTALLATION~~ DATE: 11-30-90 Plugging



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF PVC:	NA FT	
BOTTOM OF PROTECTIVE WELL COVER:	NA FT	
BOTTOM OF CEMENT:	1.0 FT	
TOP OF BENTONITE SEAL:	1.0 FT	
TOP OF SAND PACK:	NA FT	
TOP OF SCREEN:	NA FT	
BOTTOM OF SCREEN:	NA FT	
PIEZOMETER TIP:	NA FT	
BOTTOM OF BORING:	16.0 FT	

BOREHOLE DIAMETER: 6.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Leas

RECORD OF BORING NO. PWT-3

1564

Client: NLO

Page 1 of 1

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Recovery (in.)
574.2	0						
		Gray to brown clayey silt; moist, very soft to medium stiff	1 2	0.0-1.5 2.5-4.0	SS SS	1-3-7 6-6-9	16 18
		(Becomes mottled brown at 2.5')					
		(Grades to a light brown to tan silty clay at 5.0')	3 4	5.0-7.5 7.5-9.0	SS SS	7-12-16 11-12-13	18 18
		(0.2' of gray silty, sandy, clay seam at 9.0-9.2')					
563.2	11.0						
		Brown fine sand; wet, medium dense	5	10.0-11.5	SS	8-12-15	18
		(Wet zone at 11.0')					
562.9	11.3						
		Brown silty sandy clay with much silt; moist, stiff					
		(Grades to a brown sandy silt at 13.0')					
560.7	13.5						
		Brown to gray medium sand with silt and gravel; wet, medium dense	6	12.5-14.0	SS	8-10-11	12
559.2	15.0						
		Gray to brown sandy, silty clay; wet, stiff	7	15.0-16.5	SS	10-12-13	17
		(0.1' of brown fine sand with gravel present at 15.2-15.3')					
557.2	17.0						
		Boring terminated at 17.0'					
		2.0" PVC casing set to 17.0', screened between 12.0-17.0'					

Dates Drilled: 7/2/85

Driller: W. Moore

Water Depth: Initial: _____

1 Days after Completion: 3.56'

_____ Days after Completion: _____

Drilling Method: Hollow Stem Auger

Boring Location: S. 4335
E. 3635

000929

SOIL & MATERIAL ENGINEERS, INC.
Cincinnati, Ohio

FERNALD RI/FS

S.E. CORNER OF PLANT 9

	Date	8/29/90			
	Initial	E.J.			
		Field Check	1st Ker'ln	2nd Ker'ln	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1565	COORDINATES.	DATE 8-14-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8/13/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/14/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	8-13-90 1424	NA	NA	FIRST FOOT IS CONCRETE	NA	NA	Hnu = 0
	8-13-90 1424	NA	NA				α = 0
							βγ = 500 cpm
	56100 8-14-90 0838	4	6	dense 10yr 6/4 light yellowish brown clayey silt, some gravel, dry	ML	NA	
2	56101 8-14-90 0838	15	6	SAA			Hnu = 0
	56102 8-14-90 0838	16	6	dense 10yr 6/4 light yellowish brown clayey silt, trace gravel, dry			α = 0
							βγ = 400 cpm
3	56103 8-14-90 0838	27	6	SAA			
4	56104 8-14-90 1005	17	6	very dense, 80% 10yr 5/8 yellowish brown, 20% 10yr 7/1 light gray, clayey silt, trace gravel, dry; colors are intermixed	ML	NA	Hnu = 0
	56105 8-14-90 1005	69	6	SAA			α = 0
							βγ = 300 cpm
	56106 8-14-90 1005	72	6	SAA			
5	56107 8-14-90 1017	33	6	very dense 90% 10yr 5/8 yellowish brown, 10% 10yr 7/1 light gray, clayey silt, dry; (colors are intermixed)	ML	NA	Hnu = 0
	56108 8-14-90 1017	23	6	very dense 90% 10yr 5/8 yellowish brown, 10% 10yr 7/1 light gray, clayey silt, trace gravel, dry; (colors are intermixed)			α = 0
							βγ = 250 cpm
6	56109 8-14-90 1017	53	6	SAA			
7	56110 8-14-90 1417	15	6	dense 10yr 4/6 (60%) to 10yr 5/1 (40%) dark yellowish brown to gray clayey silt, trace gravel, dry (colors intermixed)	ML	NA	Hnu = 0
	56111 8-14-90 1417	18	6	dense 10yr 4/6 (50%) to 10yr 5/1 (50%) dark yellowish brown to gray clayey silt, trace gravel, dry (colors intermixed)			α = 0
							βγ = 250 cpm
	56112 8-14-90 1417	17	6	dense 10yr 4/6 (30%) to 10yr 5/1 (70%) dark yellowish brown to gray clayey silt, trace gravel, dry (colors intermixed)			

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZUK

Hnu: AO 1345
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm, α: 0 cpm, βγ: 500 cpm } READINGS TAKEN ON PLASTIC SURFACE WHERE SPOONS ARE PLACED

602-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1565	COORDINATES.		DATE 8-14-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 8/13/90
ENGINEER/GEOLOGIST J. MASON	Depth	Date/Time	DATE COMPLETED 8/14/90
DRILLING METHODS CME 45 AUGER			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56113 8-14-90 1422	25	6	dense 10yr 5/1 gray clayey silt, trace gravel, dry	ML	NA	Hnu = 0
	56114 8-14-90 1422	25	4	SAA	ML	NA	α = 0
	56115 8-14-90 1422	17	0	NR	NA	NA	βγ = 300 cpm
9	56116 8-14-90 1429	19	6	very stiff 10yr 5/1 silty clay (gray), trace gravel, dry, low plasticity	CL	2.5	Hnu = 0
	56117 8-14-90 1429	23	6	SAA	CL	2.0	α = 0
10	56118 8-14-90 1429	19	6	stiff, 10yr 5/1 gray silty clay, trace gravel, dry, low plasticity	CL	1.75	βγ = 200 cpm
	56119 8-14-90 1449	5	6	very stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, low plasticity	CL	2.0	Hnu = 0
11	56120 8-14-90 1449	5	3	SAA	CL	2.0	α = 0
	56121 8-14-90 1449	10	0	NR	NA	NA	βγ = 200 cpm
12	56122 8-14-90 1510	13	0	NO RECOVERY AFTER 2 ATTEMPTS	NA	NA	Hnu = NA
	56123 8-14-90 1510	11	0	~~SAA~~ NR JM 8-14-90	NA	NA	α = NA
13	56124 8-14-90 1510	17	0	~~SAA~~ NR JM 8-14-90	NA	NA	βγ = NA
14	56125 8-14-90 1520	20	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, low to medium plasticity	CL	1.75	Hnu = 0
	56126 8-14-90 1520	20	6	SAA	CL	1.5	α = 0
	56127 8-14-90 1520	17	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, medium plasticity	CL	1.0	βγ = 200 cpm

NOTES: CONTRACTOR: PENN DRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: Ao 1345
α: AS1 #6
βγ: AS1 #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 500 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1565	COORDINATES	DATE 8-14-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8/13/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/14/90
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56128 8-14-90 1526	17 JCM 8-14	6	~~to~~ stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, medium plasticity	CL	1.0	Hnu = 0 α = 0 βγ = 200 cpm
	56129 8-14-90 1526	19 JCM 8-14	6	SAA	CL	1.5	
16	JCM 8-14-90 ~~1526~~			DRILLING/SAMPLING STOPPED AT 16FT.; HOLE FILLED WITH 3 BUCKETS OF			
				BENTONITE, 1/2 BAG CEMENT, 3 1/2 GALLONS OF WATER.			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: Ao 1345
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: ~~0~~ 500 cpm
JCM 8-14-90

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1565
PIEZOMETER NO. NA

FIELD ENG./GEO. J MASON DATE 8-14-90
CHECKED BY E. TROLLINGER DATE 8-23-90
DATE OF ~~INSTALLATION~~ PLUGGING ~~8-14-90~~ 8-14-90 8-14-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 16.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

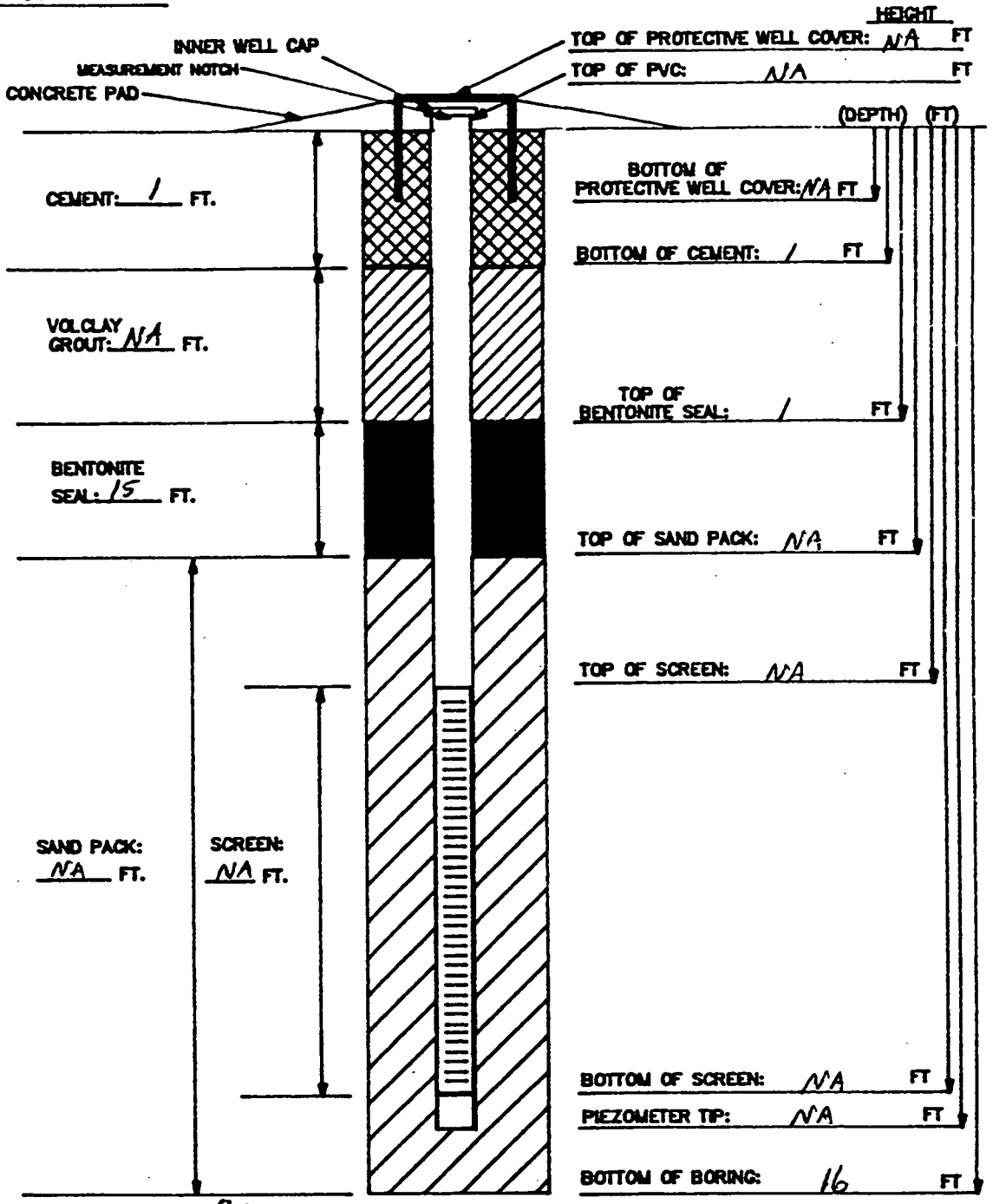
REMARKS BORING 1565 DRILLED TO DEPTH OF 16 FEET; HOLE DRY; HOLE PLUGGED WITH CEMENT (½ BAG) AFTER FILLING WITH ~~3½ BAGS BENTONITE~~ 3 BUCKETS BENTONITE (AS PER SPECIAL PROVISIONS OF SI-WELL PLAN)

000933

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1565

PLUGGING INSTALLATION DATE: 8-14-90



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 3 1/2 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.37 GEOLOGIST/ENGINEER: J. MASON

on site

FERNALD RI/FS

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	8/30/90			
Initial	E.T.			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1566	COORDINATES	DATE 8 - 28 - 90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/27/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/28/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	NA 8-27-90 1515	NA	NA	FIRST FOOT IS CONCRETE.	NA	NA	Hnu = NA
	NA 8-27-90 1515	NA	NA				α =
							βγ =
	56297 8-28-90 1013	5	6	dense 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	
2	56298 8-28-90 1013	14	6	SAA			Hnu = 0
	56299 8-28-90 1013	17	6	SAA			α = 0
							βγ = 800 cpm
3	56300 8-28-90 1013	30	6	SAA			
	56301 8-28-90 1034	21	6	very dense 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56302 8-28-90 1034	43	6	SAA			α = 0
4							βγ = 500-600 cpm
	56303 8-28-90 1034	47	6	SAA			
	56304 8-28-90 1041	44	6	very dense 10yr 6/4 light yellowish brown clayey silt, some gravel, slightly moist	ML	NA	Hnu = 0
5	56305 8-28-90 1041	38	6	SAA			α = 0
							βγ = 500 cpm
	56306 8-28-90 1041	43	6	SAA			
6	56307 8-28-90 1427	9	6	medium dense 10yr 5/1 gray to 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56308 8-28-90 1427	9	6	SAA			α = 0
7							βγ = 800 cpm
	56309 8-28-90 1427	14	5	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist			

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 1600 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1566	COORDINATES		DATE 8 - 28 - 90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 8/27/90
ENGINEER/GEOLOGIST J. MASON	Depth	Date/Time	DATE COMPLETED 8/28/90
DRILLING METHODS CME 45 AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56310 8-28-90 1431	16	0	NR AFTER 2 ATTEMPTS	NA	NA	Hnu = NA α = βγ =
	56311 8-28-90 1431	17	0				
	56312 8-28-90 1431	14	0				
9	56313 8-28-90 1437	16	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 500 cpm
	56314 8-28-90 1437	17	6	SAA			
10	56315 8-28-90 1437	15	6	SAA			
11	56316 8-28-90 1500	10	6	medium dense ~~10yr~~ 2.5y 5/4 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 600 - 700 cpm
	56317 8-28-90 1500	13	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	
	56318 8-28-90 1500	10	4	SAA	ML	NA	
12	56319 8-28-90 1505	10	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 400 cpm
	56320 8-28-90 1505	14	6	SAA			
13	56321 8-28-90 1505	16	6	SAA			
14	56322 8-28-90 1511	13	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, trace fine sand, low plasticity	CL	1.75	Hnu = 0 α = 0 βγ = 800 cpm
	56323 8-28-90 1511	17	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, low plasticity	CL	1.75	
	56324 8-28-90 1511	16	6	SAA	CL	1.75	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB KOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 1600 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1566	COORDINATES		DATE 8-28-90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 8/27/90
ENGINEER/GEOLOGIST J. MASON	Depth	Date/Time	DATE COMPLETED 8/28/90
DRILLING METHODS CME 45 AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56325 8-28-90 1516	17	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, low plasticity	CL	1.5	Hnu = α = βγ =
	56326 8-28-90 1516	20	6	SAA	CL	1.75	
16				DRILLING/SAMPLING STOPPED AT 16.0 FT. AS PER SI-WELL PLAN. BORING			
				FILLED WITH 3 BUCKETS BENTONITE, CAPPED WITH 1/2 BAG OF CEMENT. 5 GALLONS OF WATER USED. NO PIEZOMETER SET.			Hnu = α = βγ =
				SAMPLE # 56327 USED FOR TCLP SAMPLES. TIME TAKEN: 1550			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SYRAPAZZUK

Hnu: SN 1185
α: ASI # 6
βγ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 1600 cpm

000937

4G2-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J MASON DATE 8-28-90
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1566
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ PLUGGING 8-28-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ____ ~~TO~~ ____	SIZE NA ~~FROM~~ ____ ~~TO~~ ____
FLUID NA ~~FROM~~ ____ ~~TO~~ ____	SIZE NA ~~FROM~~ ____ ~~TO~~ ____

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP	BOTTOM
BENTONITE	TOP 1.0 FT	BOTTOM 16.0 FT	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0 FT			
GWL AFTER INSTALLATION	NA			

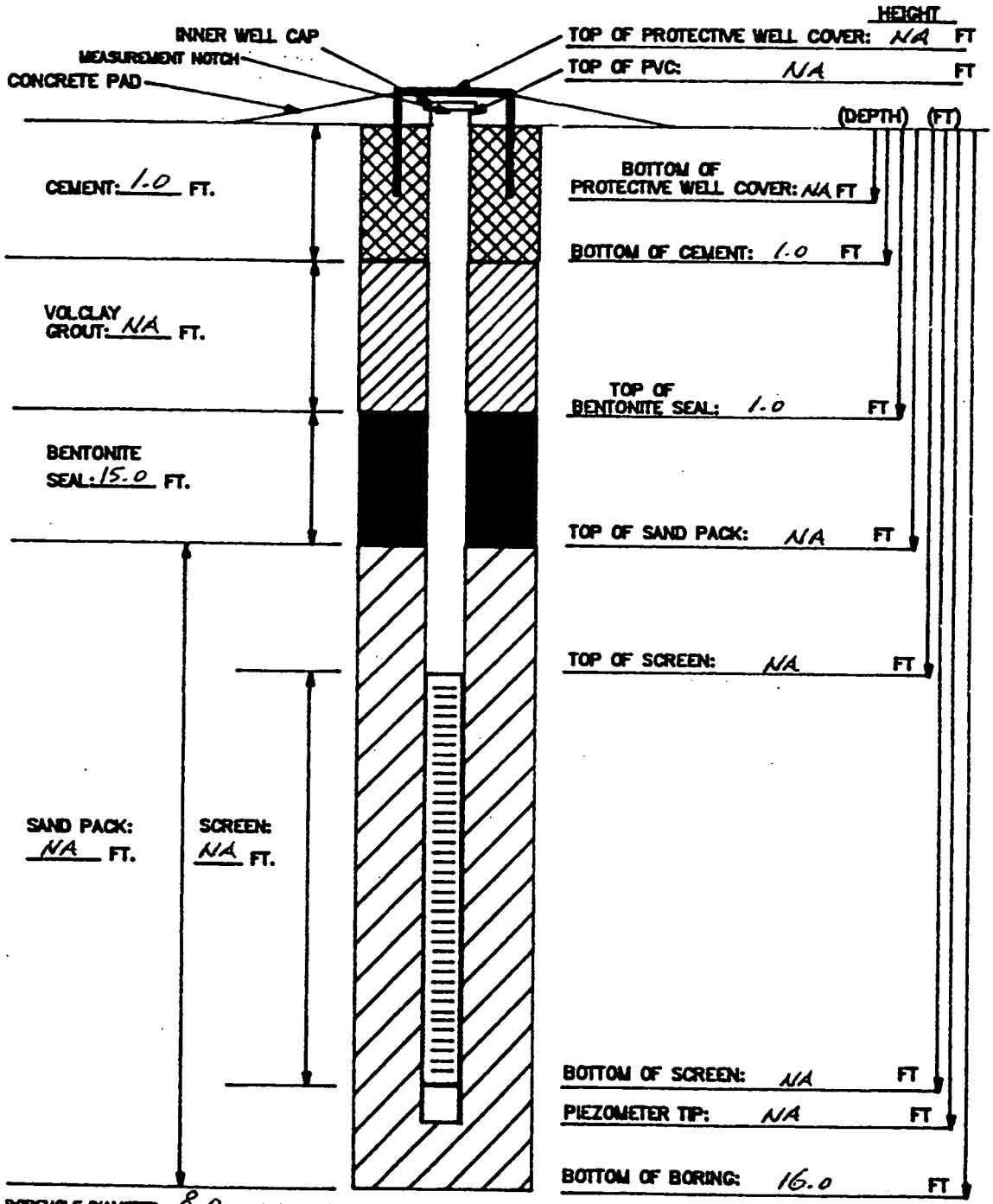
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS BORING FILLED WITH 3 BUCKETS BENTONITE, CAPPED WITH ½ BAG CEMENT. 5 GALLONS WATER USED. NO PIEZOMETER SET AS PER ST-WELL PLAN.

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1566

INSTALLATION DATE: 8-28-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	8/24/90			
Initial	E.T.			

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1567	COORDINATES	DATE 8 - 24 - 90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/24/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/24/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA 8-24-90 0919	NA	NA	FIRST FOOT IS CONCRETE	NA	NA	Hnu = NA
	NA 8-24-90 0919						α =
1	56257 8-24-90 0947	7	6	medium dense 10yr 6/6 brownish yellow clayey silt, trace gravel, slightly moist	ML	NA	βγ =
	56258 8-24-90 0947	9	6	SAA			Hnu = 0
2	56259 8-24-90 0947	12	6	medium dense 10yr 6/3 pale brown to 10yr 6/6 brownish yellow clayey silt, trace gravel, slightly moist			α = 6
	56260 8-24-90 0947	14	6	SAA			βγ = 300 cpm
3	56261 8-24-90 0952	18	6	very dense 10yr 5/1 gray with 10yr 5/8 yellowish brown intermixed clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56262 8-24-90 0952	24	6	SAA			α = 0
4	56263 8-24-90 0952	30	6	SAA			βγ = 300 cpm
	56264 8-24-90 0959	32	6	very dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
5	56265 8-24-90 0959	54	6	SAA			α = 0
	56266 8-24-90 0959	46	6	SAA			βγ = 350 cpm
6	56267 8-24-90 1118	9	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56268 8-24-90 1118	12	6	SAA			α = 0
7	56269 8-24-90 1118	15	6	SAA			βγ = 380 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 300 - 340 cpm

Hnu: SN 1185
α: AGI #6
βγ: AGI #11

SAA = SAME AS ABOVE
NR = NO RECOVERY

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1567	COORDINATES	DATE 8 - 24 - 90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8 /24/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8 /24/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56270 8-24-90 1124	7	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 350 cpm
	56271 8-24-90 1124	18	6	SAA			
	56272 8-24-90 1124	20	6	SAA			
9	56273 8-24-90 1128	17	6	stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, low to medium plasticity	CL	1.5	Hnu = 0 α = 0 βγ = 300 cpm
	56274 8-24-90 1128	19	6	SAA	CL	1.75	
10	56275 8-24-90 1128	23	6	SAA	CL	1.5	
11	56276 8-24-90 1329	4	6	medium dense 10yr 5/3 brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 250
	56277 8-24-90 1329	7	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	
	56278 8-24-90 1329	9	0	NR	NA	NA	
12	56279 8-24-90 1334	20	0	NR AFTER 2 ATTEMPTS	NA	NA	Hnu = NA α = βγ =
	56280 8-24-90 1334	23	0				
13	56281 8-24-90 1334	26	0				
14	56282 8-24-90 1340	18	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	56283 8-24-90 1340	16	6	SAA			
	56284 8-24-90 1340	18	6	SAA			

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SZRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 300 - 340 cpm

Hnu: SN 1185
α: ASI #6
βγ: ASI #11

000941

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1567	COORDINATES	DATE 8-24-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/24/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/24/90
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56285 8-24-90 1345	15	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 320 cpm
	56286 8-24-90 1345	17	6	dense 10yr 5/1 gray clayey silt, trace gravel, trace 10yr 5/3 brown sand (sand is wet) overall sample is slightly moist	ML	NA	
16				DRILLING/SAMPLING STOPPED AT 16.0 FT. AS PER SI-WELL PLAN. HOLE			
				FILLED WITH 2 BUCKET(S) BENTONITE AND CAPPED WITH 1/2 BAG CEMENT. 5 GALLONS OF WATER USED.			Hnu = α = βγ =
				A 56287 sample # FOR TCLP			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 300-340 cpm

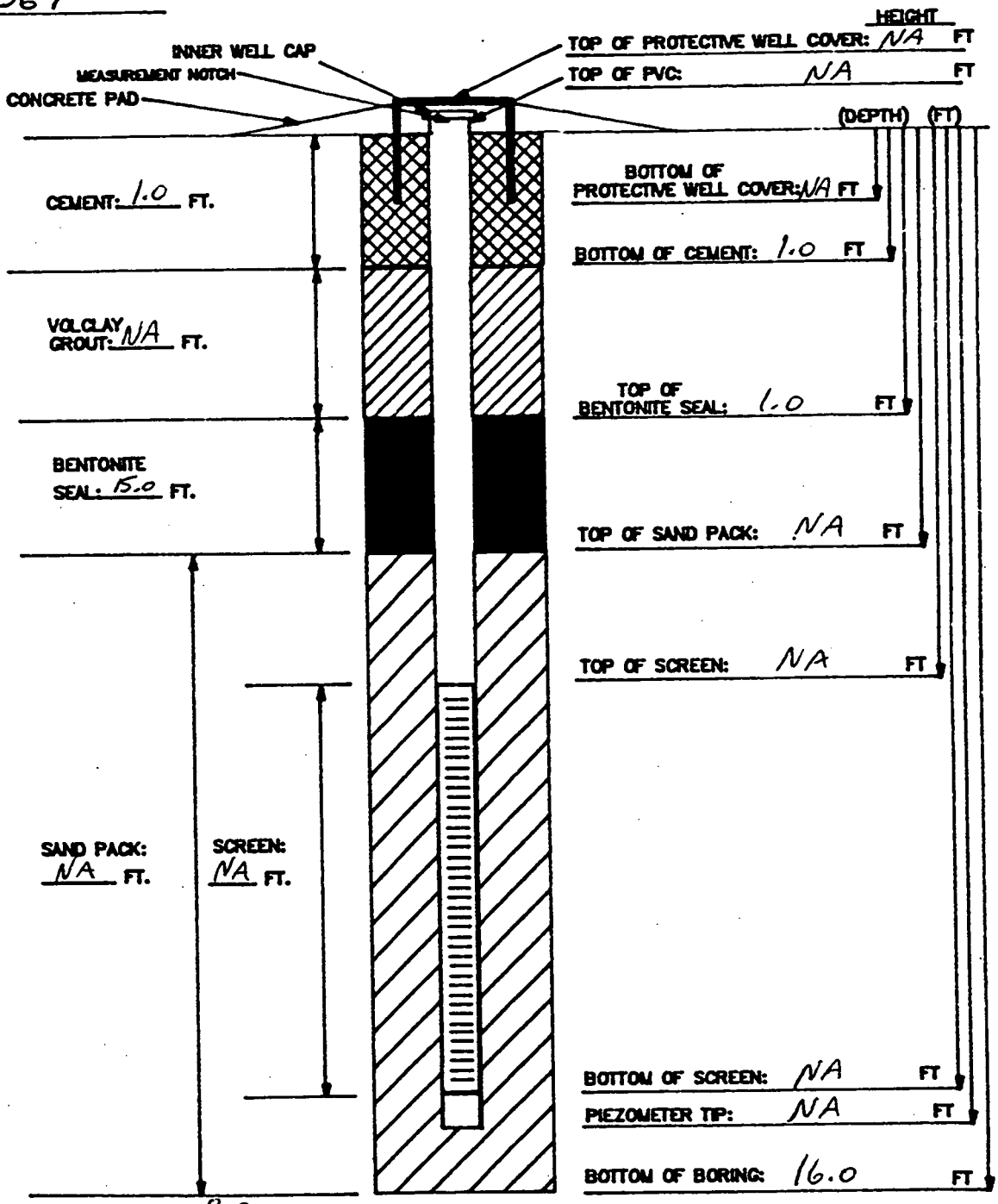
Hnu: SN 1185
α: AS1 #6
βγ: AS1 #11

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1567

INSTALLATION DATE: 8-24-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME EMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1567
PIEZOMETER NO. NA

FIELD ENG./GEO. J MASON DATE 8-24-90
CHECKED BY E. Trollinger DATE 8-25-90
DATE OF ~~INSTALLATION~~ PLUGGING 8-24-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP	BOTTOM
BENTONITE	TOP 1.0 FT	BOTTOM 16.0 FT	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0 FT			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS HOLE FILLED WITH 2 BUCKETS BENTONITE AND CAPPED WITH 1/2 BAG CEMENT, 5 GALLONS WATER. AS PER SI-WELL PLAN

FERNALD RI/FS

S.E. CORNER OF PLANT 9

Date	8/23/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Check

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI / FS		
BORING NUMBER 1568	COORDINATES	DATE 8-15-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/15/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/15/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA 8-15-90 1024	JCM 8-15-90 ~~6~~	NA	FIRST FOOT IS CONCRETE			Hnu = 0
	NA 8-15-90 1024	JCM 8-15-90 ~~46~~	NA				α = 0
1	56140 8-15-90 1315	JCM 8-15 (6) ~~26~~ ~~16~~	6	very dense 10yr 6/4 light yellowish brown clayey silt, some gravel, slightly moist	ML	NA	βγ = ~~1200~~ 800 cpm JCM 8-15-90
	56141 8-15-90 1315	(16) JCM 8-15 ~~7~~	6	SAA	ML	NA	Hnu = 0
2	56142 8-15-90 1315	26	6	very dense 10yr 6/4 light yellowish brown clayey silt, ~~some~~ gravel, slightly moist gravel coarse trace JCM 8-15-90	ML	NA	α = 0
	56143 8-15-90 1315	48	6	SAA	ML	NA	βγ = 1200 cpm
3	56144 8-15-90 1336	28	6	dense 10yr 6/6 brownish yellow clayey silt, some gravel, slightly moist gravel coarse	ML	NA	Hnu = 0
	56145 8-15-90 1336	25	6	SAA	ML	NA	α = 0
4	56146 8-15-90 1336	24	0	NR	NA	NA	βγ = 1000 cpm
	56147 8-15-90 1349	47	6	very dense 10yr 6/6 brownish yellow clayey gravelly silt, slightly moist; gravel is coarse to very coarse	ML	NA	Hnu = 0
5	56148 8-15-90 1349	47	6	SAA			α = 0
	56149 8-15-90 1349	28	6	SAA			βγ = 200 cpm
6	56150 8-15-90 1451	17	0	NR (AFTER 2 ATTEMPTS)	NA	NA	Hnu = NA
	56151 8-15-90 1451	16	0	NR	NA	NA	α = NA
7	56152 8-15-90 1451	18	0	NR	NA	NA	βγ = NA

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: Ao 1345
α: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 300 cpm

000945

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1568	COORDINATES	DATE 8-15-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/15/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/15/90
DRILLING METHODS CME 45		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56153 8-15-90 1500	18	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56154 8-15-90 1500	17	6	SAA			α = 0
	56155 8-15-90 1500	19	6	SAA			βγ = 100 cpm
9	56156 8-15-90 1505	12	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56157 8-15-90 1505	18	6	SAA	ML	NA	α = 0
10	56158 8-15-90 1505	18	6	dense 10yr 5/1 gray gravelly, clayey silt, slightly moist	ML	NA	βγ = 150 cpm
11	56159 8-15-90 1523	21	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56160 8-15-90 1523	15	0	NR	NA	NA	α = 0
	56161 8-15-90 1523	12	0	NR	NA	NA	βγ = 150 cpm
12	56162 8-15-90 1530	11	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56163 8-15-90 1530	17	0	NR	NA	NA	α = 0
13	56164 8-15-90 1530	15	0	NR	NA	NA	βγ = 150 cpm
14	56165 8-15-90 1535	12	6	stiff, 10yr 5/1 gray silty clay, trace gravel, slightly moist, low to medium plasticity	CL	1.75	Hnu = 0
	56166 8-15-90 1535	14	6	SAA	CL	1.5	α = 0
	56167 8-15-90 1535	17	6	SAA	CL	1.75	βγ = 100 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: Ao 1345
α: ASI # 6
βγ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 300 cpm

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1568	COORDINATES	DATE 8-15-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/15/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/15/90
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 3 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JCM 8-16-90)
	56168 8-15-90 1540	13	6	stiff, 10yr 5/1 gray silty clay, trace gravel, slightly moist, low to medium plasticity	CL	1.25	Hnu = 0 ∝ = 0 βγ = 150 cpm
	56169 8-15-90 1540	18	6	stiff, 10yr 5/1, gray, silty clay, trace gravel, slightly moist, medium plasticity	CL	1.5	
16				DRILLING/SAMPLING STOPPED AT 16 FT. BELOW SURFACE; HOLE FILLED WITH BENTONITE AND PLUGGED WITH			
				CEMENT. MATERIAL — QUANTITY; BENTONITE — 3 BUCKETS; CEMENT — 1/2 BAGS; WATER — 5 GALLONS; *NOTE: NO WATER BEARING ZONE ENCOUNTERED DURING DRILLING & SAMPLING			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: AO 1345
∝: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 300 cpm

000947

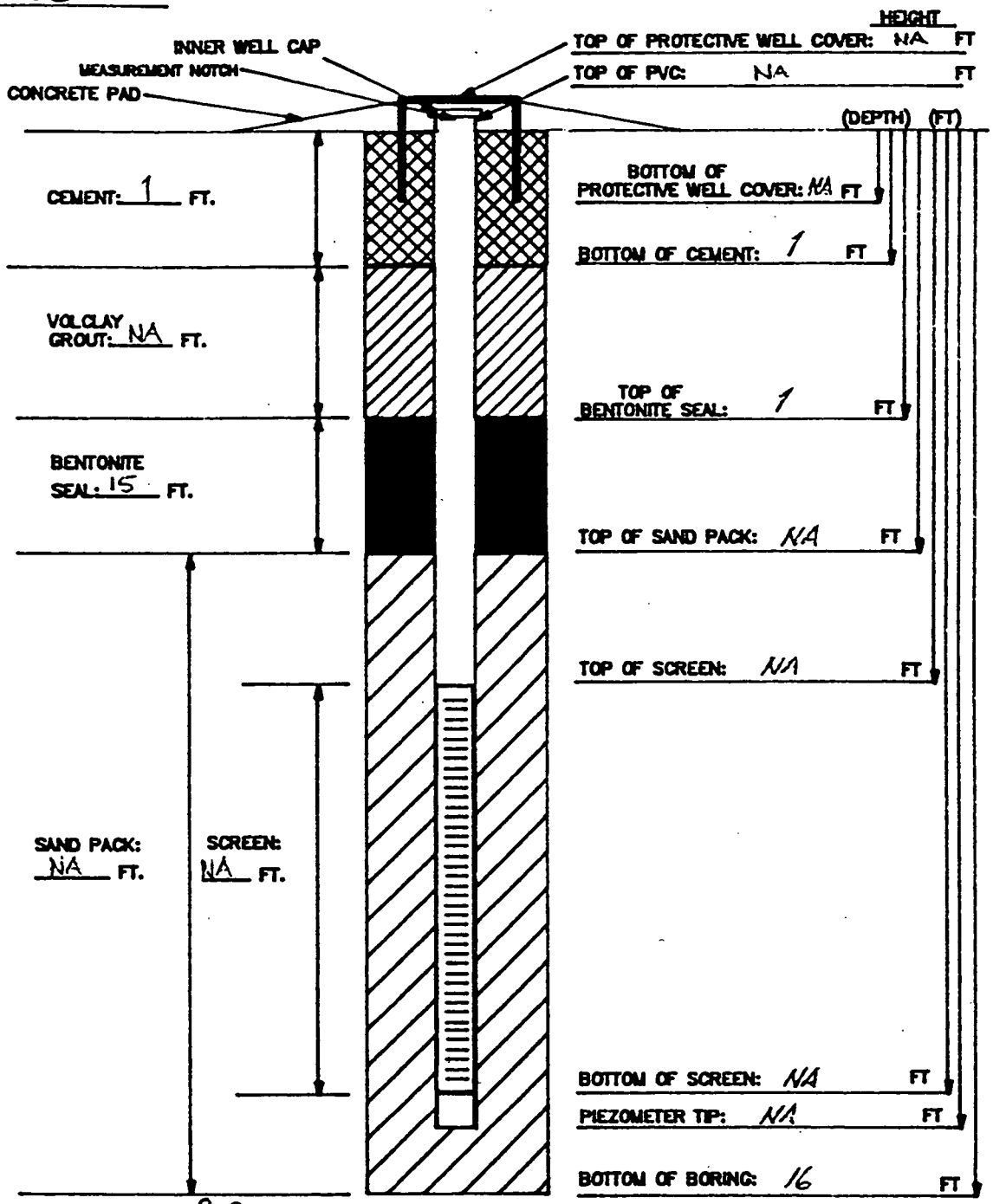
402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1568

PLUGGING ~~INSTALLATION~~ DATE: 8-15-90

571 1



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 3
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 0.5 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6OZ.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J MASON DATE 8-15-90
PROJECT NO. 602.3.7
CHECKED BY E. Trollinger DATE 8-21-90
BORING NO. 1568
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 8-15-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Hollow Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.5 BAG 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE PELLETS	TOP 3 BUCKETS ~~NA~~ 1.0 8-16-90	BOTTOM 16.0	TOP	BOTTOM
~~SAND~~ } NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ } NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0 Ft.			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS BOREHOLE FOR SAMPLING ONLY (AS PER SI-WELL PLAN); HOLE FILLED WITH BENTONITE AND PLUGGED WITH CEMENT: 3 BUCKETS BENTONITE, 1/2 BAG CEMENT, 5 GALLONS WATER

FERNALD RI/FS

S.E. CORNER PLANT 9

Date	8/23/90	5711	
Initial	ET		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1569	COORDINATES	DATE 8-21/8-22-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/21/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/22/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JCM 8-22-90)
	NA 8-21-90 1415	NA	NA	FIRST FOOT IS CONCRETE	NA	NA	Hnu = NA
	NA 8-21-90 1415	NA	NA				α =
1	56178 8-21-90 1425	4	6	very dense 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	βγ =
	56179 8-21-90 1425	12	6	SAA			Hnu = 0
2	56180 8-21-90 1425	20	6	very dense 10yr 6/4 to 10yr 5/1 light yellowish brown to gray clayey silt, trace gravel, slightly moist			α = 0
	56181 8-21-90 1425	40	6	SAA			βγ = 200 cpm
3	56182 8-21-90 1435	41	6	very dense 10yr 6/4 light yellowish brown clayey, gravelly, silt, moist	ML	NA	Hnu = 0
	56183 8-21-90 1435	38	6	SAA			α = 0
4	56183 8-21-90 1435	48	6	SAA			βγ = 250 cpm
	56184 8-21-90 1445	26	6	very dense, 10yr 5/1 gray with some 10r 5/4 weak red intermixed, clayey silt, some gravel, moist.	ML	NA	Hnu = 0
5	56185 8-21-90 1445	38	6	SAA			α = 0
	56186 8-21-90 1445	27	6	SAA			βγ = 400
6	56187 8-22-90 0944	8	6	medium dense 10yr 5/1 gray with some 10yr 5/8 yellowish brown intermixed, clayey silt, slightly moist, trace gravel	ML	NA	Hnu = 0
	56188 8-22-90 0944	7	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	α = 5 cpm
7	56189 8-22-90 0944	10	0	NR	NA	NA	βγ = 1000 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SCRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 2200 cpm

Hnu: SN AO 1345
α: ASI # 6
βγ: ASI # 11

SAA = SAME AS ABOVE NR = NO RECOVERY

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1569	COORDINATES	DATE 8-22-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/21/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/22/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 35

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JCM 8-22-90)
8	56190 8-22-90 0950	16	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56191 8-22-90 0950	20	6	dense 10yr 5/1 gray with some 10yr 5/6 yellowish brown intermixed, clayey silt, trace gravel, moist	ML	NA	α = 0
9	56192 8-22-90 0950	22	6	very loose 2.5y 7/4 pale yellow gravelly clayey silt, wet	ML	NA	βγ = 1000 cpm
	56193 8-22-90 0954	12	6	very loose 2.5y 7/4 pale yellow clayey silt, some gravel, wet	ML	NA	Hnu = 0
10	56194 8-22-90 0954	11	6	9.5-9.75 SAA medium dense 10yr 5/1 gray clayey silt, trace gravel, moist	ML ML	NA NA	α = 0 βγ = 1000 cpm
	56195 8-22-90 0954	12	6	SAA	ML	NA	
11	56196 8-22-90 0958	12	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56197 8-22-90 0958	12	6	SAA	ML	NA	α = 0 βγ = 800 cpm
12	56198 8-22-90 0958	13	0	NR	NA	NA	
	56199 8-22-90 1004	13	6	dense 10yr 5/1 gray clayey silt, trace sand (fine grained), trace gravel, moist	ML	NA	Hnu = 0
13	56200 8-22-90 1004	19	6	SAA	↓	↓	α = 0 βγ = 800 cpm
	56201 8-22-90 1004	19	6	SAA	↓	↓	
14	56202 8-22-90 1016	16	6	loose (based on visual observation) 10yr 5/1 gray clayey silt, trace fine-grained sand, trace gravel, moist	ML	NA	Hnu = 0
	56203 8-22-90 1016	19	6	dense 10yr 5/1 gray clayey silt, trace fine grained sand, trace gravel, moist	↓	↓	α = 0 βγ = 800 cpm
	56204 8-22-90 1016	25	6	SAA	↓	↓	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN A01345
α: ASI # 6
βγ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 2200 cpm

SAA = SAME AS ABOVE NR = NO RECOVERY

402-11-88

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1569	COORDINATES	DATE 8-22-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/21/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/22/90	
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 75	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JCM 8-22-90)
15	56205 8-22-90 1024	16	8-22 6 JCM	medium dense 10yr 5/1 gray clayey silt, trace fine-grained sand, trace gravel, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 800 cpm
	56206 8-22-90 1024	15	JCM 5 8-22	SAA	ML	NA	
16				DRILLING/SAMPLING STOPPED AT 16.0 FT. HOLE FILLED WITH BENTONITE AND			
				PLUGGED WITH CEMENT. 1 BUCKET BENTONITE (HOLE CAVED IN) 1/2 BAG CEMENT 5 GALLONS WATER			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN AO 1345
∝: ASI #6
βγ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 2200 cpm

SAA = SAME AS ABOVE NR = NO RECOVERY

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1569
PIEZOMETER NO. NA

FIELD ENG./GEO. J MASON DATE 8-22-90
CHECKED BY E.T. DATE 8-23-90
DATE OF ~~INSTALLATION~~ PLUGGING 8-22-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: GROUT/SLURRY/CEMENT	TOP JCM 8-22-90 ~~NA~~ 0.0 FT.	BOTTOM JCM 8-22-90 ~~NA~~ 1.0 FT.	TOP	BOTTOM
BENTONITE	TOP 1.0 FT.	BOTTOM 6.0 FT.	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0 FT			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS NO PIEZOMETER SET AS PER SI-WELL PLAN; BORING TO BE PLUGGED WITH BENTONITE AND CAPPED WITH CEMENT. CAVE-IN OF BOREHOLE NECESSITATED THE USE OF ONLY 1 BUCKET OF BENTONITE, HENCE THE RELATIVELY SHALLOW LOWER EXTENT OF THE BENTONITE FILL.

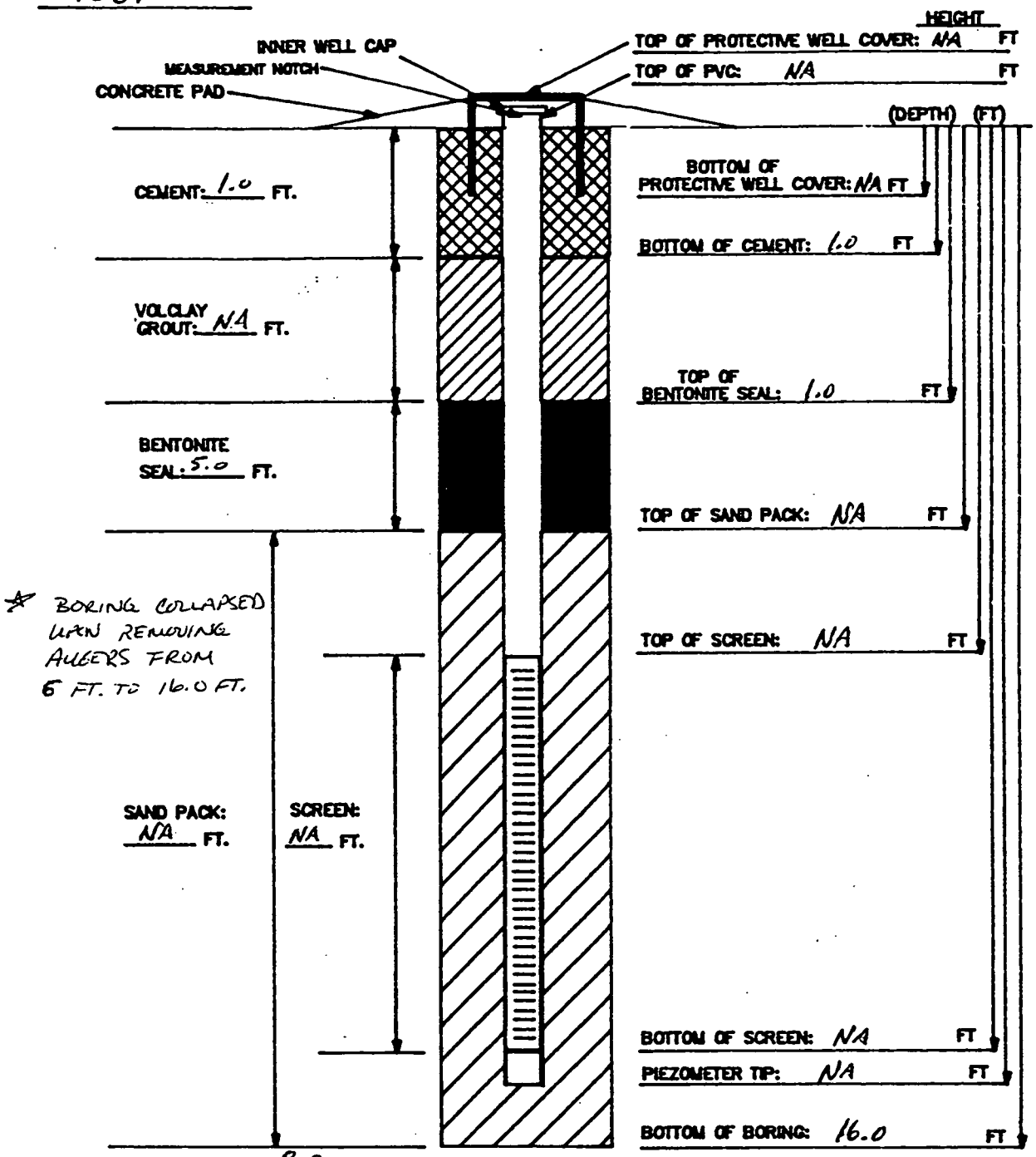
409-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1569

~~INSTALLATION~~ PLUGGING DATE: 8-22-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD RI/FS

Date	8/29/90			
Initial	J.S.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1570	COORDINATES	DATE 8 - 23 - 90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/23/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/23/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA 8-23-90	NA	NA	FIRST FOOT IS CONCRETE	NA	NA	Hnu = NA
	NA 8-23-90	NA	NA				∝ = BΥ =
1	56218 8-23-90 0940	4	6	very dense 10yr 6/8 brownish yellow to 10yr 6/4 light yellowish brown clayey silt, some gravel, slightly moist.	ML	NA	
	56219 8-23-90 0940	12	6	very dense 10yr 6/8 brownish yellow to 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist			Hnu = 0 ∝ = 0
2	56220 8-23-90 0940	32	6	SAA			BΥ = 300-400 cpm
	56221 8-23-90 0940	35	6	SAA			
3	56222 8-23-90 0947	48	6	very dense 10yr 6/8 brownish yellow to 10yr 6/4 light yellowish brown clayey silt, trace gravel, trace sand, slightly moist	ML	NA	Hnu = 0 ∝ = 0
	56223 8-23-90 0947	84	6	very dense 10yr 6/8 brownish yellow to 10yr 6/4 light yellowish brown clayey silt, some sand, trace gravel, moist	ML	NA	BΥ = 400 cpm
4	56224 8-23-90 0947	84	6	very dense 10yr 6/6 brownish yellow poorly graded sand, some silt, moist	SP	NA	
	56225 8-23-90 1000	38	6	very dense 10yr 6/6 brownish yellow poorly graded sand, some silt, moist	SP	NA	Hnu = 0 ∝ = 0
5	56226 8-23-90 1000	42	6	very dense 6/8 10yr brownish yellow to 10yr 6/3 pale brown sandy clayey silt, trace gravel, slightly moist	ML	NA	BΥ = 300 cpm
	56227 8-23-90 1000	40	6	very dense 10yr 6/3 pale brown to 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	
6	56228 8-23-90 1356	10	6	very loose 10yr 6/4 light yellowish brown clayey sand, trace gravel, wet (poorly graded) - Also, silty	SP	NA	Hnu = 0 ∝ = 0
	56229 8-23-90 1356	12	6	dense 10yr 5/1 gray with some 10yr 6/6 brownish yellow intermixed, clayey silt, trace gravel, slightly moist	ML	NA	BΥ = 300 cpm
7	56230 8-23-90 1356	20	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YUST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
∝: ASI #6
BΥ: ASI #11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
BΥ: 2000 cpm

4C2-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1570	COORDINATES	DATE 8 - 23 - 90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/23/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/23/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	S6231 8-23-90 1403	16	6	very loose 10yr 6/4 light yellowish brown sandy clayey silt, trace gravel, wet (sand is poorly graded)	ML	NA	Hnu = 0
	S6232 8-23-90 1407	20	6	dense 10yr 5/1 gray clayey silt, trace sand, trace gravel, slightly moist	ML	NA	α = 0
9	S6233 8-23-90 1407	28	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	βγ = 350 cpm
	S6234 8-23-90 1409	7	6	loose (based on visual observation) 10yr 6/4 light yellowish brown silty sand, some gravel, wet	SP	NA	Hnu = 0
10	S6235 8-23-90 1409	30	6	SAA	SP	NA	α = 0
	S6236 8-23-90 1409	20	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	βγ = 250-300 cpm
11	S6237 8-23-90 1425	5	6	medium dense 10yr 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	S6238 8-23-90 1425	10	6	medium dense 10yr 6/4 light yellowish brown to 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	α = 0
	S6239 8-23-90 1425	8	0	NR	NA	NA	βγ = 250-350 cpm
12	S6240 8-23-90 1428	11	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	S6241 8-23-90 1428	13	6	SAA	↓	↓	α = 0
13	S6242 8-23-90 1428	21	3	SAA	↓	↓	βγ = 250-350 cpm
14	S6243 8-23-90 1432	20	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	S6244 8-23-90 1432	18	6	SAA	↓	↓	α = 0
	S6245 8-23-90 1432	20	6	SAA	↓	↓	βγ = 250 cpm

NOTES: CONTRACTOR: PENUDIZILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SERAPAZZONI

Hnu: SN 1185
α: ASI # 6
βγ: ASI # 11

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 2000 cpm

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1570	COORDINATES	DATE 8-23-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8/23/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 8/23/90	
DRILLING METHODS CME 45 AUGER		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56246 8-23-90 1452	28/14	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 300 cpm
	56247 8-23-90 1452	28	6	SAA	ML	NA	
16	~~[illegible]~~ JL 8-23-90			DRILLING/SAMPLING STOPPED AT 16.0 FT. HOLE FILLED WITH 2 BUCKETS BEN-TONITE, 1/2 BAG CEMENT, 5 GALLONS WATER * Sample # 56248 USED FOR TCLP			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: DENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 2000 cpm

Hnu: SN 1185
α: ASI #6
βγ: ASI #1

000957

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. Mason
DATE 8-23-90
PROJECT NO. 602.3.7
CHECKED BY E. TROLLINGER
DATE 8-24-90
BORING NO. 1570
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 8-23-90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger
TYPE OF BIT Hollow Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~ →
SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/cement	TOP JC 8/22/90 ~~NA~~ 0.0 FT	BOTTOM 1.0 FT	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 16.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0 FT.			
GWL AFTER INSTALLATION	NA			

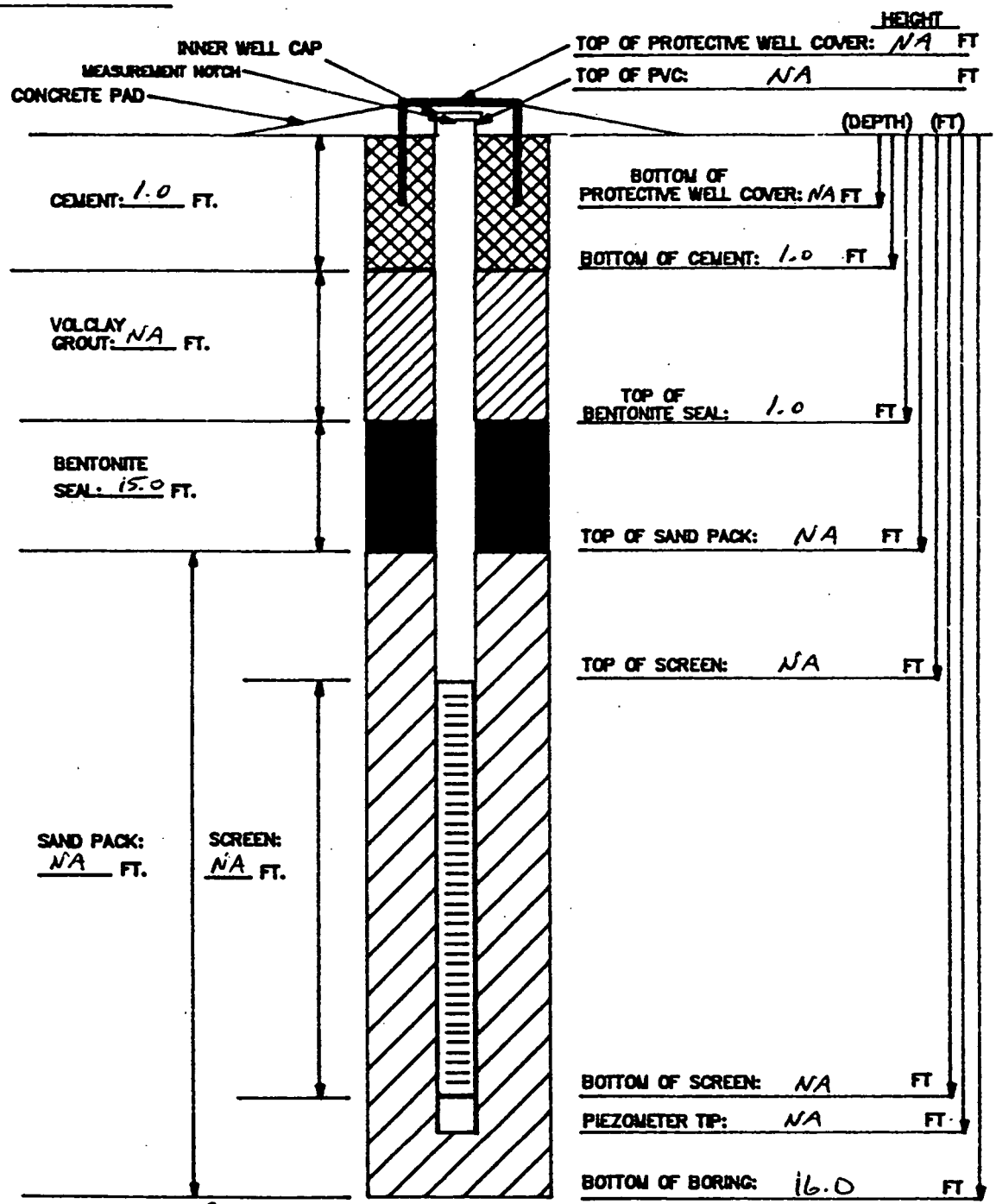
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS HOLE FILLED WITH 2 BUCKETS BENTONITE, 1/2 BAG CEMENT, 5 GALLONS WATER. NO PIEZOMETER SET AS PER SI-WELL PLAN.

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1570

INSTALLATION DATE: 8-23-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1571	COORDINATES	DATE 10-18-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/18/90	
ENGINEER/GEOLOGIST J. Leor	Depth Date/Time	DATE COMPLETED 10/23/90	
DRILLING METHODS Auger 5 7/1 SPOON SAMPLING		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A.- Same as above			
1	56577 1325 10-18-90	2	4	Soft (10yr 2/1 to 10yr 5/4) black to dark yellowish brown silty clay, low plasticity, moist.	CL	0.5	Hnu = 0
	56578 1325 10-18-90	8	6	Stiff (10yr 2/1 to 10yr 4/4) black to dark yellowish brown clayey silt, some coal gravel, slightly moist.	ML	1.5	α = 0
	56579 1325 10-18-90	15	6	Stiff (10yr 5/4 to 10yr 8/1) yellowish brown to white clayey silt, slightly moist.	ML	1.5	βγ = 100-120 cpm
2	56580 0900 10-23-90	13	6	S.A.A.	ML	1.5	Hnu = 0
	56581 0900 10-23-90	15	6	medium dense (10yr 5/4) yellowish brown clayey silt, cobbles, trace gravel, moist.	ML	NA	α = 0
3	56582 0900 10-23-90	16	6	S.A.A.	ML	NA	βγ = 100-120 cpm
	56583 1010 10-23-90	8	6	medium dense (10yr 5/4) yellowish brown subangular sandy silt, trace gravel, very moist.	SM	NA	Hnu = 0
4	56584 1010 10-23-90	12	6	S.A.A.	SM	NA	α = 0
	56585 1010 10-23-90	12	6	S.A.A.	SM	NA	βγ = 150 cpm
				End of Sampling at 4.5 feet Sampling done according to USL Sampling Plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR:
DRILLER:
ASSISTANT:

Hnu: 0
α: 0
βγ: 100-150 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 120-150 cpm

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME ~~602.3.7~~ J.L 10-23-90 FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 10-23-90
PROJECT NO. 602.3.7 CHECKED BY M.O. DATE 11-01-90
BORING NO. 1571
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ Plugging 10-23-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5 ft	BOTTOM 4.5 ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ J.L 10-23-90 cement	TOP 0.0 ft	BOTTOM 0.5 ft	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000961

409-11-86

J.L. 10-23-90

FERNALD RI/FS

INSTALLATION DIAGRAM

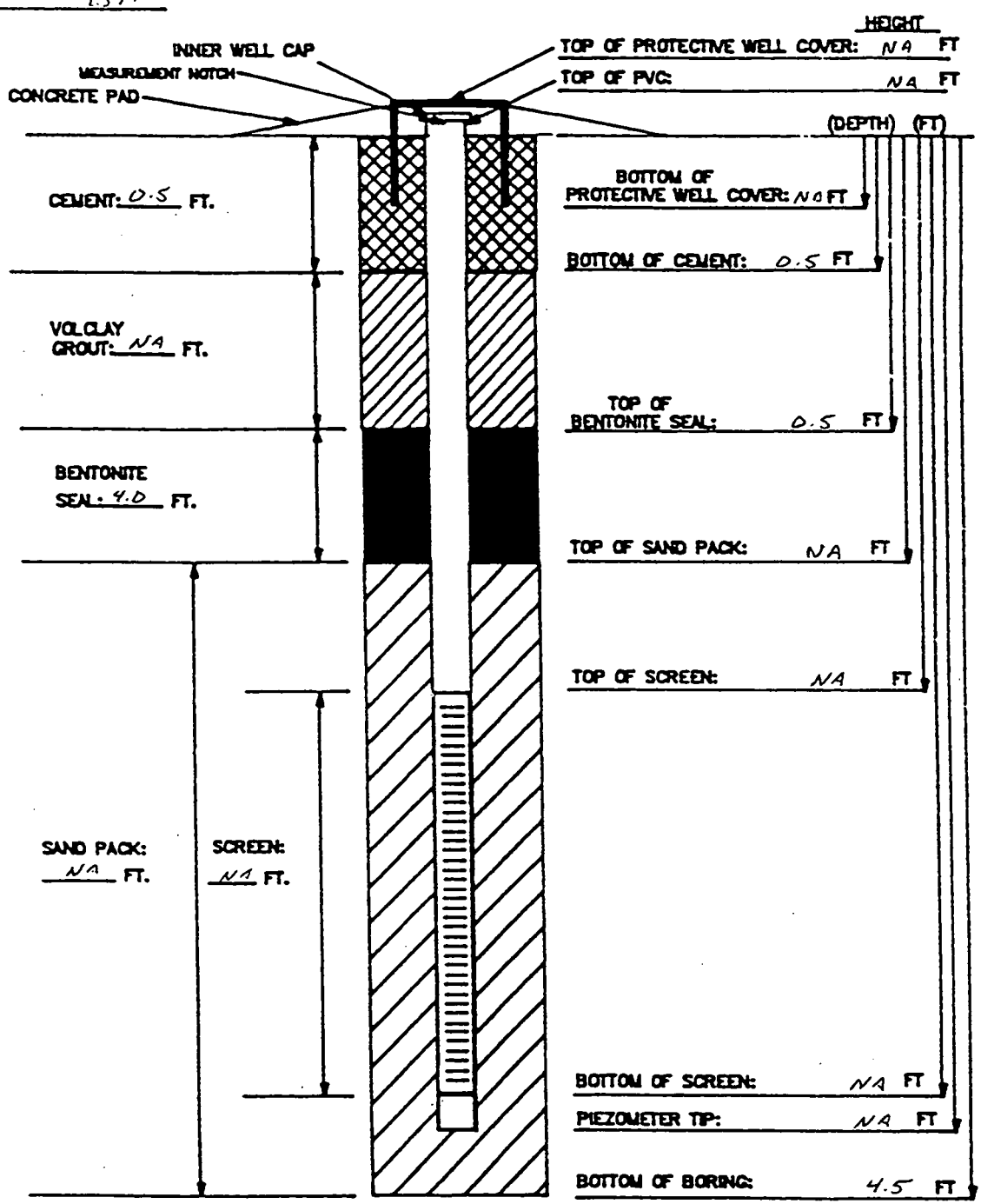
~~MONITORING WELL~~ Boring NO. 1571

J.L. 10-23-90

~~INSTALLATION DATE:~~ 10-23-90

Plugged Boring

5711



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 1

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 25 gal

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

Date	12/1/90			
Initial	ET-			
	Text Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1572	COORDINATES N481636.89, E1380952.51	DATE 11/2/90	
ELEVATION 585.9	GWL: Depth Date/Time	DATE STARTED 11/2/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 11/2/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3	

SAA - Same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56895 11-2-90 1030	39	6	very dense 2.5y 2/0 black silty gravel, poorly graded, dry well JCM 11-2-90	GM	NA	Hnu = 0
FULL HSL 1	56896 11-2-90 1030	32	6	very dense 2.5y 3/2 very dark grayish brown silty gravel, poorly graded, dry well JCM 11-2-90	GM	NA	α = 0
	56897 11-2-90 1030	28	6	very dense 2.5y 3/2 very dark grayish brown silty gravel, poorly graded, slightly moist well JCM 11-2-90	GM	NA	βγ = 100 cpm
	56898 11-2-90 1102	24	6	Soft 10yr 5/1 gray to 10yr 7/8 yellow (Bottom of sample 16 10yr 5/1) silty clay, trace gravel, trace sand, moist; good plasticity	CL	.5	Hnu = 0
2 FULL HSL	56899 11-2-90 1102	29	6	SAA		.5	α = 0
	56900 11-2-90 1102	32	6	SAA		.5	βγ = 100 cpm
3	56901 11-2-90 1159	27	6	very dense, 2.5y 6/6 olive yellow poorly graded sand, relatively fine, trace silt, very moist	SP	NA	Hnu = 0
	56902 11-2-90 1159	35	6	SAA			α = 0
4 FULL HSL	56903 11-2-90 1159	49	6	SAA			βγ = 60-80 cpm
				DRILLING/SAMPLING HALTED AT 4.5 FT.; NO PIEZOMETER SET (AS PER WORKPLAN).			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: FENWICK
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #16
βγ: ASI #8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80-120 cpm

402-11-84

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1572
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 11-2-90
CHECKED BY E. Trollinger DATE 12-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 11-2-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~ →
SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

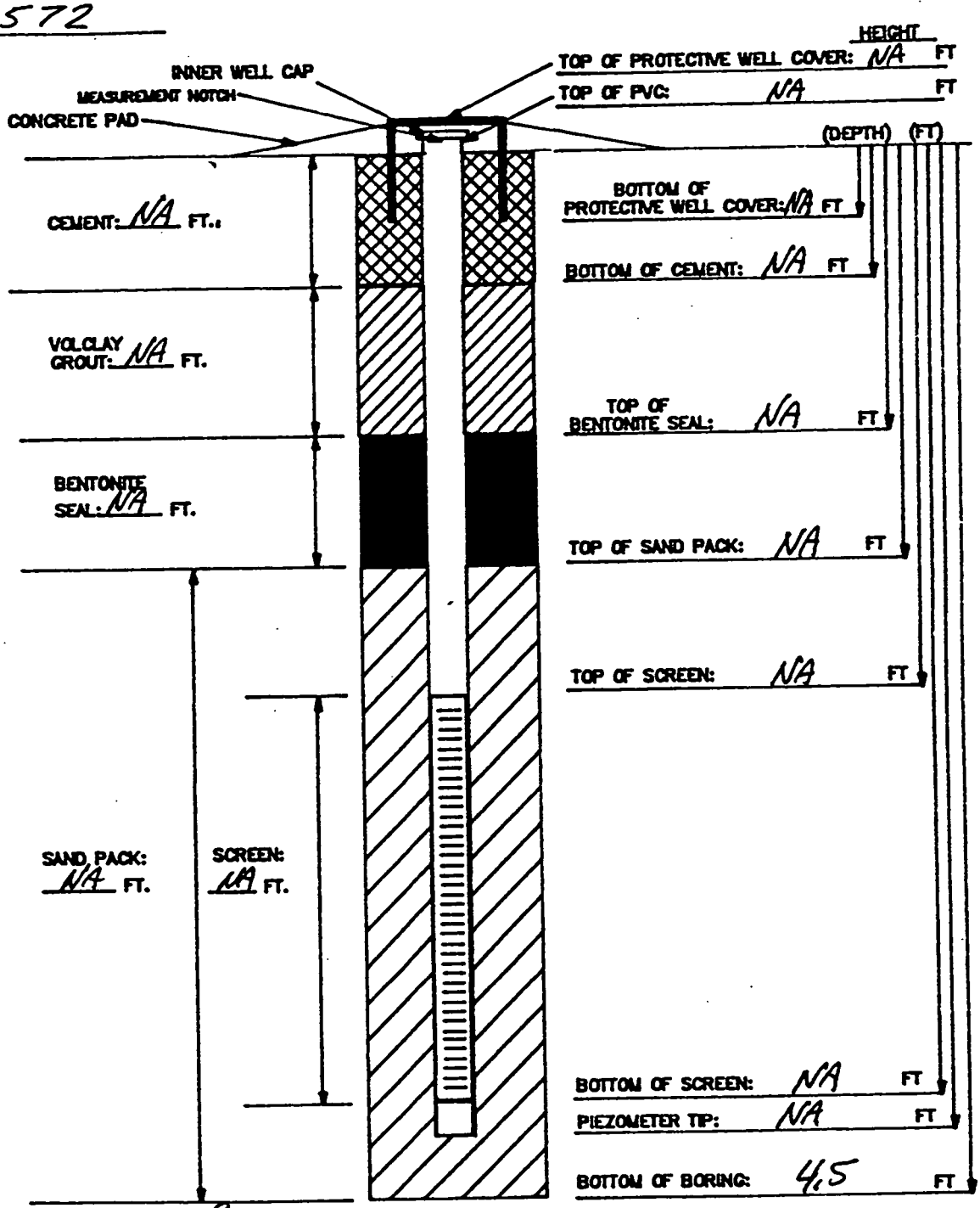
REMARKS Drilling/Sampling Halted at 4.5 ft., No Piezometer set (as per workplan). No Cement or Bentonite Used; Hole Collapsed as Sampling Ceased.

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1572

INSTALLATION DATE: 11-2-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: NA
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD
RI/FS

Date	12/2/90			
Initial	E.T.			
	Field Check	1st Review	2nd Review	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1573	COORDINATES N481591.63, E1380986.56	DATE 10-31-90
ELEVATION: 587.3	GWL: Depth Date/Time	DATE STARTED 10/31/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 11/01/90
DRILLING METHODS Split spoon Sampling/Auger		PAGE 1 OF 3

S.A.A. same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56904 1445 10-31-90	7	6	loose, black (2.5Y, 2/1) Gravel, sand & silt mixture some clay. dry	GM	NA	Hnu = 0
	56905 1445 10-31-90	5	6	very stiff dark grayish brown to gray (10YR, 4/2 To 10YR, 5/1) silty clay. moist med plasticity	CL	2.5	α = 0
1	56906 1445 10-31-90	7	6	SAA	CL	2.5	βγ = 100-120
	56907 0945 11-01-90	9	6	SAA	CL	2.0	Hnu = 0
2	56908 0945 11-01-90	15	6	SAA.	CL	2.5	α = 0
	56909 0945 11-01-90	18	6	SAA	CL	2.0	βγ = 100-200 cpm
3	56910 0945 11-01-90	10	6	SAA	CL	2.0	Hnu = 0
	56911 0945 11-01-90	12	6	SAA	CL	2.0	α = 0
4	56912 0945 11-01-90	10	6	medium stiff light gray, gray to ~~light~~ dark yellowish brown (10YR, 6/1, 10YR, 5/1, To 10YR 4/6) silty clay, high plasticity, moist -	CH	.75	βγ = 100-200 cpm
5				Sampling Ends at 4.5 ft Samples Taken according To HSL sampling Plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: E. Gardner
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-200

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-200

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear
DATE 11-01-90
PROJECT NO. 602.3.7
CHECKED BY E. Trollinger
DATE 12-2-90
BORING NO. 1523
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging 11-01-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT~~/~~SLURRY~~ CEMENT	TOP ~~NA~~ 0.0 ET 12-2-90	BOTTOM ~~NA~~ 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5 12-2-90	BOTTOM 4.5 12-2-90	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~cement~~ ET 12-2-90 ~~GRAVEL~~	TOP NA ~~0.0~~	BOTTOM NA ~~0.5~~	TOP	BOTTOM
PERFORATED SECTION	TOP ET 12-2-90 NA	BOTTOM ET 12-2-90 NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000967

409-11-86

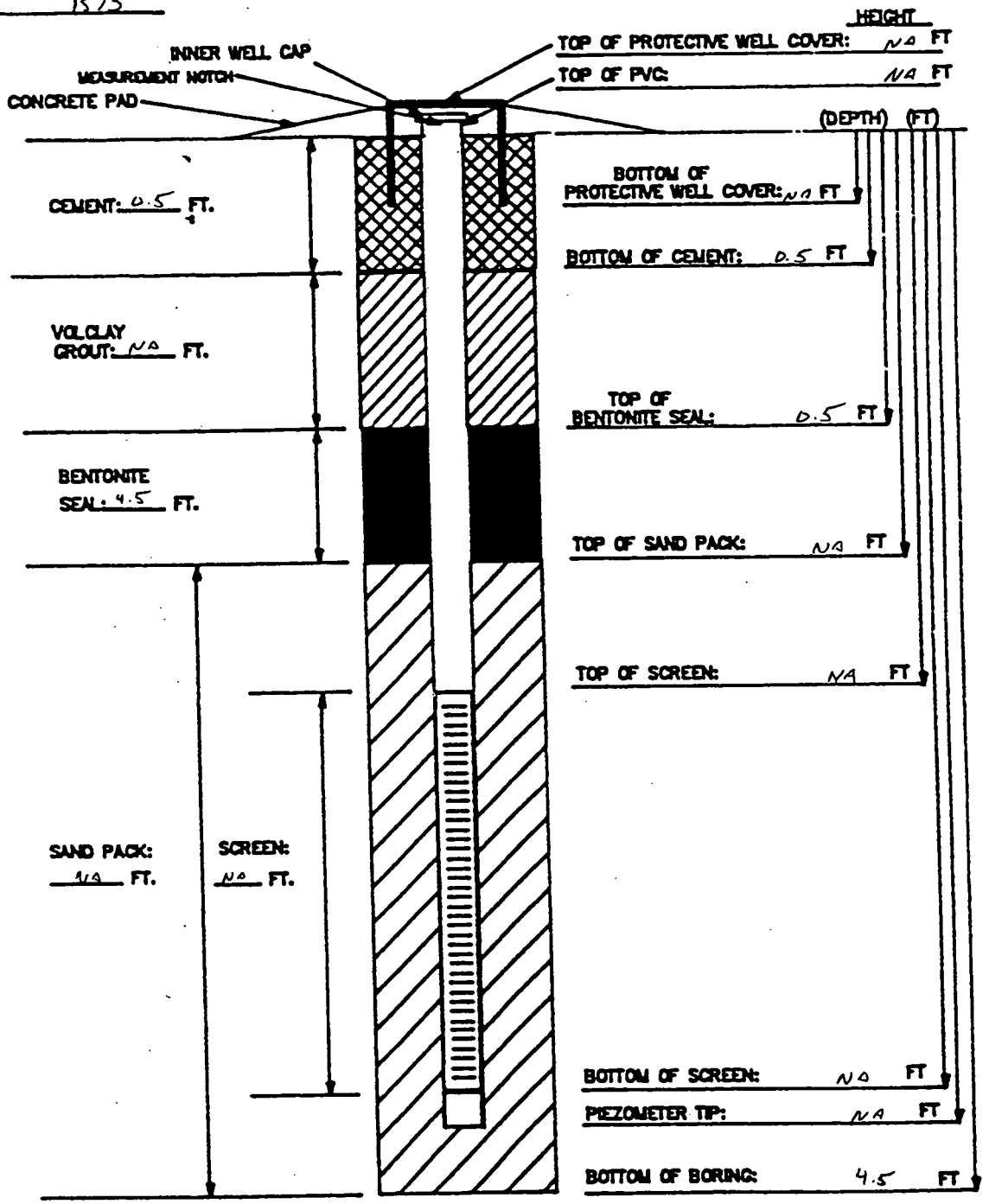
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. PLUGGED 1523

INSTALLATION DATE: 11-01-90 Plugging

5711



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: 602.3.7

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1574 (original)	COORDINATES.	DATE 10 24 90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/24/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/30/90	
DRILLING METHODS Auger Split spoon Sampling		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. - same as above			
	56913 1400 10-24-90	7	6	Dense (10yr 2/2) black silt, some coal gravel No plasticity, moist	NA	NA	Hnu = 0 ppm
	56914 1400 10-24-90	14	6	Hard (10yr 3/6) grayish brown silt, some clay trace sand & gravel (organic) Low plasticity, moist	>4.0	OL	α = 0 cpm βγ = 350-400 cpm
1	56915 1400 10-24-90	19	6	Hard (10yr 5/6) grayish brown silty clay, some gravel, low plasticity, moist.	>4.0	OL	
	56916 0900 10-25-90	13	6	very stiff (10yr 4/2) dark grayish brown, clayey silt, trace sand, dry.	3.5	ML	Hnu = 0 ppm
2	56917 0900 10-25-90	13	6	very stiff (10yr 4/1 to 10yr 4/6) silty clay, low plasticity, moist.	3.0	CL	α = 0 cpm βγ = 100-150 cpm
	56918 0900 10-25-90	25	6	very stiff (10yr 4/6 to 10yr 5/1) silty clay, some sand trace gravel, med plasticity, moist.	2.5	CL	
3	56919 0900 10-30-90	12	6	very stiff (10yr, 5/2 to 10yr, 5/6) grayish brown to yellowish brown silty clay, trace gravel, medium plasticity, moist.	2.5	CL	Hnu = 0 ppm
	56920 0900 10-30-90	13	6	S.A.A.	2.5	CL	α = 0 cpm βγ = 100-150 cpm
4	56921 0900 10-30-90	13	6	S.A.A.	2.5	CL	
5				Sampling Ends at 4.5 ft. Samples taken according to HSC Sampling Plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn. Drilling
DRILLER: Craig Coulter
ASSISTANT: K. Myers

Hnu: 0 ppm
α: 0 cpm
βγ: 100-150 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 250-300 cpm

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear
DATE 10-30-90
PROJECT NO. L02.3.7
CHECKED BY M.A.
DATE 11-01-90
BORING NO. 1574 (original)
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging J.L. 10-30-90 10-30-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5 ft	BOTTOM 4.5 ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ cement J.L. 10-30-90	TOP 0.0 ft	BOTTOM 0.5 ft	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS

000970

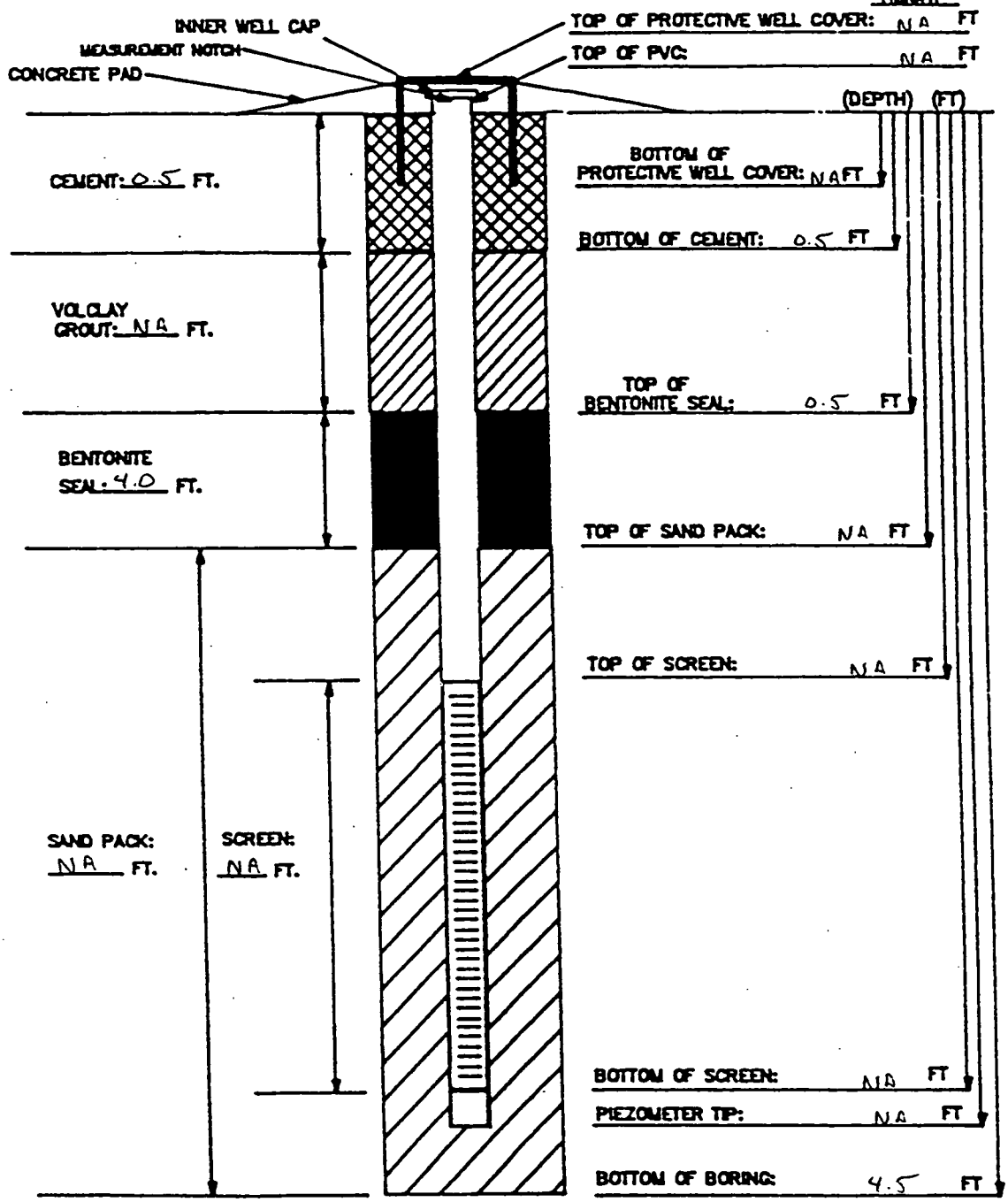
409-11-88

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ Plugged WELL NO. JL 10-30-90 1574 (original)

INSTALLATION DATE: 10-30-90 J.L 10-30-90 Plugging



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF PVC:	NA FT	
BOTTOM OF PROTECTIVE WELL COVER:	NA FT	
BOTTOM OF CEMENT:	0.5 FT	
TOP OF BENTONITE SEAL:	0.5 FT	
TOP OF SAND PACK:	NA FT	
TOP OF SCREEN:	NA FT	
BOTTOM OF SCREEN:	NA FT	
PIEZOMETER TIP:	NA FT	
BOTTOM OF BORING:	4.5 FT	

BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

5711

FERNALD RI/FS

Date	12/2/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1574 REDRILL	COORDINATES N 481,467.79, E1381163.33	DATE	11/4/90
ELEVATION 588.7	GWL: Depth Date/Time	DATE STARTED	11/4/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	11/4/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3	

S.A.A - Same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56970 11-4-90 1045	15	6	very dense 10yr 3/2 very dark grayish brown silt; trace gravel, dry; trace organic material	ML	NA	Hnu = 0 ∝ = 0 βγ = 300 cpm
FULL HSL 1	56971 11-4-90 1045	28	6	SAA, except traces of bright orange material observed.			
	56972 11-4-90 1045	41	6	SAA			
	56973 11-4-90 1352	50	6	very dense 10yr 3/2 very dark grayish brown silt; trace gravel, trace organic material, dry	ML	NA	Hnu = 0 ∝ = 0 βγ = 200 - 240 cpm
2 FULL HSL	56974 11-4-90 1352	41	6	very dense 10yr 4/1 dark gray silt, some traces of iron oxidation present; dry	ML	NA	
	56975 11-4-90 1352	52	6	very dense, 10yr 6/6 brownish yellow with some (20%) 10yr 4/1 dark gray, silt; dry	ML	NA	
3	56976 11-4-90 1501	38	6	Stiff 10yr 6/8 brownish yellow silty clay, low to medium plasticity, slightly moist	CL	1.75	Hnu = 0 ∝ = 0 βγ = 150 cpm
FULL HSL 4	56977 11-4-90 1501	22	6	SAA	CL	1.5	
M 4-90 FULL HSL	56978 11-4-90 1501	24	2	SAA	CL	1.5	
				DRILLING/SAMPLING HALTED AT 4.5 FT.; NO PIEZOMETER SET (AS PER WORKPLAN) FULL HSL IN LAST SAMPLE INTER-			Hnu = ∝ = βγ =
				VAL TAKEN FROM 3.5 TO 4.0 FT. BECAUSE OF INSUFFICIENT RECOVERY.			Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
∝: ASI # 7
βγ: ASI # 8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 300 cpm

000972

402-11-88

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1574 redrill
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 11-4-90
CHECKED BY E. Trollinger DATE 12-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 11-4-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
IS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Drilling Halted at 4.5 Ft.; No Piezometer set (as per work plan). Boring operations at this location on 11-4-90 were to redrill, since samples from previous boring operations at this site were invalidated by lab.

000973

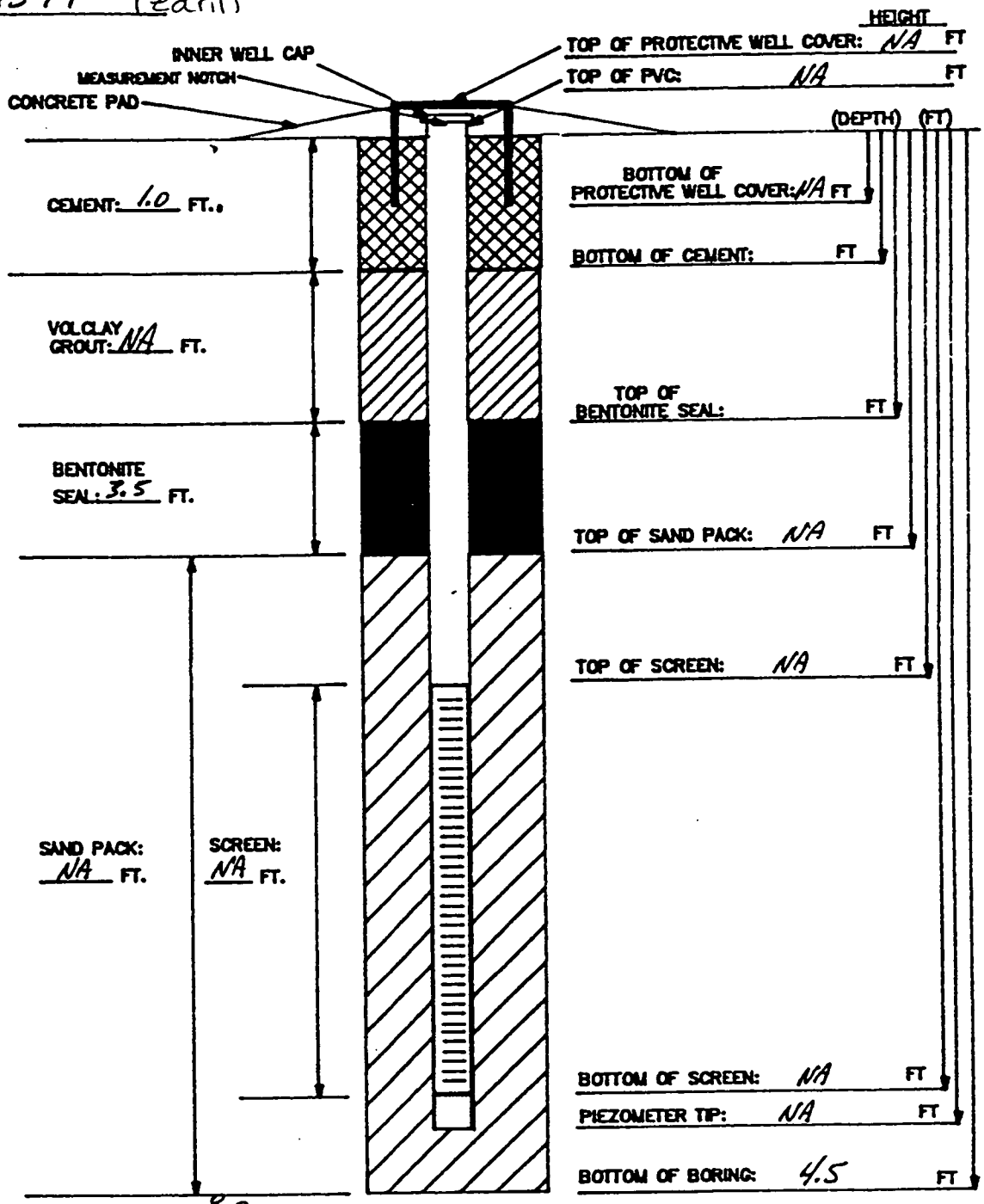
409-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1574 redrill

INSTALLATION DATE: 11-4-80
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/4 BAG
AMOUNT OF WATER USED: 1 GALLON
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1575	COORDINATES	DATE 10-23-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/23/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/24/90	
DRILLING METHODS SPLIT SPOON SAMPLING (AUGER)		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA - Same as Above; N.R. - No Recovery)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56886 1400 10-23-90	2	6	Soft (10yr 4/6 to 10yr 2/2) dark yellowish brown to very dark brown highly organic silty clay, high plasticity, very moist.	CL	0.5	Hnu = 0 ppm
	56887 1400 10-23-90	4	6	very stiff (10yr 2/2) very dark brown silty clay. Trace sand, medium plasticity moist.	CL	2.0	α = 0 cpm βγ = 150-200 cpm
1	56888 1400 10-23-90	8	6	SAA	CL	2.5	
	56889 0900 10-23-90	6	6	Stiff (10yr 4/1) dark gray clayey silt, med plasticity, moist.	ML	2.0	Hnu = 0 ppm
2	56890 0900 10-23-90	9	6	Stiff (10yr 5/6 to 10yr 5/1) yellowish brown to gray clayey silt, med plasticity, moist.	ML	2.0	α = 0 cpm βγ = 250-300 cpm
3	56891 0900 10-24-90	25	6	SAA	ML	2.0	
	56892 1100 10-24-90	8	6	Stiff (10yr 6/1 to 2.5yr 5/6) gray to strong brown clayey silt, Trace gravel, med plasticity moist.	ML	2.5	Hnu = 0 ppm
4	56893 1100 10-24-90	12	0	J.L 10-24-90 ~~SAA~~ N.R.	~~CL~~	~~2.5~~	α = 0 cpm βγ = 200-300 cpm
	56894 1100 10-24-90	20	6	SAA	ML	2.5	
5	~~56895~~ 10-24-90			END of Sampling at 4.5 feet SAMPLES TAKEN ACCORDING TO HSL SAMPLING PLAN			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: Craig Coulter
ASSISTANT: Kevin Myers

Hnu: 0 ppm
α: 0 cpm
βγ: 200-300 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 250-300 cpm

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC-RI/FS FIELD ENG./GEO. J. Lear DATE 10-24-90
PROJECT NO. 602.3.7 CHECKED BY MD. DATE 11-01-90
BORING NO. 1575
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ Plugging 10-24-90
J.L. 10-24-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5ft	BOTTOM 4.5ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ cement	TOP 0.0ft	BOTTOM 0.5ft	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000976

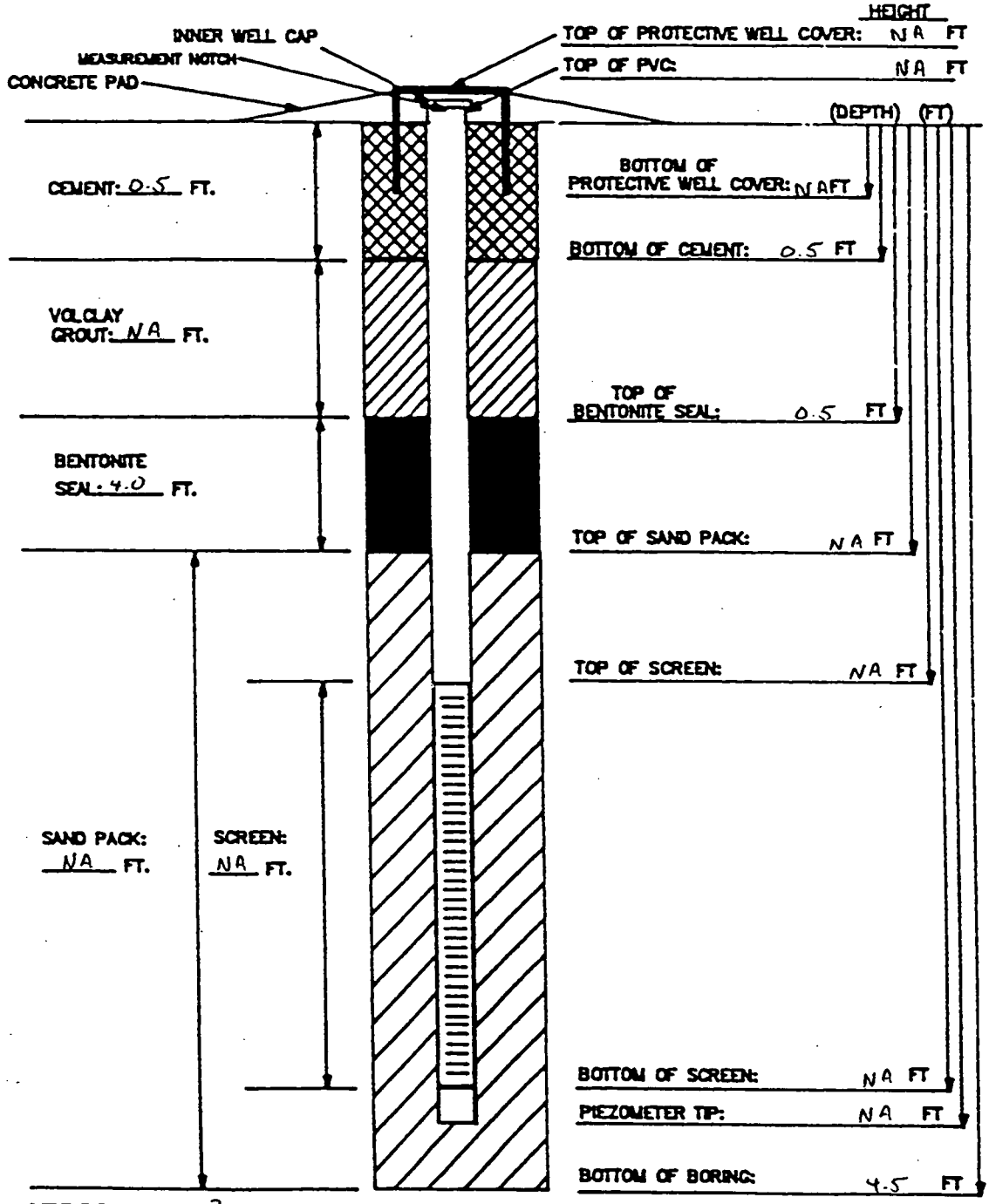
409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ Plugged WELL NO. 1575

INSTALLATION DATE: 10-24-90 Plugging



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS):

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 2 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1576 (original)	COORDINATES	DATE 10-30-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/30/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/30/90	
DRILLING METHODS Split Spoon sampling (Auger)		PAGE 1 OF 3	

SAA. Same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1010 10-30-90	28	6	Dense (10yr, 2/1; 10yr, 4/2; 7.5yr 5/8) black to dark grayish brown to strong brown silt with coal sand & gravel, dry.	GM	NA	Hnu = 0 ppm
1	1010 10-30-90	30	6	SAA.	GM	NA	α = 0 cpm βγ = 150-250 cpm
	1010 10-30-90	12	6	SAA.	GM	NA	
2	1255 10-30-90	6	6	Very stiff (10yr, 4/1 to 10yr, 5/6) clayey silt, medium plasticity, moist. dark gray to yellowish brown	ML	2.5	Hnu = 0 ppm
	1255 10-30-90	10	6	SAA	ML	2.5	α = 0 cpm βγ = 150-200 cpm
3	1255 10-30-90	10	6	SAA.	ML	2.5	
	1415 10-30-90	17	6	SAA	ML	2.5	Hnu = 0 ppm
4	1415 10-30-90	21	6	SAA.	ML	2.5	α = 0 cpm βγ = 180-200 cpm
	1415 10-30-90	10	6	Dense (10yr, 4/6) dark yellowish brown clayey silt, trace sand and gravel slightly moist	ML	NA	
5				Sampling ends at 45 ft samples taken according to HSL sampling plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: Craig Coulter
ASSISTANT: K. Myers

Hnu: 0 ppm
α: 0 cpm
βγ: 150-250 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 150-250 cpm

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS FIELD ENG./GEO. J. Lear DATE 10-30-90
PROJECT NO. 602.3.7 CHECKED BY JAB, DATE 11-01-90
BORING NO. 1576 (Original)
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ Plugging 10-30-90
J.L 10-30-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.5ft	BOTTOM 4.5ft.	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
J.L 10-30-90 ~~GRAVEL~~ Cement	TOP 0.0	BOTTOM 0.5	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000979

409-11-86

FERNALD RI/FS

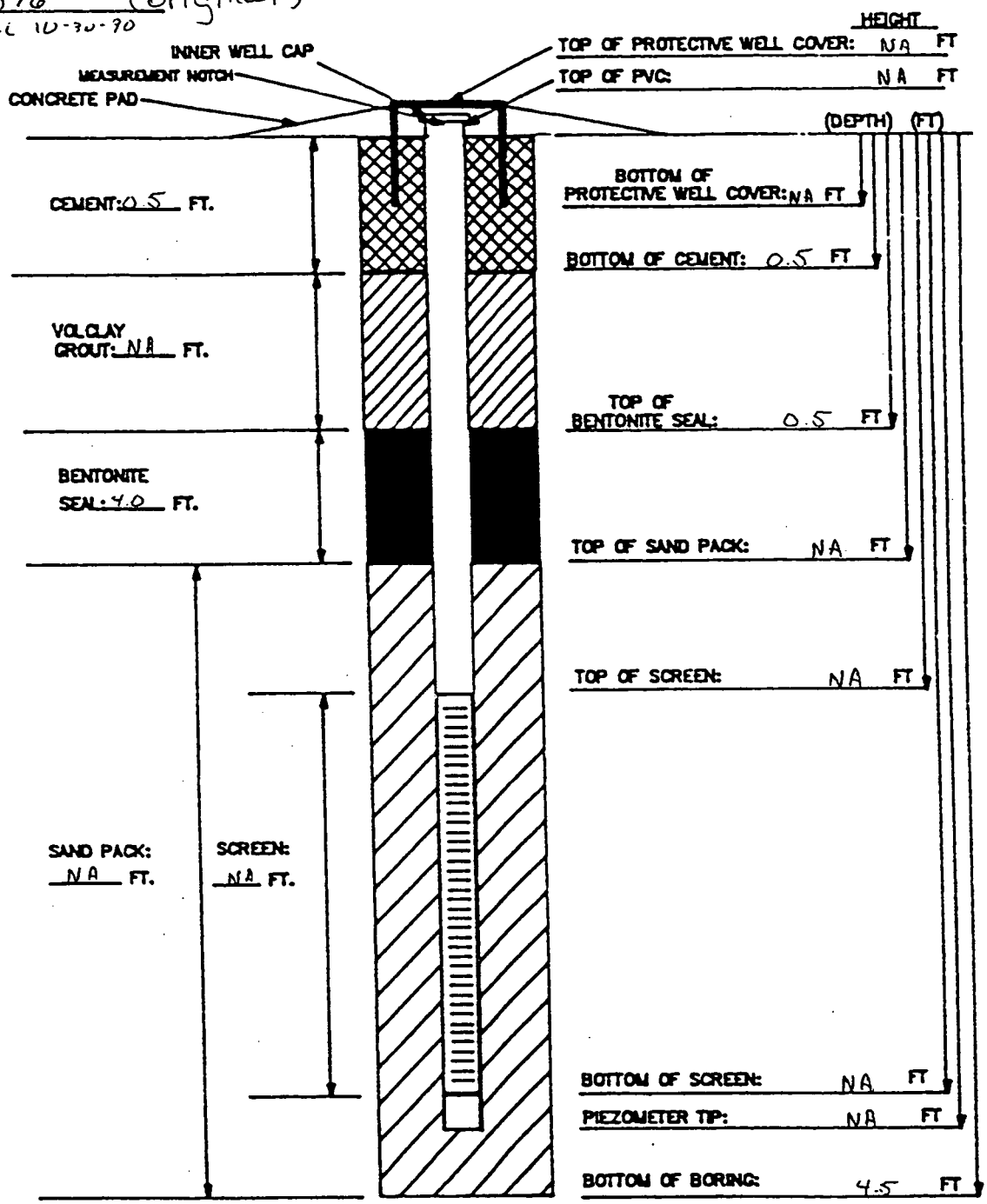
INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. 1576 Plugged (original)

J.L 10-30-90

J.L. INSTALLATION DATE: 10-30-90

Plugging



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

RI/FS ☆ LAB RECEIVED VOLATILE SAMPLES ABOVE 4°C, HENCE RESAMPLE EFFORT.

VISUAL CLASSIFICATION OF SOILS

Date	12/1/90			
Initial	E.T.			
	Key Check	1st Key II	2nd Key I	Final Copy Verification

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1576 Redrill	COORDINATES.	DATE 11-04-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/04/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED: 11/04/90	
DRILLING METHODS Auger/split spoon sampling		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (S.A.A - Same as above)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56981 1040 11-04-90	9	6	Dense, yellowish brown to black (10yr, 5/8 To 2.5y, 2/1) coal gravel with clayey silt, dry.	GM	NA	Hnu = 0 ∝ = 0 βγ = 120 - 200 cpm
	56982 1040 11-04-90	20	6	S.A.A.	GM	NA	
	56983 1040 11-04-90	13	6	S.A.A.	GM	NA	
2	56984 1130 11-04-90	12	6	St.ff, yellowish brown to gray (10yr, 5/8 To 10yr, 5/1) clayey silt, med plasticity, moist.	ML	2.0	Hnu = 0 ∝ = 0 βγ = 150 - 200 cpm
	56985 1130 11-04-90	15	6	very st.ff S.A.A.	ML	2.5	
3	56986 1130 11-04-90	19	6	S.A.A.	ML	2.5	
	56987 1230 11-04-90	10	6	Stiff, yellowish brown to light gray (10yr, 4/6 to 10yr, 6/1) clayey silt, trace gravel med. plasticity, moist	ML	2.0	Hnu = 0 ∝ = 0 βγ = 150 - 200 cpm
4	56988 1230 11-04-90	14	6	S.A.A.	ML	2.0	
	56989 1230 11-04-90	12	6	S.A.A.	ML	2.0	
5				Sampling Ends at 4.5 ft Samples Taken according to HSL Sampling Plan			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: E. Gardner
ASSISTANT: K. Myers

Hnu: 0
∝: 0
βγ: 120 - 200 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 100 - 200 cpm

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear
DATE 11-04-90
PROJECT NO. 602-3-7
CHECKED BY E. Trollinger
DATE 12-2-90
BORING NO. 1576 Redrill
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 11-04-90
J.L. 11-04-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT~~ / ~~SLURRY~~ CEMENT	TOP 0.0 ET ~~NA~~	BOTTOM 0.5 ~~NA~~	TOP	BOTTOM
BENTONITE	TOP 0.5 ET 12-2-90	BOTTOM 4.5 ET 12-2-90	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~Cement~~ ET 12-2-90 ~~GRAVEL~~ none used JL 11-04-90	TOP NA ~~0.0~~	BOTTOM NA ~~0.5~~	TOP	BOTTOM
PERFORATED SECTION	TOP NA ET 12-2-90	BOTTOM NA ET 12-2-90	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

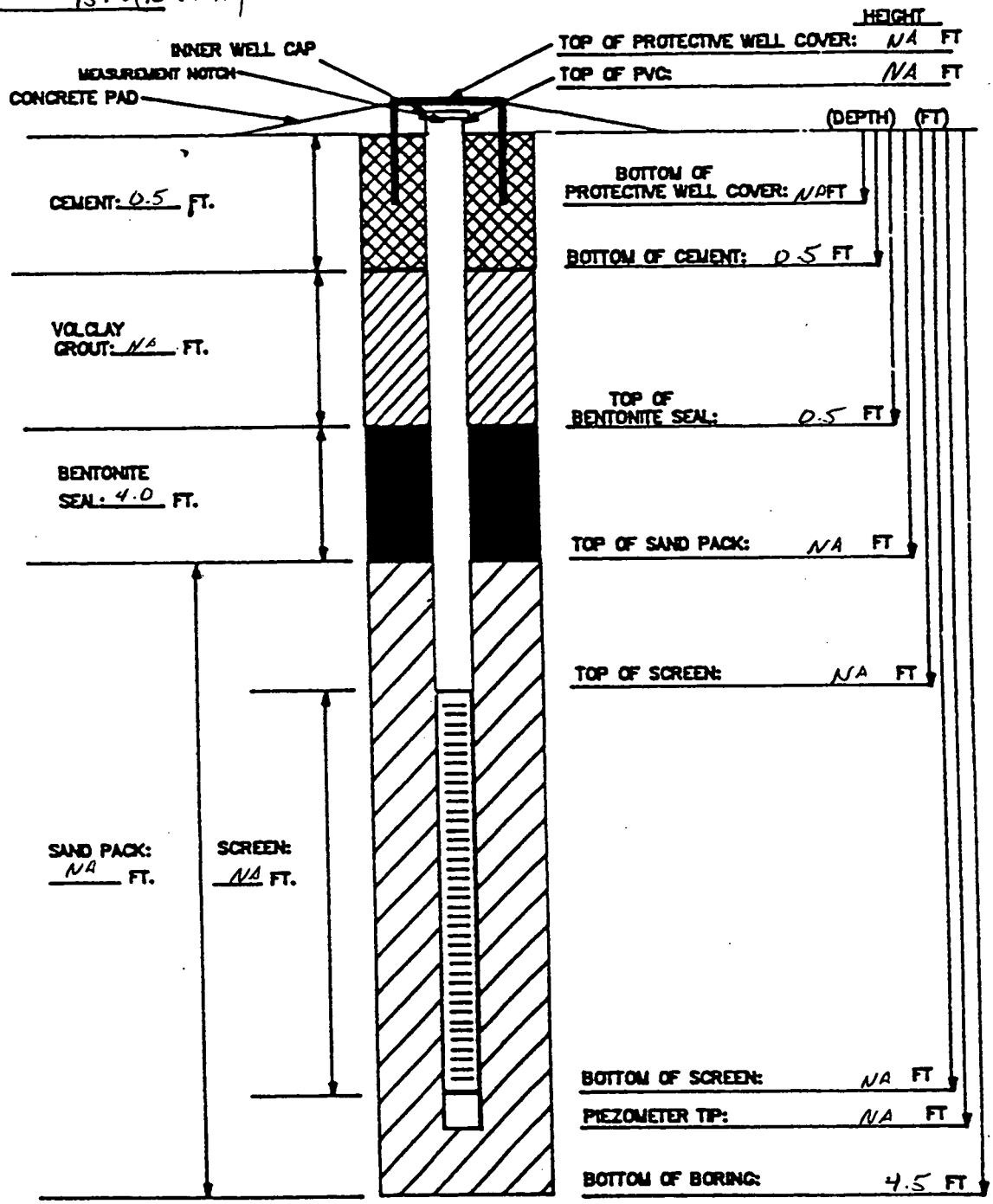
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. 1576 (12cdr.11)

J.L. 10-04-90

INSTALLATION DATE: 11-04-90 11-04-90 Plugging



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 1

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 2 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: 602.3.7

571

Date	7/2/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6023.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1577	COORDINATES N481607.16, E.138052.08	DATE 11/6/90	
ELEVATION 5869	GWL: Depth Date/Time	DATE STARTED 11/6/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 11/6/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 3	

S.A.A - Same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56931 11-6-90 0938	4	6	10yr 2/1 black coal, medium (EDGE OF COAL PILE) dense	NA	NA	Hnu = 0
FULL HSL 1	56932 11-6-90 0938	5	6	medium dense 10yr 7/4 very pale brown to 10yr 4/2 dark grayish brown clayey silt, trace gravel, slightly moist	ML	NA	α = 0
	56933 11-6-90 0938	12	6	medium dense 10yr 7/6 yellow clayey silt, slightly moist	ML	NA	βγ = 100 cpm
	56934 11-6-90 1055	8	6	JCM 11-6-90 very stiff ~~dense~~ 2.5y 6/8 olive yellow to 2.5y 6/4 light yellowish brown silty clay; trace fine gravel, slightly moist, medium plasticity	CL	2.25	Hnu = 0
2 FULL HSL	56935 11-6-90 1055	18	6	SAA	CL	2.25	α = 0
	56936 11-6-90 1055	19	6	SAA	CL	2.0	βγ = 100 cpm
3	56937 11-6-90 1305	8	6	medium stiff 2.5y 6/8 olive yellow to 2.5y 6/4 light yellowish brown, with some 10y-5/1 gray and iron oxide staining intermixed, silty clay, trace gravel, slightly moist, medium ~~to good~~ plasticity ET 12-2-90	CL	.75	Hnu = 0
	56938 11-6-90 1305	9	6	SAA		1.0	α = 0
4 FULL HSL	56939 11-6-90 1305	14	6	SAA		.75	βγ = 100 cpm
				DRILLING/SAMPLING HALTED AT 4.5 FT.; NO PIEZOMETER SET (AS PER WORKPLAN).			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNTORK
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI # 7
βγ: ASI # 8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80 - 100 cpm

000984

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1577
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 11-6-90
CHECKED BY E. Trollinger DATE 12-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 11-6-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Hollow Auger.
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
(WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑)

REMARKS Drilling/Sampling Halted at 4.5 ft.; No piezometer set (as per workplan). No bentonite or cement used to fill boring; Coal and loose soil caved in and filled borehole as sampling was completed.

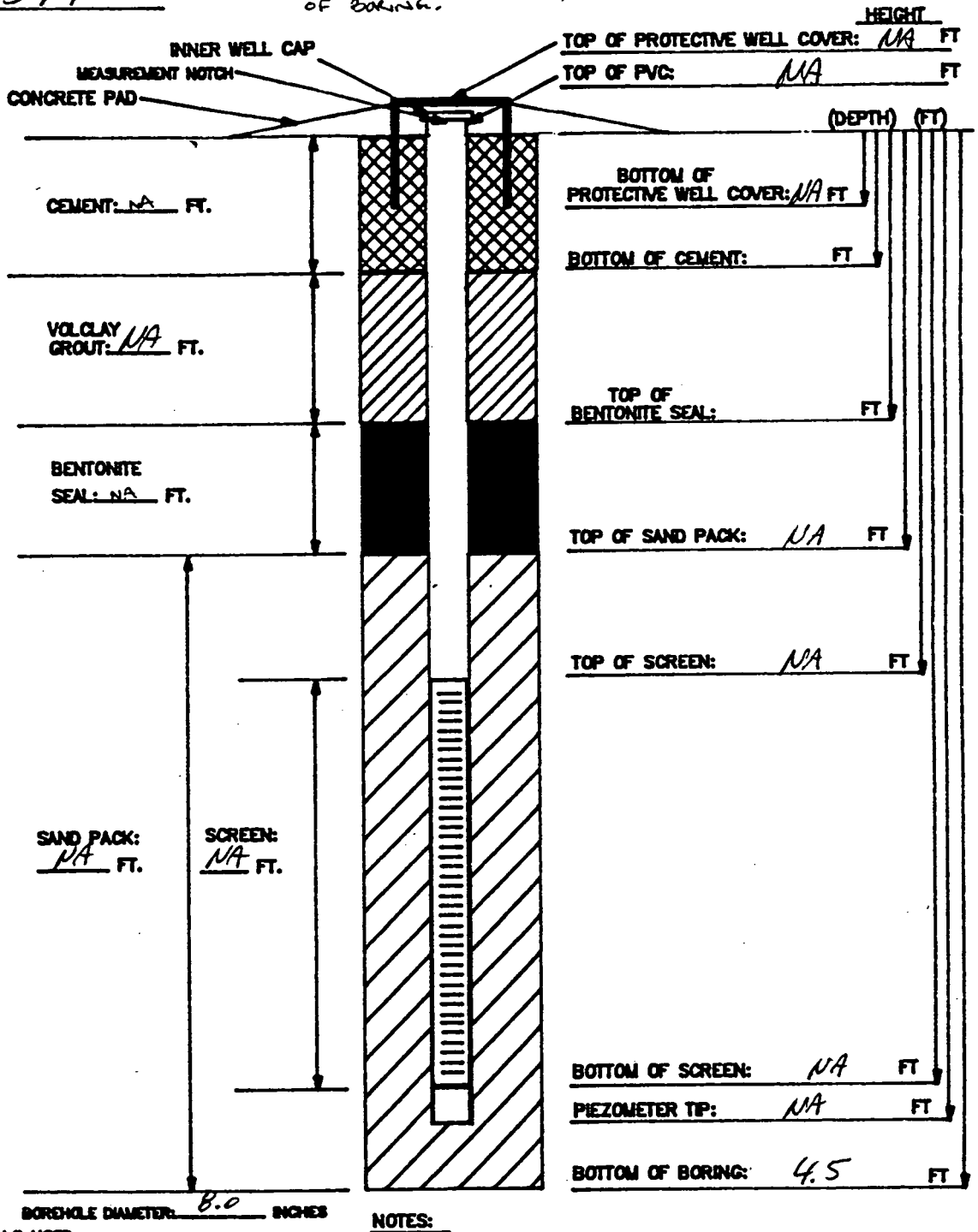
409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1577

(☆ NOTE, PLUGGING WAS NOT NECESSARY DUE TO COLLAPSE OF BORING.)

INSTALLATION DATE: 11-6-80
PLUGGED



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: NA
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6023.7 GEOLOGIST/ENGINEER: J. MASON

PI/FS

VISUAL CLASSIFICATION OF SOILS

Date	12/2/90			
Initial	ET.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1578	COORDINATES N.481676.05, E.1381044.93	DATE 11-06-90	
ELEVATION: 589.4	GWL: Depth Date/Time	DATE STARTED 11/06/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 11/06/90	
DRILLING METHODS Auger Split Spoon Sampling		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S.A.A. - Same as above						
	56940 0930 11-06-90	4	6	medium dense, black (2.5Y, 2/1) coal gravel, some sand & silt, wet.	GM	NA	Hnu = 0
	56941 0930 11-06-90	6	6	V. stiff, yellowish brown to black (10yr, 5/8 to 2.5Y, 2/1) clayey silt, trace gravel, medium plasticity, moist.	ML	2.5	α = 0
1	56942 0930 11-06-90	8	6	S.A.A	ML	2.5	βγ = 120cpm
	56943 1030 11-06-90	9	6	V. stiff, yellowish brown to light gray (10yr, 5/8 to 10yr, 6/1) clayey silt, trace gravel, medium plasticity, moist	ML	2.5	Hnu = 15ppm
2	56944 1030 11-06-90	14	6	S.A.A	ML	2.5	α = 0
	56945 1030 11-06-90	24	6	S.A.A	ML	2.5	βγ = 120cpm
3	56946 1410 11-06-90	9	6	medium stiff, yellowish brown to light gray (10yr, 5/6 to 10yr, 6/1) silty clay, trace gravel, high plasticity, wet	CH	.75	Hnu = 350ppm
	56947 1410 11-06-90	11	6	S.A.A.	CH	.75	α = 0
4	56948 1410 11-06-90	17	6	medium stiff, yellowish brown to olive to very dark gray to reddish brown (10yr, 5/8 to 5Y, 4/3 to 2.5Y, 3/1 to 2.5Y, 3/4) poorly graded	CH	.75	βγ = 120cpm
			4.5ft	angular gravel with some silty clay, wet.			Hnu =
5				Sampling Ends at 4.5ft Samples taken according To HSL Sampling Plan			α =
							βγ =
							Hnu = Ø
							α = Ø
							βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: E. Gardner
ASSISTANT: K. Myers

Hnu: 0 - 350 PPM
α: 0
βγ: 120 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 120 - 200cpm

402-11-86

2/3

5711

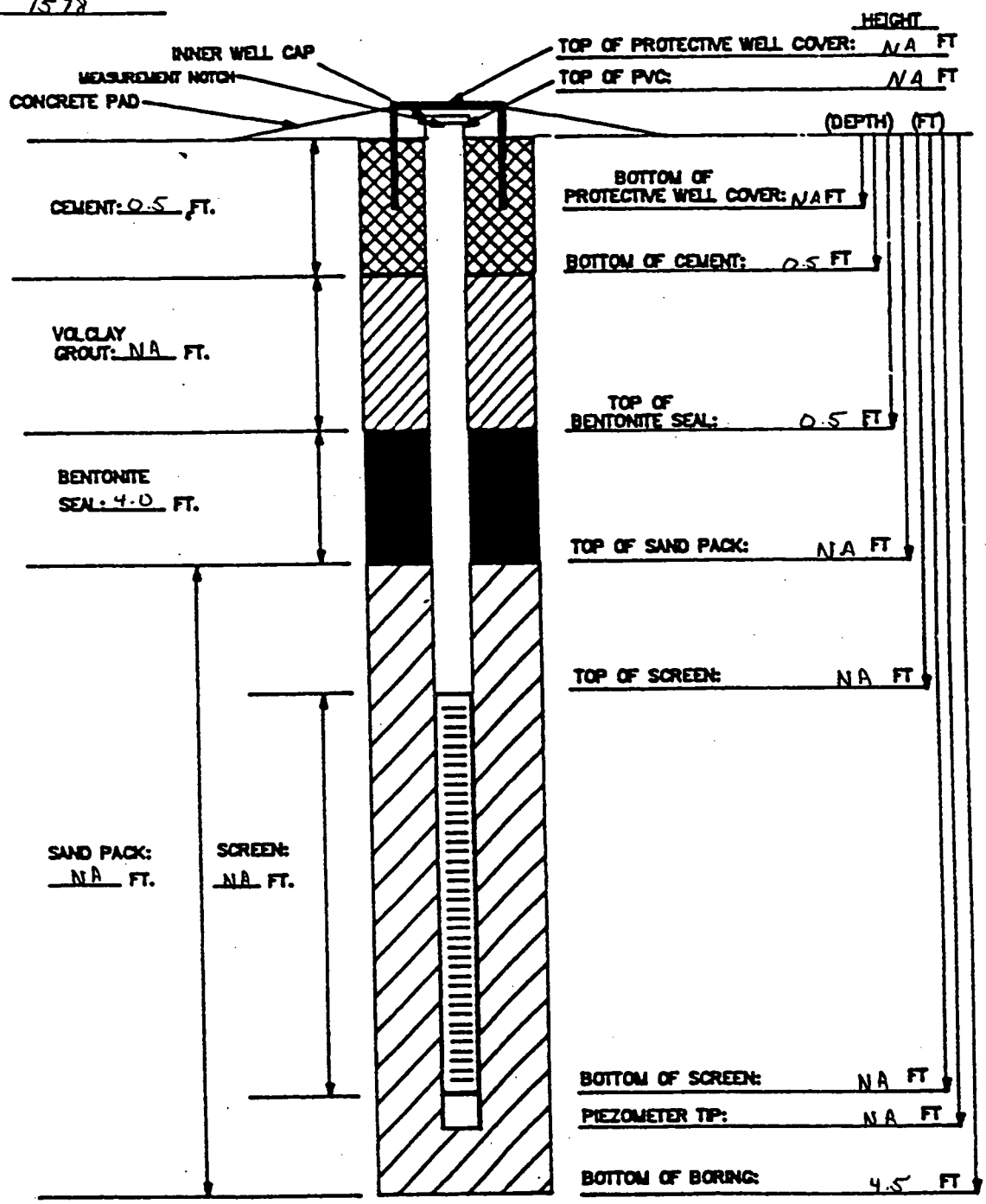
J.L. 11-06-90

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged Boring 1578

Plugging INSTALLATION DATE: 11-06-90
11-06-90



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS FIELD ENG./GEO. J. Lear DATE 11-06-90
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1578
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ Plugging 11-06-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		589.4	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~/CEMENT	TOP 0.0 ~~NA~~	BOTTOM ~~NA~~ 0.5	TOP 589.4	BOTTOM 588.9
BENTONITE	TOP 0.5	BOTTOM 4.5	TOP 588.9	BOTTOM 584.4
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
~~Cement~~ ~~GRAVEL~~ ~~J.L. 11-06-90~~ ET 12-2-90	TOP NA ~~0.0~~	BOTTOM NA ~~0.5~~	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	4.5		584.4	
GWL AFTER INSTALLATION	NA		NA	

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS _____

000989

RI/FS

VISUAL CLASSIFICATION OF SOILS

Date	11/14/90			
Initial	E.T.			5711
	Field Check	1st Key In	2nd Key In	H.S. Copy Verification

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1579	COORDINATES N481675.67, E.1381045.09	DATE	11/02/90
ELEVATION: 589.0	GWL: Depth Date/Time	DATE STARTED	11/02/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED	11/02/90
DRILLING METHODS Auger/Solid Spoon Sampling		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION (SAA - Same as Above)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56950 0945 11-02-90	13	6	medium dense, light gray (10yr, 7/1) poorly graded gravel trace silt, dry 0.5 ft.	GP	NA	Hnu = 0
	56951 0945 11-02-90	16	6	medium dense yellowish brown (10yr, 4/2) poorly graded sand, some silt, moist. 0.8 ft.	SM	NA	α = 0
1				medium dense, black (10yr 2/1) clayey silt, some coal and limestone gravel moist 0.8'	ML	NA	βγ = 200-~~900~~ ppm 4000 ppm J.L 11-02-90
	56952 0945 11-02-90	9	6	SAA.	ML	NA	
	56953 1045 10-02-90	7	6	very stiff dark gray to dark brown (2.5y, 4/1 to 10yr, 4/3) clayey silt, low plasticity, moist	ML	2.5	Hnu = 0
2	56954 1045 10-02-90	12	6	very stiff dark gray (2.5y, 4/1) clayey silt, low plasticity, moist.	ML	2.5	α = 0
	56955 1045 10-02-90	13	6	SAA.	ML	2.5	βγ = 200-400 ppm
3	56956 1145 11-02-90	15	6	very stiff gray to dark yellowish brown, (10yr, 5/1 to 10yr, 4/2) silty clay, trace sand, med. plasticity, moist.	CL	2.5	Hnu = 0
	56957 1145 11-02-90	15	6	SAA			α = 0
4	56958 1145 11-02-90	13	6	SAA			βγ = 200-400
5				Sampling ends at 4.5 ft samples taken according to HSL sampling plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: E. Gardner
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-4000 ppm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-300 ppm

402-11-88

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME SMPC RI/FS FIELD ENG./GEO. J. Lear DATE 11-02-90
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1573
~~PIEZOMETER~~ NO. NA DATE OF ~~INSTALLATION~~ Plugging 11-02-90
L 12-90 Plugged well

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY CEMENT~~	TOP 0.0 ~~NA~~ ET 12-2-90	BOTTOM ~~NA~~ ET 12-2-90 0.5	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 4.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ ~~cement~~ ET 12-2-90	TOP ~~0.0~~ NA	BOTTOM ~~0.5~~ NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS _____

409-11-86

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FERNALD RI/FS

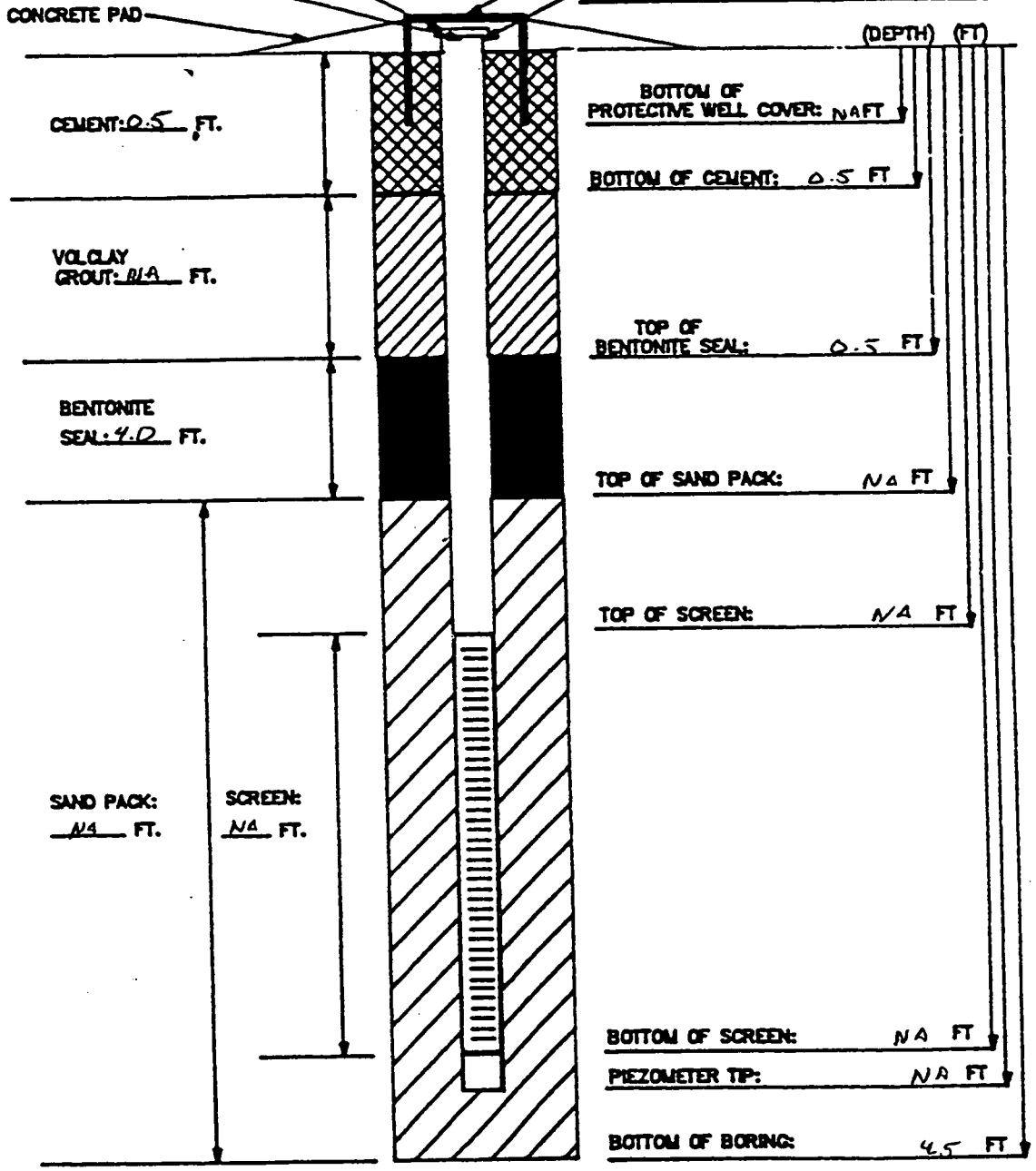
INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. Plugged 1579

J.L. 11-02-90

J.L. 11-02-90

INSTALLATION DATE: 11-02-90 Plugging



BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 1

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 2 gal

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. Lear

RI/FS

VISUAL CLASSIFICATION OF SOILS

Date	12/7/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1580	COORDINATES N481676.00, E1381101.87	DATE	11-07-90
ELEVATION: 589.9	GWL: Depth Date/Time	DATE STARTED	11/07/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED	11/07/90
DRILLING METHODS Auger/Split Spoon Sampling		PAGE	1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S.A.A. Same as above						
	56959 0930 11-07-90	13	6	very dense, light gray to gray (10yr. 6/1 to 10yr 5/1) gravel with some clayey silt, dry	GM	NA	Hnu = 0
	56960 0930 11-07-90	27	6	very dense, dark grayish brown to black (10yr, 4/2 To 2.5y 2/1) clayey silt with some coal gravel, moist	ML	NA	α = 300 cpm βγ = 8000 cpm
1	56961 0930 11-07-90	33	6	very dense, yellowish brown (10yr 5/4) clayey silt, some gravel, ~~mo~~ slightly moist	ML	NA	BACKGROUND High closer to surface.
	56962 1040 11-07-90	80	6	Very dense, yellowish brown to light gray (10yr. 5/4 To 10yr. 6/1) gravel with some silt, dry cobbles.	GM	NA	Hnu = 0
2	56963 1040 11-07-90	60	6	very dense, light yellowish brown to light gray (10yr. 6/4 To 10yr. 6/1) Gravel with some silt, dry.	GM	NA	α = 200 cpm βγ = 200-4000 cpm
	56964 1040 11-07-90	13	6	very dense ~~to~~ yellowish brown (10yr. 5/4) clayey silt, some gravel, dry.	ML ~~GM~~ J. 11-07-90	NA	
3	56965 1130 11-07-90	11	6	Stiff, dark gray To dark yellowish brown (10yr. 5/1 To 10yr 4/6) clayey silt, Trace gravel, medium plasticity, moist	ML	1.75	Hnu = 0 α = 0-200 cpm
	56966 1130 11-07-90	16	6	S.A.A.	ML	1.75	βγ = 3000 cpm
4	56967 1130 11-07-90	20	6	S.A.A.	ML	1.75	
5				Sampling Ends at 4.5 ft Samples Taken according to HSL Sampling Plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: E. Gardner
ASSISTANT: K. Myers

Hnu: 0
α: 0-300 cpm
βγ: 200-8000 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 100-300 cpm
βγ: 3000 cpm
6000 cpm surface

402-11-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7.
BORING NO. 1580
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Lear DATE 11-07-90
CHECKED BY E. Trollinger DATE 12-2-90
DATE OF ~~INSTALLATION~~ Plugging 11-07-90
J.L. 11-07-90

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 0.5 ET ~~NA~~ 12-2-90	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 4.5 ET ~~NA~~ 12-2-90	TOP	BOTTOM
SAND NONE USED ~~Cement~~	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ J.L. 11-07-90 ET 12-2-90	TOP NA ET ~~0.0~~ 12-2-90	BOTTOM NA ET ~~0.5~~ 12-2-90	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000994

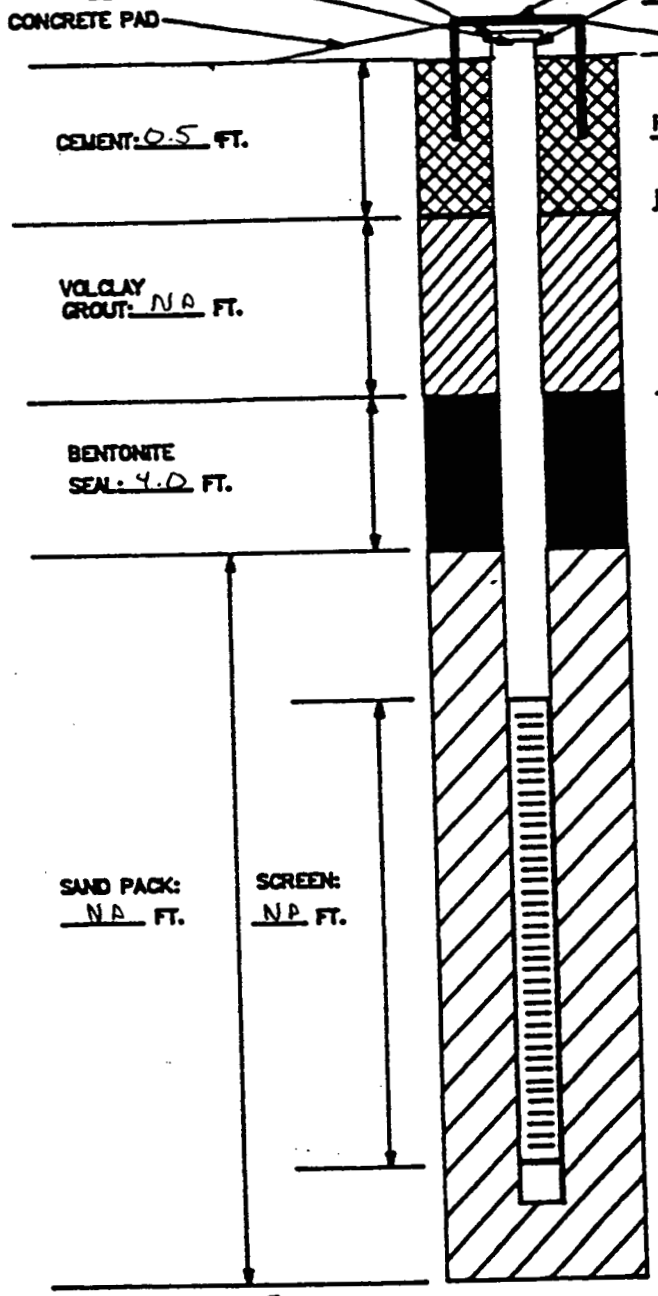
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged Boring 1580

J.L. 11-07-90

INSTALLATION DATE: 11-07-90



	HEIGHT
TOP OF PROTECTIVE WELL COVER:	NA FT
TOP OF PVC:	NA FT

(DEPTH) (FT)

BOTTOM OF PROTECTIVE WELL COVER:	NA FT
BOTTOM OF CEMENT:	0.5 FT
TOP OF BENTONITE SEAL:	0.5 ~~NA~~ FT (11-07-90 J.L)
TOP OF SAND PACK:	NA FT
TOP OF SCREEN:	NA FT
BOTTOM OF SCREEN:	NA FT
PIEZOMETER TIP:	NA FT
BOTTOM OF BORING:	4.5 FT

BOREHOLE DIAMETER: 3 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bags
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

Date	10/6/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

571 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1581	COORDINATES	DATE 10-2-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/27/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/2/90	
DRILLING METHODS ~~Split~~ & Auger drilling		PAGE 1 OF 4	

SAA - Same as above
NR - No Return

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56483 1645 9-27-90	7	6	medium dense 3/2 10yr very dark grayish brown gravelly silt moist, high organic content	GM	NA	Hnu = 0
	56484 1045 9-27-90	10	6	medium dense 4/6 10yr dark yellowish brown clayey silt trace sand gravel	ML	NA	α = 0
1	56485 1045 9-27-90	9	6	SAA	ML	NA	βγ = 80-90 cpm
	56486 1100 10-2-90	8	6	medium dense 5/4 10yr yellowish brown clayey silt trace sand moist	ML	NA	Hnu = 0
2	56487 1100 10-2-90	12	6	stiff 5/6 10yr to 3/2 10yr very dark grayish brown to yellowish brown silty clay trace silt moist	CL	1.75	α = 0
	56488 1100 10-2-90	21	6	medium dense 5/4 10yr yellowish brown clayey silt some gravel trace sand moist	ML	NA	βγ = 100-110 cpm
	56489 1335 10-2-90	13	6	SAA only slightly moist	ML	NA	Hnu = 0
4	56490 1335 10-2-90	19	6	SAA	ML	NA	α = 0
	56491 1335 10-2-90	17	6	SAA	ML	NA	βγ = 100 cpm
	56492 1415 10-2-90	6	6	SAA	ML	NA	Hnu = 0
5	56493 1415 10-2-90	9	6	SAA	ML	NA	α = 0
	56494 1415 10-2-90	14	6	SAA	ML	NA	βγ = 100 cpm
	56495 1422 10-2-90	5	0	NR	NA	NA	Hnu = 0
	56496 1422 10-2-90	11	3	medium dense 5/4 10yr to 4/6 7.5yr yellowish brown to strong brown clayey silt some gravel trace sand moist	ML	NA	α = 0
7	56497 1422 10-2-90	15	6	SAA	ML	NA	βγ = 60-80 cpm

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K Myers

Hnu: ~~80-12~~ J.L. 0.0 ppm
α: 0 cpm
βγ: 80-120 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0.0 ppm
α: 0 cpm
βγ: 80-120 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1581	COORDINATES	DATE 10-2-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/27/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/2/90	
DRILLING METHODS Auger drilling		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56498 1432 10-2-90	14	0	NR	NA	NA	Hnu = 0 α = 0 βγ = 100 cpm
	56499 1432 10-2-90	15	6	medium dense 5Y4/1 oyr yellowish brown clayey silt some gravel moist	ML	NA	
	56500 1432 10-2-90	12	4	stiff 5Y1/1 oyr to 5Y4/1 oyr ~~silty~~ gray to yellowish brown silty clay some gravel moist	CL	1.5	
9	56501 1520 10-2-90	17	6	medium dense 5Y4/1 oyr yellowish brown clayey silt trace sand moist	ML	NA	Hnu = 0 α = 0 βγ = 60-80 cpm
	56502 1520 10-2-90	22	6	stiff 5Y1/1 oyr gray silty clay some gravel moist	CL	1.75	
10				End of Sampling at 10.0 ft.			
				boring plugged and abandoned according to HSC sampling plan Total U and TCLP samples Taken from Drummed cuttings TCLP Sample No. 56503 Total U. " " 56504 IT Total U " " 56863 WMCO			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 60-120 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 60-120 cpm

402-11-86

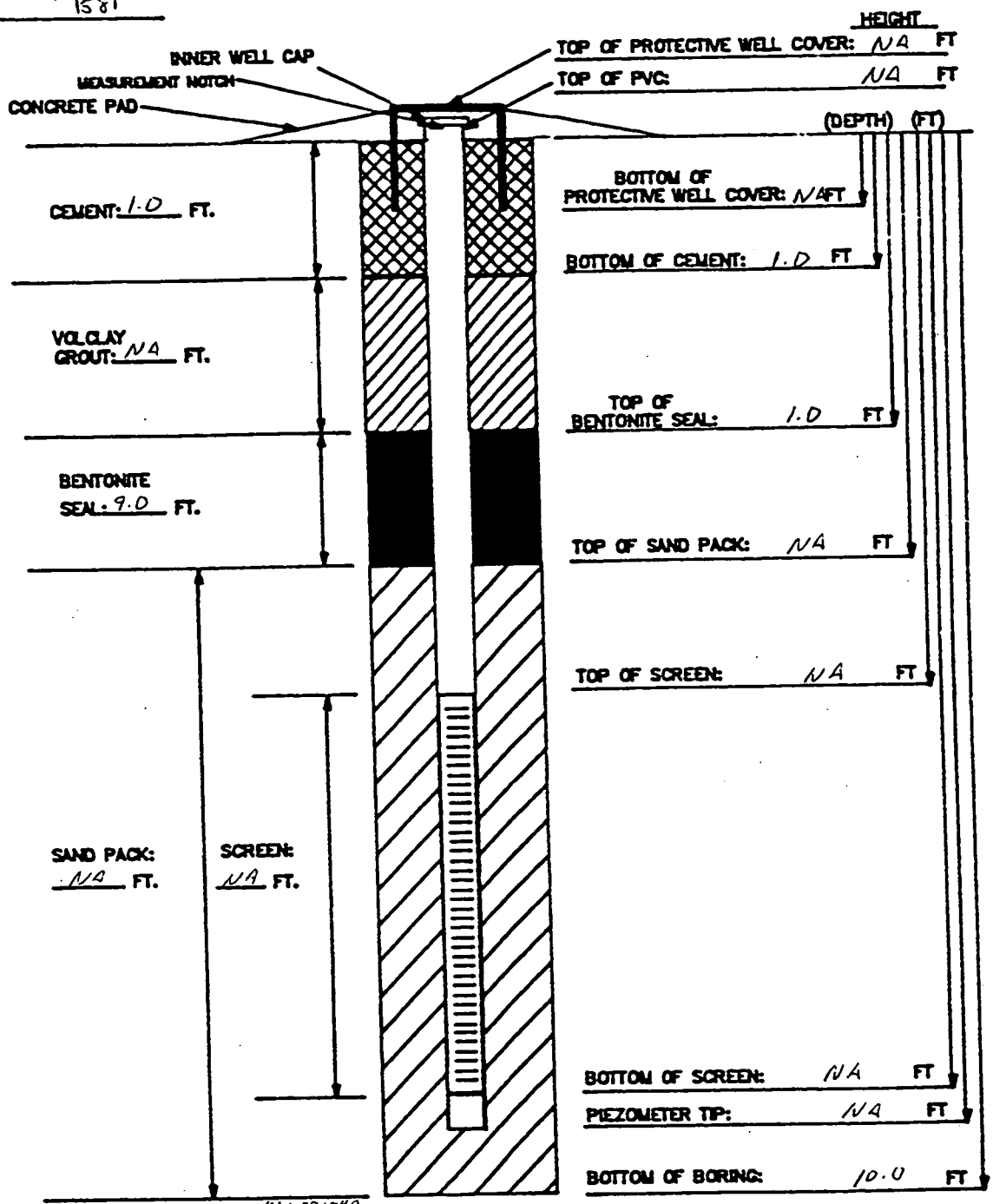
5711

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1581

INSTALLATION DATE: 10-3-90 Plugging



	HEIGHT	
TOP OF PROTECTIVE WELL COVER:	NA	FT
TOP OF PVC:	NA	FT

	(DEPTH)	(FT)
BOTTOM OF PROTECTIVE WELL COVER:	NA	FT
BOTTOM OF CEMENT:	1.0	FT
TOP OF BENTONITE SEAL:	1.0	FT
TOP OF SAND PACK:	NA	FT
TOP OF SCREEN:	NA	FT
BOTTOM OF SCREEN:	NA	FT
PIEZOMETER TIP:	NA	FT
BOTTOM OF BORING:	10.0	FT

BOREHOLE DIAMETER: 36 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 4.5

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: .5 bag

AMOUNT OF WATER USED: 5 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fmpc RIFS
FIELD ENG./GEO. J. Lear
DATE 10-03-90
PROJECT NO. 1602.3.7
CHECKED BY M.S.
DATE 11-01-90
BORING NO. 1581
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging 10-3-90

BOREHOLE DRILLING

DRILLING METHOD Auger Drilling
DRILLING FLUID (S) USED: NA
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 6" solid Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP ET ~~NA~~ 0.0	BOTTOM ~~NA~~ 1.0 ET	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

000999

FERNALD RI/FS

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	10-28-90		5711	
Initial	MC			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1582	COORDINATES	DATE 10-3-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/3/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/3/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56505 10-3-90 1004	6	6	medium dense 2.5y 5/4 light olive brown sandy gravelly silt, some organic material, slightly moist	ML	NA	Hnu = 0
Full HSL 1	56506 10-3-90 1004	8	6	SAA except no organic material	ML	NA	α = 0
	56507 10-3-90 1004	10	0	NR	NA	NA	βγ = 80 cpm
	56508 10-3-90 1054	19	6	very dense 2.5y 5/4 light olive brown sandy gravel, some silt, moist. Sand is poorly graded, gravel size is an average of .4 inches to 6 mm (~~well~~ graded)	GP	NA	Hnu = 0
2 Full HSL	56509 10-3-90 1054	30	6	SAA	GP	NA	α = 0
	56510 10-3-90 1054	28	6	SAA	GP	NA	βγ = 100 cpm
3	56511 10-3-90 1122	23	6	medium dense 2.5y 5/4 light olive brown sandy gravel, some silt, poorly graded, wet (WEM 10-3-90)	GP	NA	Hnu = 0
	56512 10-3-90 1122	15	6	SAA	GP	↓	α = 0
4 Full HSL	56513 10-3-90 1122	13	6	SAA	GP	↓	βγ = 80 cpm
	56514 10-3-90 1319	7	6	medium dense 2.5y 5/4 light olive brown sandy gravel, trace silt, well graded, wet	GP	NA	Hnu = 0
5	56515 10-3-90 1319	9	6	SAA	GP	NA	α = 0
	56516 10-3-90 1319	10	0	NR	NA	NA	βγ = 100 cpm
6	56517 10-3-90 1321	10	6	medium dense 2.5y 5/4 light olive brown sandy gravel, trace silt, well graded, wet	GP	NA	Hnu = 0
	56518 10-3-90 1321	10	0	NR	NA	NA	α = 0
7	56519 10-3-90 1321	15	0	NR	NA	NA	βγ = 100 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: CHRIS COULTER
ASSISTANT: BRIAN STRAPPAZZON

Hnu: SN 1185
α: ASI #13
βγ: ASI #2

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80-100 cpm

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ACZ-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1582	COORDINATES	DATE 10-3-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/3/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/3/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56520 10-3-90 1329	18	6	medium dense 2.5y 5/4 light olive brown sandy gravel, some silt, well graded, wet	GP	NA	Hnu = 0 α = 0 βγ = 100 cpm
	56521 10-3-90 1329	12	6	~~SAA~~ NR JCM 10-3-90	NA ~~GP~~	NA	
	56522 10-3-90 1329	10	0	NR	NA	NA	
9	56523 10-3-90 1408	18 G JCM 10-3-90	6	DENSE, 2.5y 5/4 light olive brown sandy gravel, trace silt, well graded, wet	GP	NA	Hnu = 0 α = 0 βγ = 80 - 100 cpm
FULL HSL 10	56524 10-3-90 1408	16 G JCM 10-3-90	6	SAA	GP	NA	
				DRILLING/SAMPLING HALTED @ 10.0 FT. AS PER WORKPLAN. NO PIEZOMETER SET. TCLP (# 56525) TAKEN AT 1423			Hnu = α = βγ =
				TOTAL U'S (ASI/17 # 56526, WMCO # 56864) TAKEN AT 1437			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: CHRIS COULTER
ASSISTANT: BRIAN STRAPAZZIN

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80 - 100 cpm

Hnu: SN 1185
α: ASI #13
βγ: ASI #2

001001

402-11-86

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. MASON DATE 10-3-90
PROJECT NO. 602.3.7
CHECKED BY MS DATE 11-01-90
BORING NO. 1582
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 10-3-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS DRILLING/SAMPLING HALTED @ 10.0 FT.; NO PIEZOMETER SET (AS PER WORKPLAN)

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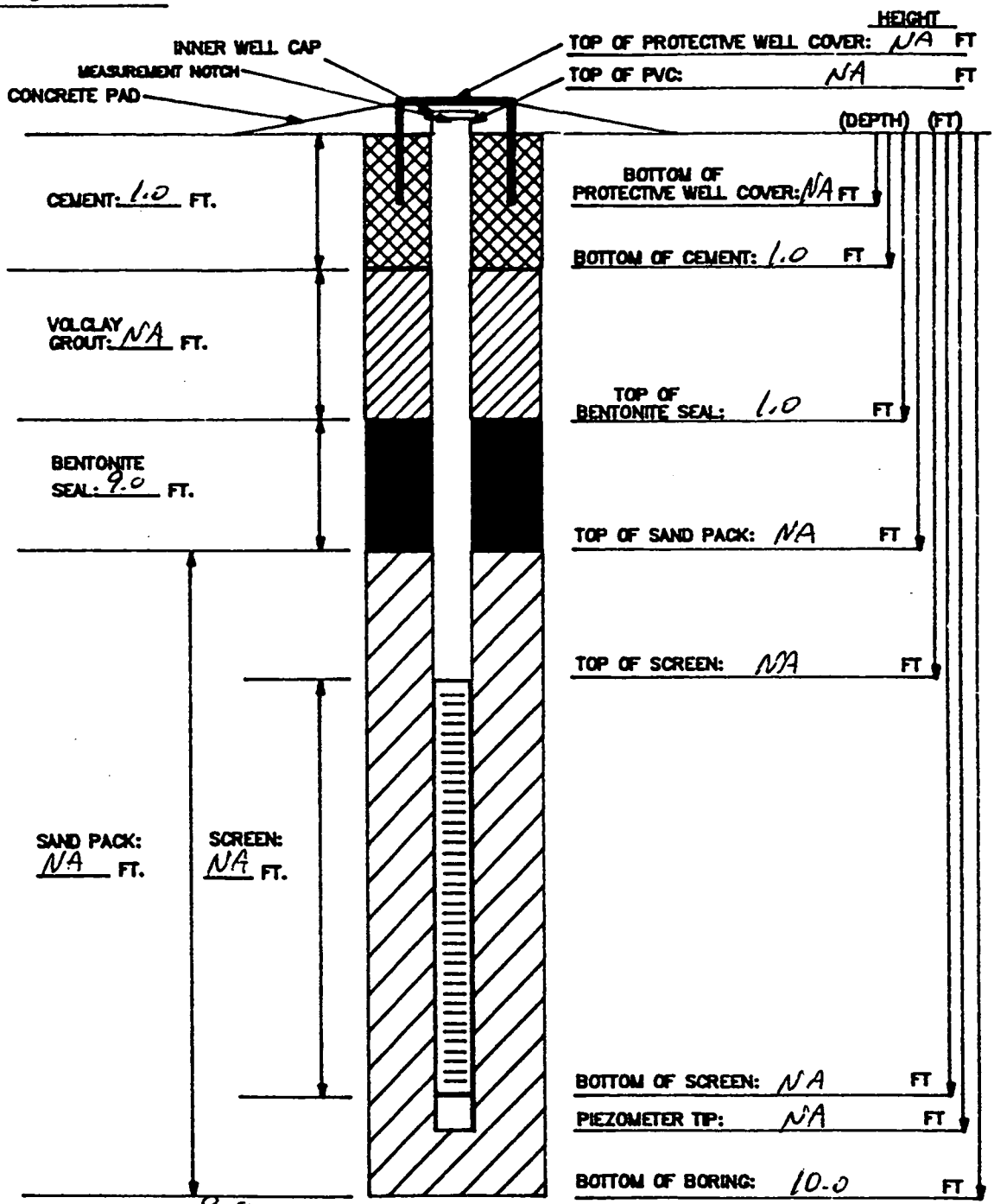
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1582

~~INSTALLATION~~ PLUGGING DATE: 10-3-90



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 7.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

Date	10/5/90			
Initial	B.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1583	COORDINATES	DATE 10/02/90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/27/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/2/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56550 9-27-90 0913	12	6	very dense 2.5y 5/6 sandy clayey gravel, some organic material, moist	GC	NA	Hnu = 0
Field HSL 1	56551 9-27-90 0913	22	6	very dense 2.5y 5/6 gravelly ~~silty~~ clay 9-27-90 sandy silt, some organic material slightly moist	ML	NA	α = 0
	56552 9-27-90 0913	48	0	NR	NA	NA	βγ = NO METER AVAILABLE
	56553 10-2-90 1036	9	6	dense 2.5y 5/4 light olive brown poorly graded sand, some gravel, moist	SP	NA	Hnu = 0
2 Field HSL	56554 10-2-90 1036	19	6	SAA			α = 0
	56555 10-2-90 1036	21	6	SAA			βγ = 100 cpm
3	56556 10-2-90 1256	17	6	dense 2.5y 5/4 light olive brown poorly graded sand, some gravel, trace silt, wet (sand is coarse)	SP	NA	Hnu = 0
	56557 10-2-90 1256	15	6	SAA			α = 0
4 Field HSL	56558 10-2-90 1256	18	6	SAA			βγ = 100 cpm
	56559 10-2-90 1309	7	6	medium dense 2.5y 5/4 light olive brown poorly graded sand, some gravel, trace silt, wet (sand is coarse)	SP	NA	Hnu = 0
5	56560 10-2-90 1309	7	6	SAA	SP	NA	α = 0
	56561 10-2-90 1309	6	0	NR	NA	NA	βγ = 80 cpm
6	56562 10-2-90 1312	10	6	medium dense 2.5y 5/4 light olive brown poorly graded sand, some gravel, trace silt, wet (sand is coarse)	SP	NA	Hnu = 0
	56563 10-2-90 1312	10	6	SAA	SP	NA	α = 0
7	56564 10-2-90 1312	12	0	NR	NA	NA	βγ = 100 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST/CHRIS COULTER
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100 cpm

Hnu: SN 1185
α: AS1 # 13
βγ: AS1 # 2

SAA = "same as above"
NR = "no recovery"

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1583	COORDINATES	DATE 10-2-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/27/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/2/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56565 10-2-90 1315	10	6	medium dense 2.5y 5/4 light olive brown poorly graded sand, some gravel, trace silt, wet (sand is coarse)	SP	NA	Hnu = 0 α = 0 βγ = 100 cpm
	56566 10-2-90 1315	7	6	SAA	SP	NA	
	56567 10-2-90 1315	8	0	NR	NA	NA	
9	56568 10-2-90 1330	7	6	medium dense 2.5y 5/4 light olive brown gravelly poorly graded sand, trace silt, wet (sand is coarse	SP	NA	Hnu = 0 α = 0 βγ = 40-60 cpm
10	56569 10-2-90 1330 (ALL HSL)	9	6	SAA	SP	NA	
				DRILLING/SAMPLING HALTED AT 10.0 FT.			
				AS PER WORKPLAN. NO PIEZOMETER SET. TCLP TAKEN AT 1345 TCLP SAMPLE NO. 56570 TOTAL U'S TAKEN AT 1359 ASI/IT TOTAL U SAMPLE NO 56571 WMCO TOTAL U SAMPLE NO 56865			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: DENNDRILL
DRILLER: CHRIS COULTER
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100 cpm

Hnu: SN 1185
α: ASI #13
βγ: ASI #2

SAA = "Same as above"
NR = "no recovery"

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1583
PIEZOMETER NO. NA

FIELD ENG./GEO. J MASON DATE 10-2-90
CHECKED BY E.T. DATE 10-05-90
DATE OF ~~INSTALLATION~~ PLUGGING 10-2-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE PELLETS + H_2O	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

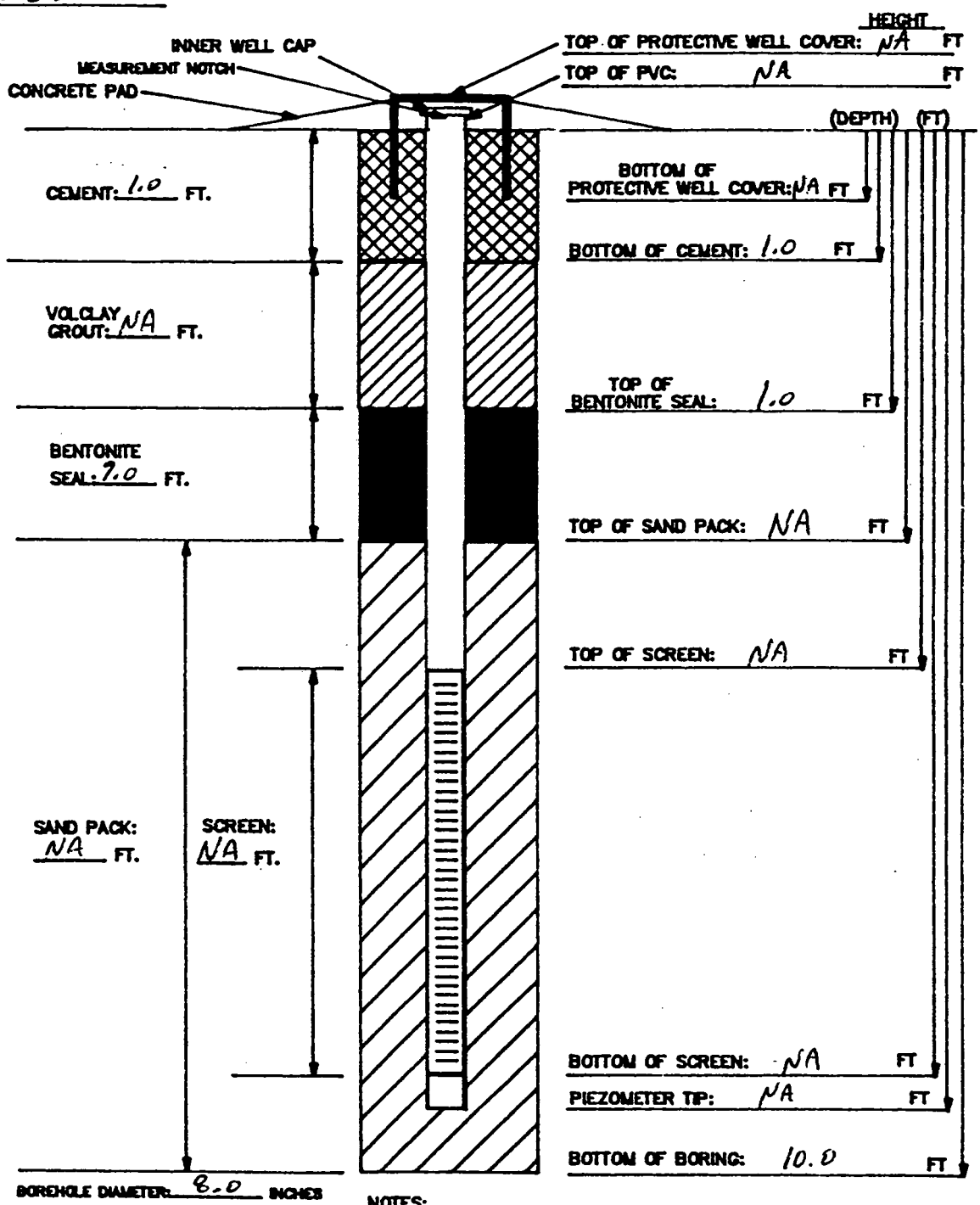
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS SAMPLING/DRILLING HALTED @ 10.0 FT. AS PER WORKPLAN, NO PIEZOMETER SET.

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1583

INSTALLATION DATE: 10-2-90
PLUGGING



MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 1 GALLON
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD RI/FS

	Date			
	Initial	E.T.		
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1584	COORDINATES	DATE 9-27-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/24/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/25/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56572 9-24-90 1343	6	6	very dense 10yr 3/3 dark brown humus, organic material about 30-40%, slightly moist	PT	NA	Hnu = 0 α = 0 βγ = 180-200 cpm
FILL HSL 1	56573 9-24-90 1343	19	6	very dense 10yr 2/0 black coal, some gravel, some silt, trace organic matter (rootlets)			
	56574 9-24-90 1343	57	6	very dense 2.5y 5/4 light olive brown clayey silt, ~~some gravel~~, slightly moist gravelly JCM 9-24-90	ML	NA	
	56575 9-24-90 1434	53	6	very dense 2.5y 5/6 light olive brown clayey gravelly silt, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 100 cpm
2 FILL HSL	56576 9-24-90 1434	39	6	SAA	↓	↓	
	56577 9-24-90 1434	24	6	SAA	↓	↓	
3	56578 9-24-90 1538	60	6	very dense 2.5y 5/6 light olive brown clayey gravelly silt, trace sand, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 100 cpm
	56579 9-24-90 1538	52	6	SAA	↓	↓	
4 FILL HSL	56580 9-24-90 1538	31	6	SAA	↓	↓	
	56581 9-24-90 1615	16	6	dense 10yr 2/1 black with some (10%) 10yr 8/8 yellow gravelly clayey silt, trace sand, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 80 cpm
5	56582 9-24-90 1615	17	6	SAA	↓	↓	
	56583 9-24-90 1615	20	6	dense 2.5y 6/6 olive yellow with some 10yr 6/1 gray intermixed clayey silt, trace gravel, slightly moist	↓	↓	
6	56584 9-24-90 1619	21	6	dense 2.5y 6/6 olive yellow clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 90
	56585 9-24-90 1619	23	4	SAA	ML	NA	
7	56586 9-24-90 1619	20	0	NR	NA	NA	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SCRAPPZZONI

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80 cpm

Hnu: SN 1185
α: ASI #3
βγ: ASI #5

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1584	COORDINATES	DATE	9-27-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	9/24/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	9/25/90
DRILLING METHODS CME 45 AUGER		PAGE 2	OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56587 9-24-90 1625	23	0	NR	NA	NA	Hnu = NA α = Bγ =
	56588 9-24-90 1625	27	0				
9	56589 9-24-90 1625	29	0				
	56590 9-25-90 0906	15	6	Loose (10yr 5/1 with 5yr 4/6 gelatinous FeO (about 10% of sample) intermixed; Clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 Bγ = 80-90 cpm
FAIL MSL 10	56591 9-25-90 0906	28	6	SAA	ML	NA	
				DRILLING HALTED @ 10.0 FEET AS PER WORKPLAN. NO PIEZOMETER SET. HOLE FILLED WITH 4 BUCKETS BENTONITE AND CAPPED WITH 1/2 BAG CEMENT. 1.5 GALLONS WATER USED.			Hnu = α = Bγ =
				TCLP TAKEN AT 0915 SAMPLE #: 56592 TOTAL U'S TAKEN AT 0922 SAMPLE # 56593 SAMPLE # 56860 (WMCo)			Hnu = α = Bγ =
							Hnu = α = Bγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #3
Bγ: ASI #5

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
Bγ: 80 cpm

001009

402-11-88

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1584
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 9-27-90
CHECKED BY E. Trollinger DATE 10-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 9-25-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

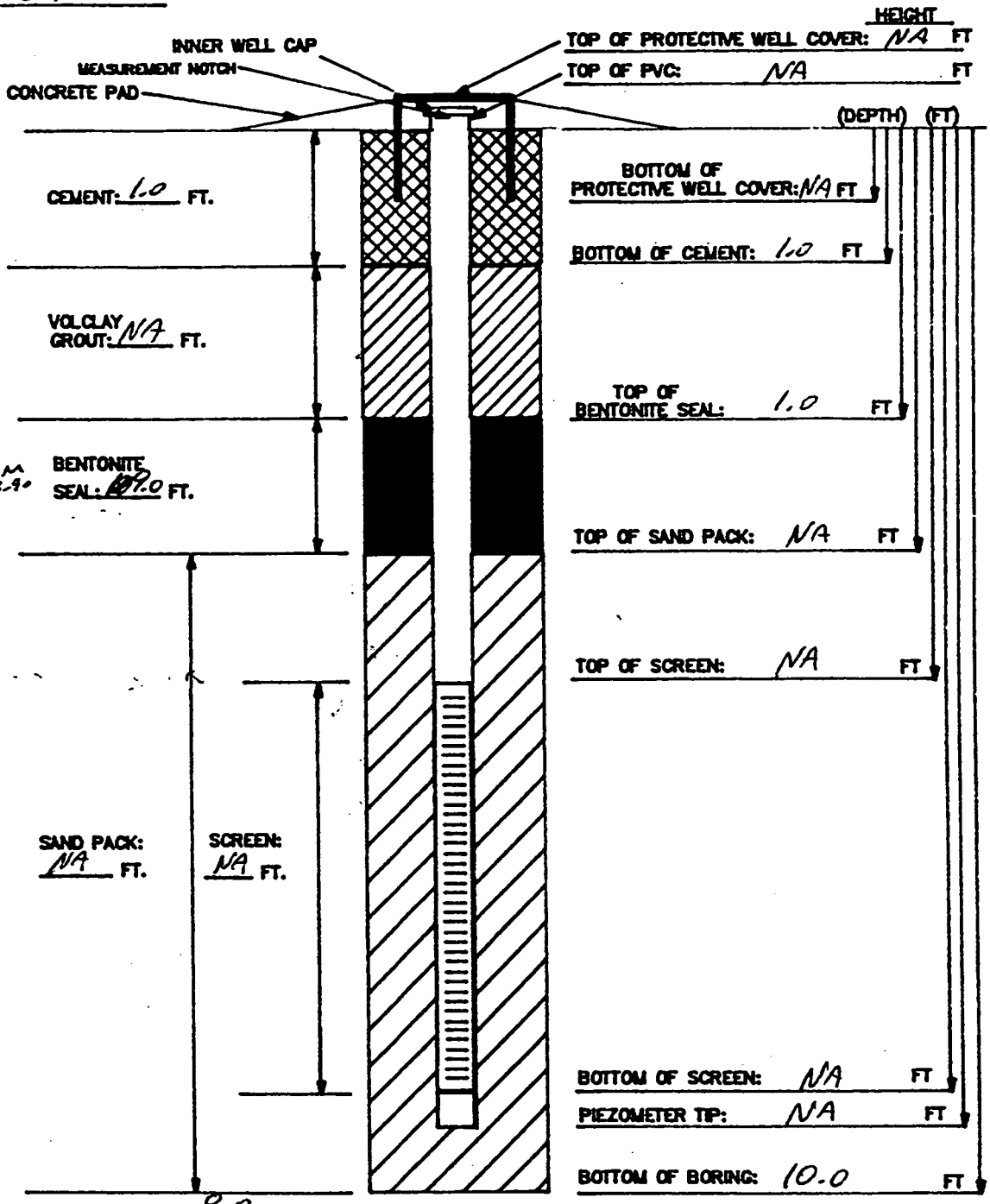
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING HALTED @ 10.0 FT. AS PER WORKPLAN. NO PIEZOMETER SET.

001010

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1584

INSTALLATION DATE: 9-25-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 1.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD
RI/FS

Date	10/1/90		
Reviewer	KET	5711	
	File Copy	1st Review	2nd Review	Final Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1585	COORDINATES	DATE 9-25-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/25/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/26/90	
DRILLING METHODS Auger Drilling		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56594 1420 9-25-90	5	6	medium dense 4/4 10yr clayey silt trace sand moist, organics	ML	NA	Hnu = 0 α = 0 βγ = 30-50 CPM
	56595 1420 9-25-90	7	6	medium dense 4/4 10yr, 5YR 10yr 4/6 10yr dark yellowish brown to yellowish red clayey silt trace sand trace coal ~~slightly~~ moist	ML	NA	
	56596 1420 9-25-90	12	6	SAA	ML	NA	
2	56597 1512 9-25-90	22	6	medium dense 5/4 10yr yellowish brown gravelly sand some silt (poorly graded)	SW	NA	Hnu = 0 α = 0 βγ = 20-50 CPM
	56598 1512 9-25-90	9	6	medium dense 5/1 10yr to 5/4 10yr ~~clayey silt~~ gray to yellowish brown clayey silt ~~trace~~ ~~silt~~ sand moist	ML	NA	
3	56599 1512 9-25-90	10	6	SAA	ML	NA	
4	56600 0910 9-26-90	7	0	NR			Hnu = 0 α = 0 βγ = 60-80 CPM
	56601 0910 9-26-90	9	6	medium stiff 5/1 10yr to 4/6 7.5yr ~~silty clay~~ gray to strong brown trace sand and gravel moist	CL	I.D.	
	56602 0910 9-26-90	10	6	same as above as well as: medium dense 5/1 10yr to 4/6 10yr gray to dark yellowish brown clayey silt trace sand and gravel slightly moist	ML	NA	
5	56603 0927 9-26-90	5	3	medium stiff 5/1 10yr to 4/6 ~~10yr~~ 7.5yr gray to strong brown silty clay trace sand and gravel moist	CL	I.D	Hnu = 0 α = 0 βγ = 80-100 CPM
	56604 0927 9-26-90	6	6	medium dense 4/6 10yr dark yellowish brown clayey silt trace sand moist	ML	NA	
6	56605 0927 9-26-90	11	6	SAA	ML	NA	
7	56606 1040 9-26-90	23	0	NR			Hnu = 0 α = 0 βγ = 60-80 CPM
	56607 1040 9-26-90	21	0	NR			
	56608 1040 9-26-90	25	6	Dense 4/6 10yr dark yellowish brown clayey silt some gravel moist	ML	NA	

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K Myers

Hnu: 0 ppm
α: 0 CPM
βγ: 100-200 CPM

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 CPM
βγ: 100-200 CPM

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI / FS		
BORING NUMBER 1595	COORDINATES	DATE 9-26-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/25/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/26/90	
DRILLING METHODS Auger Drilling		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56608 1035 9-26-90	5	0	NR			Hnu = 0 α = 0 βγ = 80-120
	56609 1035 9-26-90	14	6	Dense 4/6 10yr - ~~7.5yr clayey silt~~ dark yellowish brown to strong brown clayey silt Limestone gravel moist	ML	NA	
	56610 1035 9-26-90	30	6	Stiff 5/1 10yr to 4/6 7.5yr gray to strong brown silty clay Limestone gravel moist	CL	1.5	
9	56611 1400 9-26-90	11	6	Stiff 5/1 10yr to 4/6 10yr gray to dark yellowish brow Gravelly clay moist	CL	1.5	Hnu = 0 α = 0 βγ = 80-120
	56612 1400 9-26-90	13	6	SAA	CL	1.5	
10	9-26-90			Bottom of Boring @ 10.0 FT. End of Sampling @ 10.0 FT.			
			K	TCLP & Total U. Sample (Taken from Drummed cuttings TCLP Sample No. Total U sample No. 76862 Total U Sample No. 76615 II			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: —
DRILLER: See p. 1
ASSISTANT: —

Hnu: 0
α: 0
βγ: 100-200 CPM

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-200 CPM

402-11-86

FERNALD RI/FS

3/4

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
PROJECT NO. 602.3.7
BORING NO. 1585
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Lear DATE 9-26-90
CHECKED BY E. Trollinger DATE 10-2-90
~~DATE OF INSTALLATION~~ Plugged 9-26-90

BOREHOLE DRILLING

DRILLING METHOD Auger drilling
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT ~~6" Solid Stem~~ 8 in Hollow stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 FT. ~~NA~~ ET	BOTTOM 0.5 FT. ~~NA~~ ET	TOP	BOTTOM
BENTONITE PELLETS	TOP 0.5 ft	BOTTOM 9-26-90 ~~NA~~ 100 ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	NA			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS water added to Bentonite pellets

001014

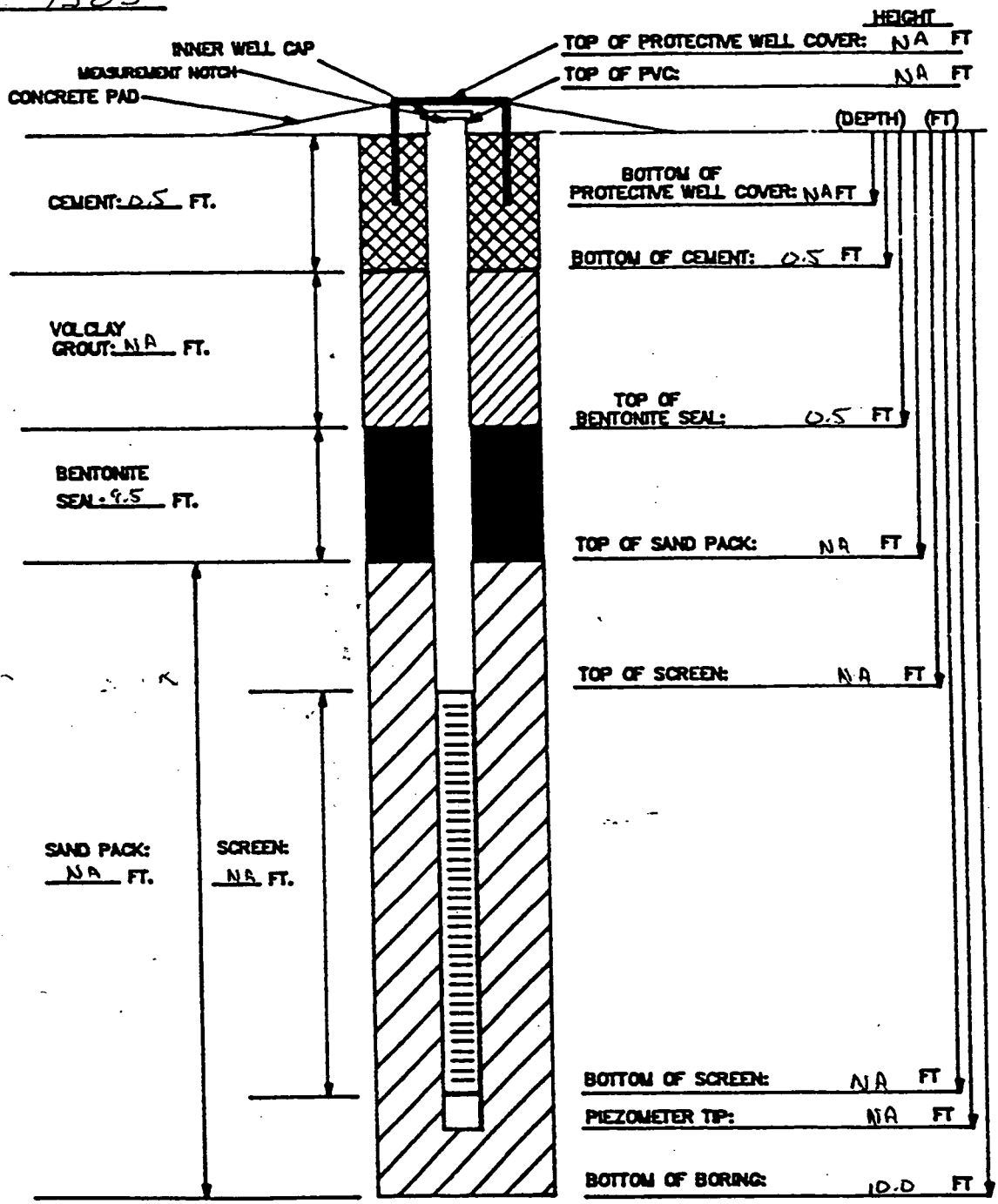
409-11-85

4/4

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1585

Plug INSTALLATION DATE: 9-26-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 10 gals
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6023.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

Date	10/9/90			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Ver.

571 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1586	COORDINATES	DATE	9-27-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	9/25/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	9/26/90
DRILLING METHODS CME 45 AUGER		PAGE 1	OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56616 9-25-90 1359	10	6	dense 10yr 4/2 dark grayish brown humus, trace gravel, slightly moist	PT	NA	Hnu = 0; α = 0; βγ = 100 cpm
FULL HOL 1	56617 9-25-90 1359	10	6	SAA; Also, some pieces of asbestos found at this interval	PT	NA	
	56618 9-27-90 1359	35	6	dense 2.5y 5/4 light olive brown clayey silty gravel, slightly moist	GC		
	56619 9-25-90 1507	21	6	very dense 2.5y 6/6 olive yellow clayey silt; some 10yr 6/1 gray intermixed (10%) some gravel, slightly moist	ML	NA	Hnu = 0; α = 0; βγ = 80 cpm
2 FULL HOL	56620 9-25-90 1507	33	6	SAA			
	56621 9-25-90 1507	21	6	SAA			
3	56622 9-26-90 0920	21	6	very dense 2.5y 6/6 olive yellow with some 10yr 7/1 light gray (10%) intermixed clayey silt, some gravel, slightly moist	ML	NA	Hnu = 0; α = 0; βγ = 50 cpm
	56623 9-26-90 0920	30	6	very dense 2.5y 6/6 olive yellow with some 10yr 7/1 light gray intermixed (10%) clayey silt, trace gravel, slightly moist			
4 FULL HOL	56624 9-26-90 0920	23	6	SAA			
	56625 9-26-90 1038	7	0	NR	NA	NA	Hnu = NA; α = ; βγ =
5	56626 9-26-90 1038	10	0				
	56627 9-26-90 1038	10	0				
6	56628 9-26-90 1041	17	0	NR	NA	NA	Hnu = NA; α = ; βγ =
	56629 9-26-90 1041	25	0				
7	56630 9-26-90 1041	24	0				

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN K STRAPAZION

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100 cpm

Hnu: SN 1185
α: ASI #3
βγ: ASI #5

SAA: SAME AS ABOVE
NR: NO RECOVERY

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1586	COORDINATES	DATE 9-27-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/25/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/26/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56631 9-26-90 1046	23	6	dense 2.5y 5/4 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 100 cpm
	56632 9-26-90 1046	22	6	SAA	↓	↓	
	56633 9-26-90 1046	24	0	NR	NA	NA	
9	56634 9-26-90 1351	19	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist, 20% of sample is iron stained	ML	NA	Hnu = 0 ∝ = 0 βγ = 100 cpm
FULL HSL 10	56635 9-26-90 1351	19	6	SAA	↓	↓	
				DRILLING HALTED @ 10.0 FT. AS PER WORKPLAN. HOLE FILLED WITH 5 BUCKETS OF BENTONITE, CAPPED WITH 1/2 BAG CEMENT. 2 GALLONS WATER USED. NO PIEZOMETER SET.			Hnu = ∝ = βγ =
				TCLP TAKEN @ 1410 TCLP SAMPLE # 56636			
				TOTAL U'S TAKEN @ 1421 TOTAL U SAMPLE #'S : 56637 & 56866 (NMCO)			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB LOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 100 cpm

Hnu: SN 1185
∝: ASI #3
βγ: ASI #5

001017

402-11-88

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J MASON DATE 9-27-90
PROJECT NO. 602.3.7
CHECKED BY E. Trollinger DATE 10-2-90
BORING NO. 1586
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 9-26-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~ →
SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS DRILLING HALTED @ 10.0 FT. AS PER WORKPLAN. NO PIEZOMETER SET.

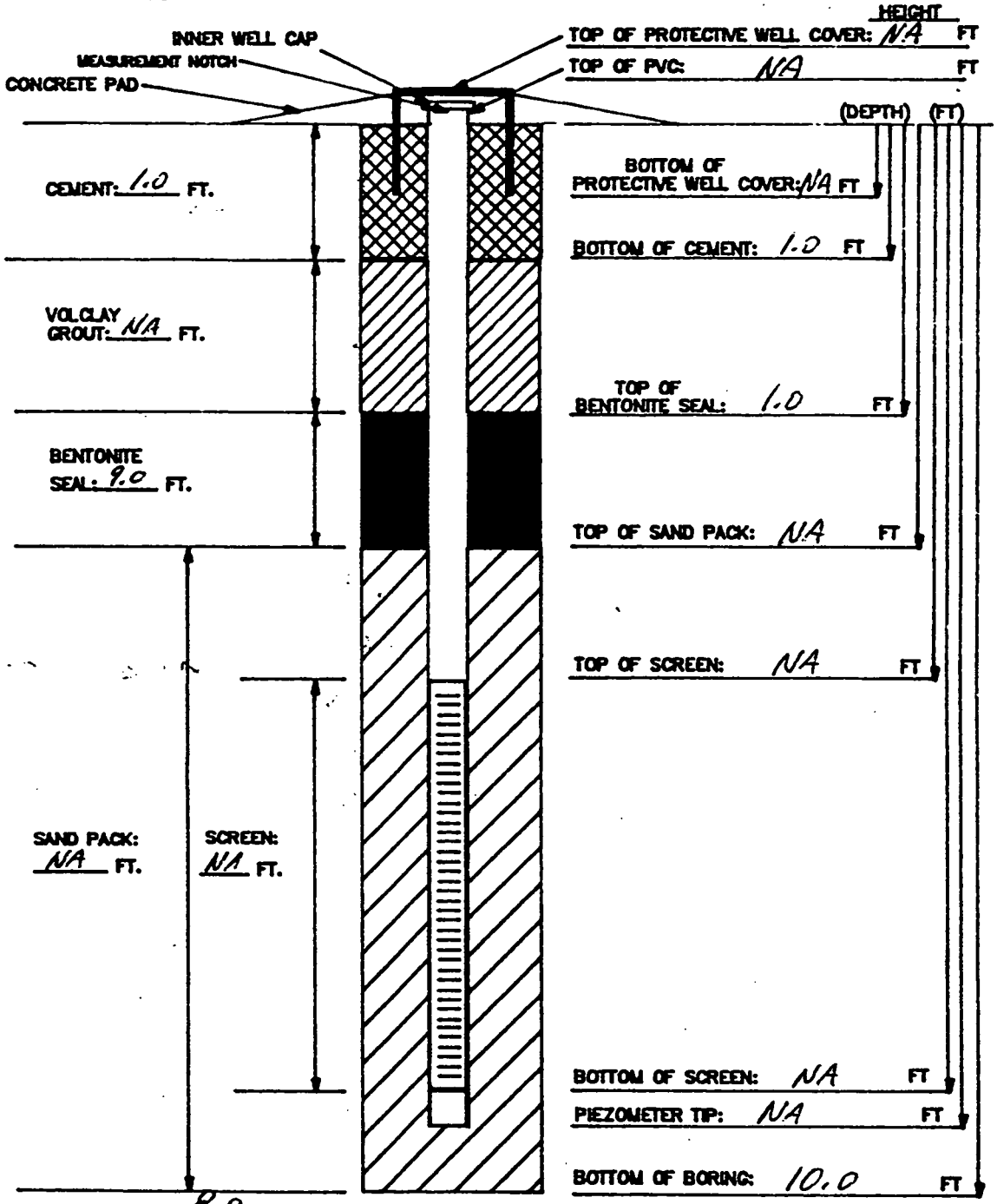
001018

4C9-11-85

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1586

~~INSTALLATION~~ PLUGGING DATE: 9-26-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 2 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J NASON.

FERNALD RI/FS

Date	10/23/90			
Initial	MG	5711		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1587	COORDINATES	DATE	10/17/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	10/16/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	10/17/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56638 10/16/90 1406	18	6	dense 2.5y 5/6 light olive brown sandy silty gravel, dry; gravel is poorly graded trace organic material	GP	NA	Hnu = 0
FULL HSL 1	56639 10/16/90 1406	24	6	dense 2.5y 5/6 light olive brown silt, some gravel, dry (clayey)	ML	NA	α = 0
	56640 10/16/90 1406	14	0	NR	NA	NA	βγ = 100 cpm
	56641 10/16/90 1459	11	6	dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
2 FULL HSL	56642 10/16/90 1459	20	6	SAA			α = 0
	56643 10/16/90 1459	17	6	SAA			βγ = 80 cpm
3	56644 10/17/90 0922	14	6	very dense 2.5y 5/6 light olive brown clayey silt, some gravel, slightly moist	ML	NA	Hnu = 0
	56645 10/17/90 0922	29	6	SAA			α = 0
4 FULL HSL	56646 10/17/90 0922	22	6	SAA			βγ = 100 cpm
	56647 10/17/90 1004	7	4	medium dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
5	56648 10/17/90 1004	6	0	NR	NA	NA	α = 0
	56649 10/17/90 1004	5	0	NR	NA	NA	βγ = 80 cpm
6	56650 10/17/90 1006	4	6	medium dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56651 10/17/90 1006	6	0	NR	NA	NA	α = 0
7	56652 10/17/90 1006	8	0	NR	NA	NA	βγ = 80 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN SMAPAZZON

Hnu: SN 1185
α: ASI #6
βγ: ASI # 19

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100 cpm

001020

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1587	COORDINATES.	DATE	10/17/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	10/16/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	10/17/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56653 10/17/90 1009	5	6	medium stiff 2.5, 5/6 light olive brown silty clay, trace gravel, slightly moist, medium plasticity	CL	.75	Hnu = 0 ∝ = 0 βγ = 80 cpm
	56654 10/17/90 1009	5	0	NR	NA	NA	
	56655 10/17/90 1009	5	0	NR	NA	NA	
9	56656 10/17/90 1050	6	6	stiff 10yr 5/1 gray silty clay, trace gravel, moist, medium plasticity	CL	1.5	Hnu = 0 ∝ = 0 βγ = 80 cpm
FILL HSL 10	56657 10/17/90 1050	5	6	medium stiff 10yr 5/1 gray silty clay, trace gravel, moist, medium plasticity	CL	.75	
				DRILLING/SAMPLING HALTED AT 10.0 FT. AS PER WORK PLAN. NO PIEZOMETER SET. TCLP SAMPLES (# 56658) TAKEN AT 1105			Hnu = ∝ = βγ =
				TOTAL U SAMPLES (IT # 56659 AND WMCO # 56867) TAKEN AT 1120			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN K. STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 100 cpm

Hnu: SN 1185
∝: ASI #6
βγ: ASI #19

001021

402-11-88

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. MASON
DATE 10-17-90
PROJECT NO. 602.37
CHECKED BY MS
DATE 11-01-90
BORING NO. 1587
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 10-17-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

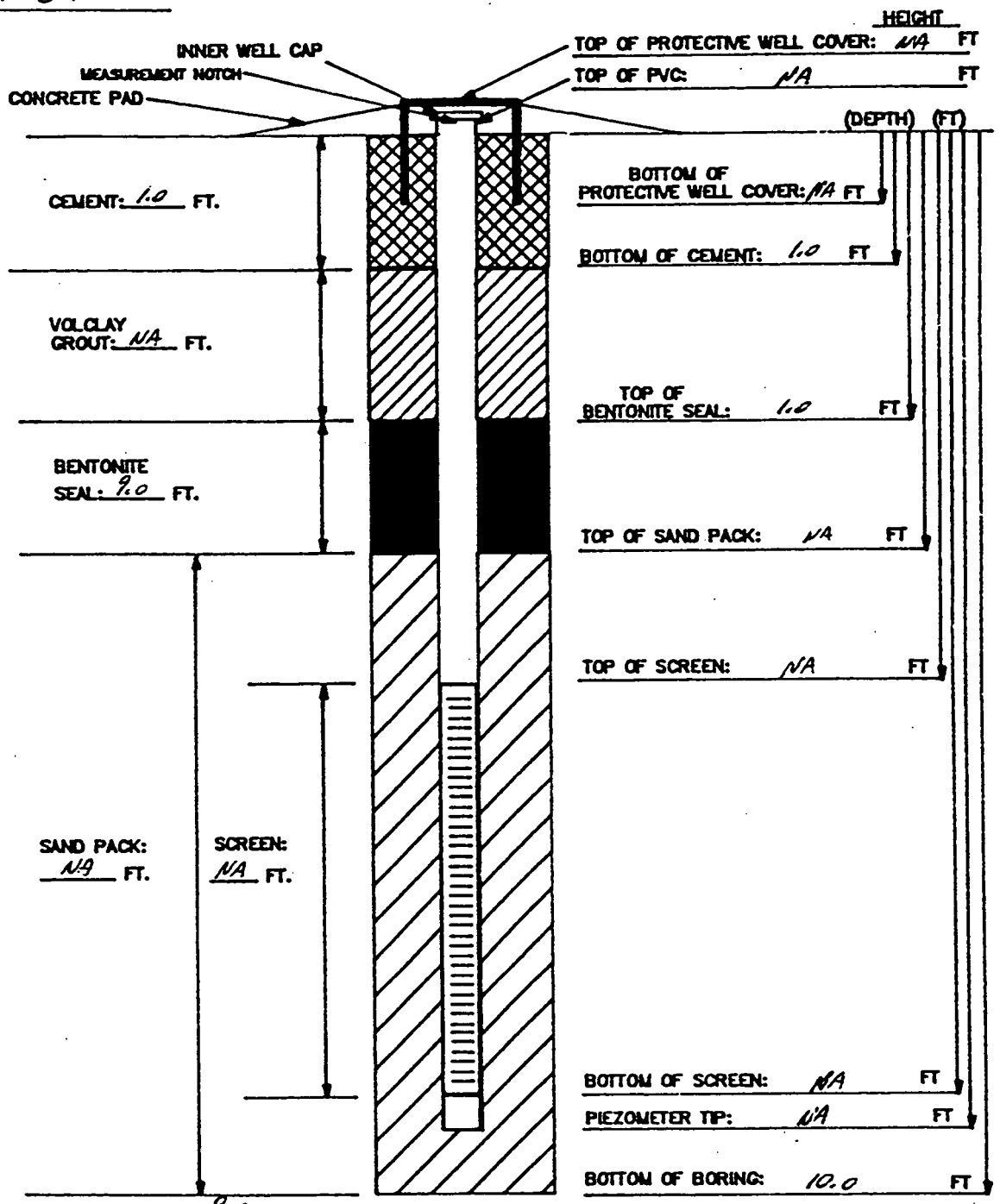
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING STOPPED AT 10.0 FT, NO PIEZOMETER SET (AS PER WORKPLAN)

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1587

~~INSTALLATION~~ PLUGGING DATE: 10-17-80



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6023.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

Date	9/12/90			
Initial	E.T.			
	Field Check	1st Keyin	2nd Keyin	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1588	COORDINATES	DATE 9-20-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/19/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/20/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE (TYPE & NO)	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
-M -20-90							
56417	~~18295~~ 9-19-90 1610	11	6	dense 10yr 5/2 grayish brown organic soil, some gravel, some sand moist	PT	NA	Hnu = 0
.418							α = 0
FULL HSL 1	~~18296~~ 9-19-90 1610	14	6	dense 2.5y 5/6 light olive brown gravelly clayey silt, trace sand, some organic material, slightly moist	ML	NA	βγ = 30 cpm
.419	~~18297~~ 9-19-90 1610	15	6	SAA, except no organic matter	ML	NA	
2	56420 9-20-90 0913	34	6	dense 10yr 7/6 yellow with some 10yr 7/1 light gray intermixed clayey silt; some gravel, dry	ML	NA	Hnu = 0
							α = 0
FULL HSL	56421 9-20-90 0913	22	6	SAA			βγ = 40 cpm
	56422 9-20-90 0913	24	6	SAA			
3	56423 9-20-90 1036	26	6	very dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
							α = 0
	56424 9-20-90 1036	33	6	SAA			βγ = 80 cpm
4 FULL HSL	56425 9-20-90 1036	20	6	SAA			
	56426 9-20-90 1332	9	6	medium dense 2.5y 6/6 olive yellow clayey silt, slightly moist; some 10yr 6/1 gray intermixed	ML	NA	Hnu = 0
5							α = 0
	56427 9-20-90 1332	13	6	SAA			βγ = 0
	56428 9-20-90 1332	17	6	SAA			
6	56429 9-20-90 1337	17	6	very dense 2.5y 6/6 olive yellow clayey silt, trace gravel, slightly moist, some 10yr 6/1 gray intermixed	ML	NA	Hnu = 0
							α = 0
	56430 9-20-90 1337	24	6	SAA			βγ = 0
7	56431 9-20-90 1337	27	3	SAA, except some gravel			

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 900 cpm

Hnu: 1185
α: ASI # 3
βγ: ASI # 5

001024

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1588	COORDINATES	DATE 9-20-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 9/19/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 9/20/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56432 9-20-90 1342	21	6	very dense 2.5 y 5/4 light olive brown clayey silt, trace gravel, dry	ML	NA	Hnu = 0 α = 0 βγ = 10 cpm
	56433 9-20-90 1342	33	6	very dense 10yr 5/1 gray with some 7.5yr 5/6 strong brown intermixed clayey silt, trace gravel, dry	↓	↓	
	56434 9-20-90 1342	27	3	SAA	↓	↓	
9	56435 9-20-90 1421	9	6	medium dense 10yr 6/2 light brownish gray to 10yr 5/1 gray with some 10yr 6/6 brownish yellow mixed in; clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 0 cpm
FOU HSL 10	56436 9-20-90 1421	14	6	medium dense 10yr 5/1 gray with some 10yr 6/6 brownish yellow intermixed, clayey silt, trace gravel, slightly moist	ML	NA	
				DRILLING/SAMPLING STOPPED AT 10.0 FEET AS PER WORKPLAN. HOLE FILLED WITH 5 BUCKETS BENTONITE			
				AND PLUGGED WITH 1 BAG CEMENT 2.5 GALLONS WATER USED.			Hnu = α = βγ =
				TCLP'S TAKEN AT 1425 TOTAL U'S TAKEN AT 1427			
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAAAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 900 cpm

Hnu: SN 1185
α: ASI #3
βγ: ASI #5

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME EMPC RI/FS
FIELD ENG./GEO. J. MASON
DATE 9-20-90
PROJECT NO. 602.3.7
CHECKED BY E. Trollinger
DATE 10-2-90
BORING NO. 1588
PIEZOMETER NO. ~~1588~~ NA JCM 9-20-90
DATE OF ~~INSTALLATION~~ PLUGGING 9-20-90

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Hollow Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →	SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

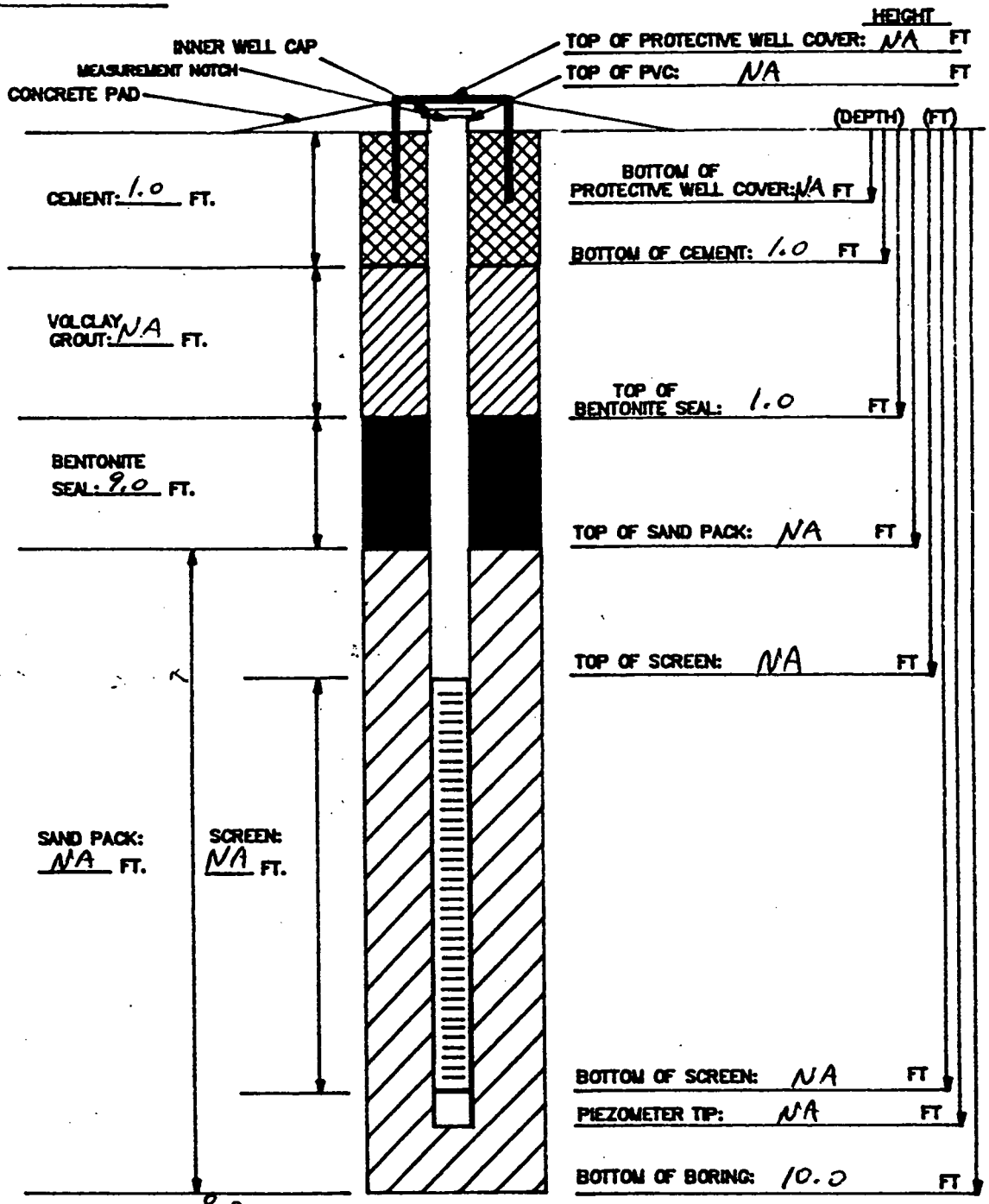
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING HALTED AT 10.0 FT. AS PER WORK PLAN. NO PIEZOMETER SET.

001026

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1588

~~INSTALLATION DATE:~~ 9-20-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J MASON

FERNALD RI/FS

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	10/2/90			
Initial	E.T.			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1589	COORDINATES	DATE	9 23 90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	9/21/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	9/23/90
DRILLING METHODS CME 45 AUGER		PAGE 1	OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56461 9-21-90 0954	8	6	medium dense 10yr 3/1 very dark gray to 10yr 5/4 yellowish brown organic material, trace gravel, slightly moist	PT	NA	Hnu = 0
FULL HOL	56462 9-21-90 0954	8	6	medium dense 10yr 5/4 yellowish brown clayey silt, trace gravel, trace organic material, slightly moist; some 10yr 5/1 intermixed	ML	NA	α = 0
1	56463 9-21-90 0954	18	6	SAA	↓	↓	βγ = 100 cpm
	56464 9-21-90 1046	33	6	very dense 2.5y 6/6 olive yellow clayey silt, trace gravel, dry	ML	NA	Hnu = 0
2 FULL HOL	56465 9-21-90 1046	25	6	SAA	↓	↓	α = 0 βγ = 100 cpm
	56466 9-21-90 1046	27	6	SAA	↓	↓	
3	56467 9-23-90 1011	24	6	very dense 2.5y 6/6 olive yellow clayey silt, slightly moist	ML	NA	Hnu = 0
	56468 9-23-90 1011	25	6	SAA except some 2.5y 6/0 gray color intermixed (about 10% of sample)	ML	NA	α = 0 βγ = 80 cpm
4	56469 9-23-90 1011	26	6	same as 3.5-4.0 interval	ML	NA	
	56470 9-23-90 1024	6	6	medium dense 2.5y 5/6 light olive brown clayey silt, slightly moist	ML	NA	Hnu = 0
5	56471 9-23-90 1024	11	6	medium dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	α = 0 βγ = 60 cpm
	56472 9-23-90 1024	14	6	SAA	ML	NA	
6	56473 9-23-90 1028	21	6	very dense 2.5y 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56474 9-23-90 1028	36	6	SAA except some 10yr 6/8 brownish yellow intermixed (20% of sample is brownish yellow)	↓	↓	α = 0 βγ = 70 cpm
7	56475 9-23-90 1028	37	3	same as 6.5-7.0 interval	↓	↓	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN K STRAPAZZON

Hnu: SN 1185
α: ASI # 3
βγ: ASI # 5

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100 cpm

001028

402-11-66

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1589	COORDINATES	DATE	9-23-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	9/21/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	9/23/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56476 9-23-90 1032	24	6	very dense 2.5y 6/4 light yellowish brown clayey silt with some 10y 6/8 brownish yellow intermixed clayey silt, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 70 cpm
	56477 9-23-90 1032	28	6	very dense 10yr 5/1 gray with some 10yr 6/8 brownish yellow intermixed clayey silt, trace gravel, slightly moist	ML	NA	
9	56478 9-23-90 1032	26	6	SAA	↓	↓	
	56479 9-23-90 1339	14	6	dense 10yr 5/1 gray clayey silt, some gravel, slightly moist, trace sand	ML	NA	Hnu = 0 ∝ = 0 βγ = 80 cpm
	56480 9-23-90 1339	19	6	SAA	ML	NA	
10			K	DRILLING STOPPED AT 10.0 FEET AS PER WORK PLAN. HOLE FILLED WITH 4 BUCKETS OF BENTONITE AND CAPPED	SCM 9-23-90		
				WITH 1/2 BAG CEMENT. 2.5 GALLONS OF WATER USED. NO PIEZOMETER SET AS PER WORK PLAN.			Hnu = ∝ = βγ =
				TCLP TAKEN @ 1400			
				TOTAL U ET. TAKEN @ 1425			
							Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZIN

Hnu: SN 1185
∝: ASI #3
βγ: ASI #5

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 100 cpm

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1589
PIEZOMETER NO. NA

FIELD ENG./GEO. J MASON DATE 9-23-90
CHECKED BY E. Trollinger DATE 10-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 9-23-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~ →
SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

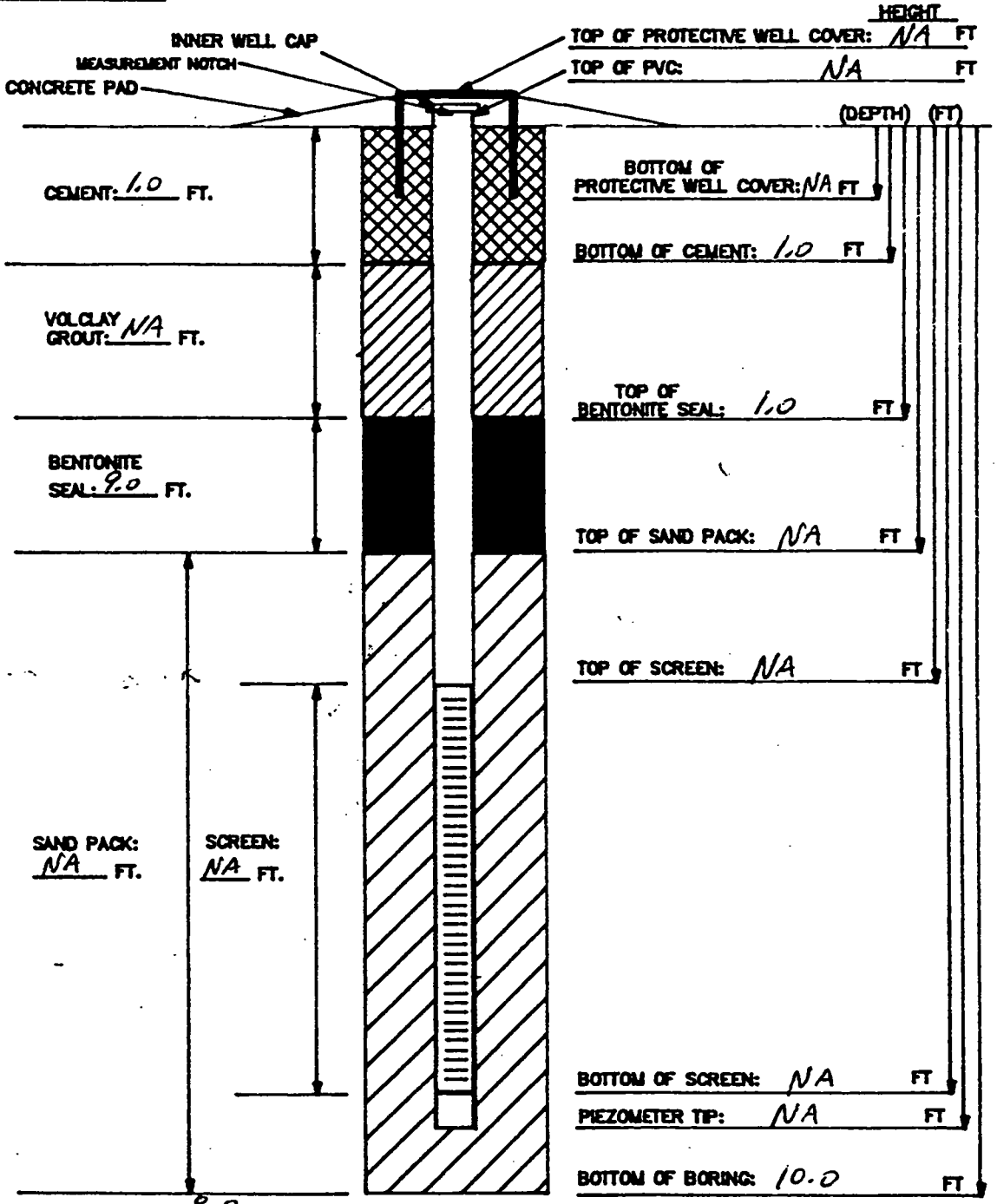
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING STOPPED AT 10.0 FT. AS PER WORK PLAN. NO PIEZOMETER SET.

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1589

~~INSTALLATION~~ PLUGGING DATE: 9-23-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4 JCM 9-23-90
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

EKNALD
RI/FS

	Date			
	Initial	FT		571
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1590	COORDINATES	DATE 9-20-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/20/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/20/90	
DRILLING METHODS Auger Drilling		PAGE 21 OF 34	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS 9-25-90
	56439 0855 9-20-90	9	6	Dense 5/4 10yr yellowish brown clayey silt some sand semi moist. some organics	ML	NA	Hnu = 0 α = 0 βγ = 100-150 CPM
1	56440 0855 9-20-90	24	6	SAA No organics slightly moist	ML	NA	
	56441 0855 9-20-90	25	6	SAA	ML	NA	
	56442 0948 9-20-90	4	6	Dense 5/4 10yr yellowish brown clayey silt some sand Trace gravel moist. organics	ML	NA	Hnu = 0 α = 0 βγ = 100-150 CPM
2	56443 0948 9-20-90	19	6	SAA	ML	NA	
3	56444 0948 9-20-90	23	4	SAA	ML	NA	
	56445 0949 9-20-90	21	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 150-200 CPM
4	56446 1045 9-20-90	19	6	SAA	ML	NA	
	56447 1045 9-20-90	23	6	SAA	ML	NA	
	56448 1045 9-20-90	5	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 100-120 CPM
5	56449 1359 9-20-90	10	6	medium dense 5/4 10yr to 5/8 10yr yellowish brown clayey silt some sand Trace gravel moist	ML	NA	
6	56450 1359 9-20-90	13	6	SAA	ML	NA	
	56451 1359 9-20-90	20	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 150-200 CPM
J.C. 9-24-90	~~56452~~ 1359 9-20-90	7	0	NR			
7	56453 1409 9-20-90	9	6	medium dense 5/1 10yr to 5/4 10yr gray to yellowish brown clayey silt some sand Trace gravel moist	ML	NA	

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K Myers

Hnu: 0 ppm
α: 0 cpm
βγ: 100-200 CPM

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 100-200 CPM

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME. FMPC RI/FS	
BORING NUMBER. 1590	COORDINATES.	DATE 9-20-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/20/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED: 9/20/90
DRILLING METHODS Auger drilling		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56454 1409 9-20-90	9	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 100-120 cpm
	56455 1420 9-20-90	9	6	SAA	ML	NA	
	56456 1420 9-20-90	8	6	medium dense 5/.10yr gray clayey silt some gravel trace silt moist	ML	NA	
9	56457 1420 9-20-90	10	6	SAA	ML	NA	Hnu = 0 ppm α = 0 βγ = 100-150 cpm
	56458 1430 9-20-90	9	6	SAA 9.75 ft 5/.10yr gray ~~cla~~ gravelly clay trace sand moist	ML / CL	1.75	
10				End of Sampling @ 10.0 FT. ~~BOTTOM OF BORING~~ @ 10.0 FT.			
				TCLP, ~~Total~~ & Total U Taken out of Drummed cuttings TCLP Sample No. 56459 Total U Sample No. 56452 WMCD " " " " 56460 IT			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0 ppm
α: 0 cpm
βγ: 100-200 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 ppm
α: 0 cpm
βγ: 100-200 cpm

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC R/FS
FIELD ENG./GEO. J Lear DATE 9-20-90
PROJECT NO. 602.3.7
CHECKED BY E. Trollinger DATE 10-2-90
BORING NO. ~~1590~~ ET ~~1591~~ 1590 ET 10-2-90
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ ET PLUGGING ~~NA~~ 9-20-90

BOREHOLE DRILLING

DRILLING METHOD Auger driller
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT ~~6" Solid Stem~~ 8 in Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 ~~NA~~ ET	BOTTOM 0.5 ET ~~NA~~	TOP	BOTTOM
BENTONITE	TOP 0.5	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

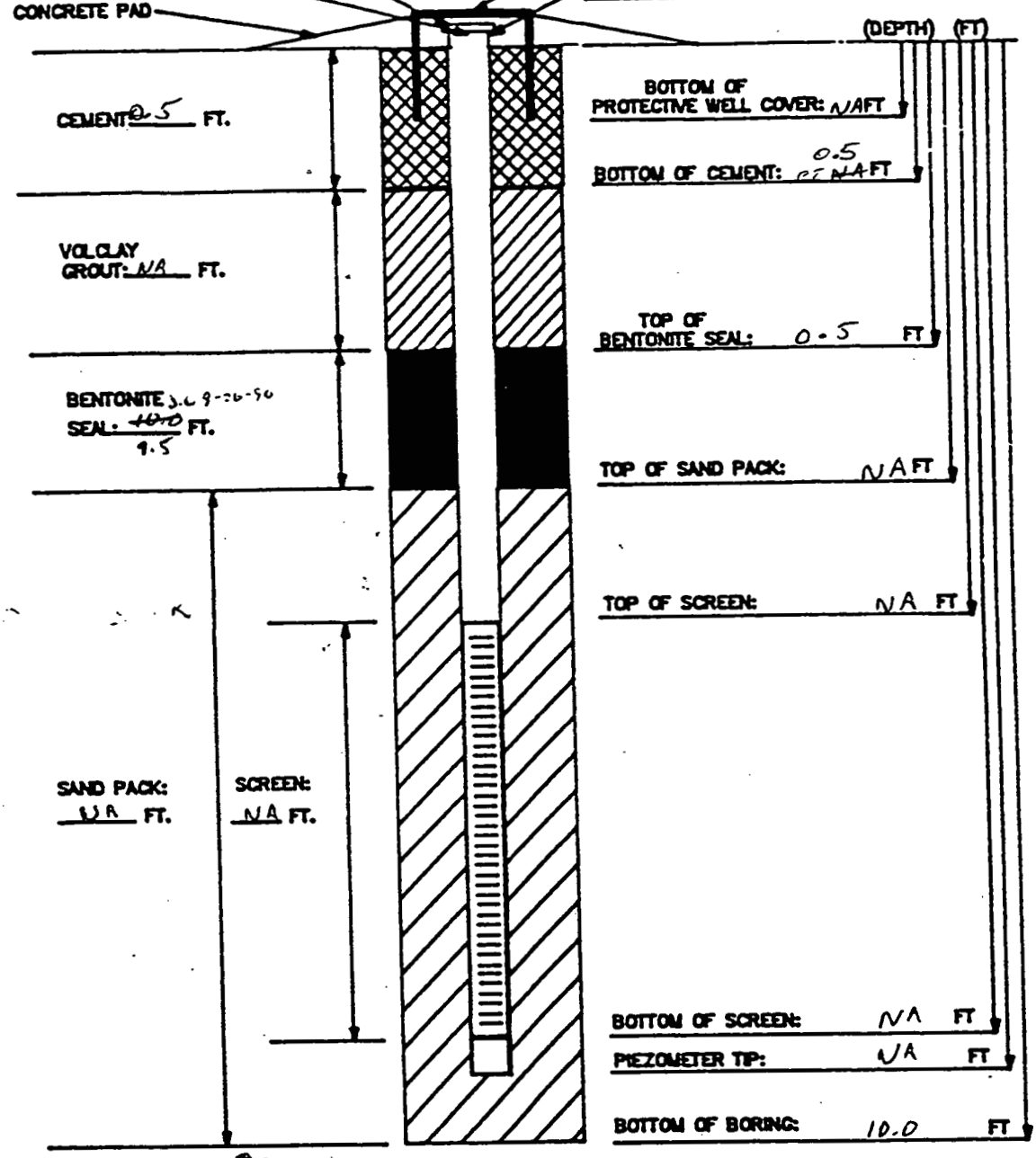
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS 2 gal buckets of H_2O used to Saturate Bentonite Pellets

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
B-1590
E-2

Plugging INSTALLATION DATE: 9-20-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 2.5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 20 lbs
AMOUNT OF WATER USED: 20 gals
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

Date	10/2/90		
Indist	EK	5711	
	Field Book	Test Key	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1591	COORDINATES	DATE 9 21 90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/21/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/23/90
DRILLING METHODS Auger Drilling		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56528 0915 9-21-90	11	6	very dense 3/4 2.5yr to 3/1 10yr dark reddish brown to very dark gray silty gravel moist	GM	NA	Hnu = 0
	56529 0918 9-21-90	30	6	very dense 4/6 10yr dark yellowish brown clayey silt some gravel trace sand slightly moist	ML	NA	α = 0
	56530 0918 9-21-90	24	6	SAA	ML	NA	βγ = 100-120 cpm
2	56531 0918 9-22-90	10	6	Dense 5/1 10yr to 4/6 10yr gray to dark yellowish brown clayey silt some gravel trace sand moist	ML	NA	Hnu = 0
	56532 0918 9-22-90	12	6	Dense 4/6 10yr dark yellowish brown clayey silt trace sand and gravel moist	ML	NA	α = 0
3	56533 0918 9-23-90	14	6	SAA	ML	NA	βγ = 80-120 cpm
4	56534 1020 9-23-90	14	6	very Dense 4/4 10yr dark yellowish brown clayey silt trace sand and gravel	ML	NA	Hnu = 0
	56535 1020 9-23-90	23	6	SAA	ML	NA	α = 0
	56536 1020 9-23-90	37	6	SAA	ML	NA	βγ = 60-120 cpm
5	56537 1310 9-23-90	4	6	medium dense 4/6 10yr dark yellowish brown clayey silt trace sand & gravel moist	ML	NA	Hnu = 0
	56538 1310 9-23-90	7	6	SAA	ML	NA	α = 0
6	56539 1310 9-23-90	14	6	SAA	ML	NA	βγ = 60-80 cpm
7	56540 1317 9-23-90	9	6	SAA	ML	NA	Hnu = 0
	56541 1317 9-23-90	16	6	SAA	ML	NA	α = 0
	56542 1317 9-23-90	14	6	medium dense 4/6 10yr dark yellowish brown clayey silt some gravel trace sand moist	ML	NA	βγ = 60-100 cpm

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-200 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-200 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME. FMPC RI/FS		
BORING NUMBER. 1591	COORDINATES.	DATE 9 - 23 - 90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9 / 21 / 90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED: 9 / 23 / 90	
DRILLING METHODS Auger Drilling		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	56543 1333 9-23-90	6	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 80-140 CPM
	56544 1333 9-23-90	7	6	medium dense 4/6 10yr to 5/1 10yr dark yellowish brown to gray clayey silt Trace sand & gravel moist	ML	NA	
	56545 1333 9-23-90	9	6	medium dense 5/1 10yr gray clayey silt Trace sand & gravel moist	ML	NA	
9	56546 1400 9-23-90	25	6	Dense 4/6 10yr to 5/1 10yr dark yellowish brown to gray clayey silt some gravel Trace silt moist	ML	NA	Hnu = 0 α = 0 βγ = 100-120 CPM
10	56547 1400 9-23-90	22	6	Dense 5/1 10yr gray clayey silt Trace sand & gravel semi moist	ML	NA	
				End of Sampling @ 10.0 FT. BOTTOM OF BORING @ 10.0 FT			
				TCLP ~~& Thermal~~ & Total U Taken out of Drummed cuttings TCLP Sample ~~Depth~~ No. 56548 Tot U Sample No. 56549 A51 Tot U Sample No. 56859 WMCO			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR:
DRILLER:
ASSISTANT:

Hnu: 0
α: 0
βγ: 100-200 cpm

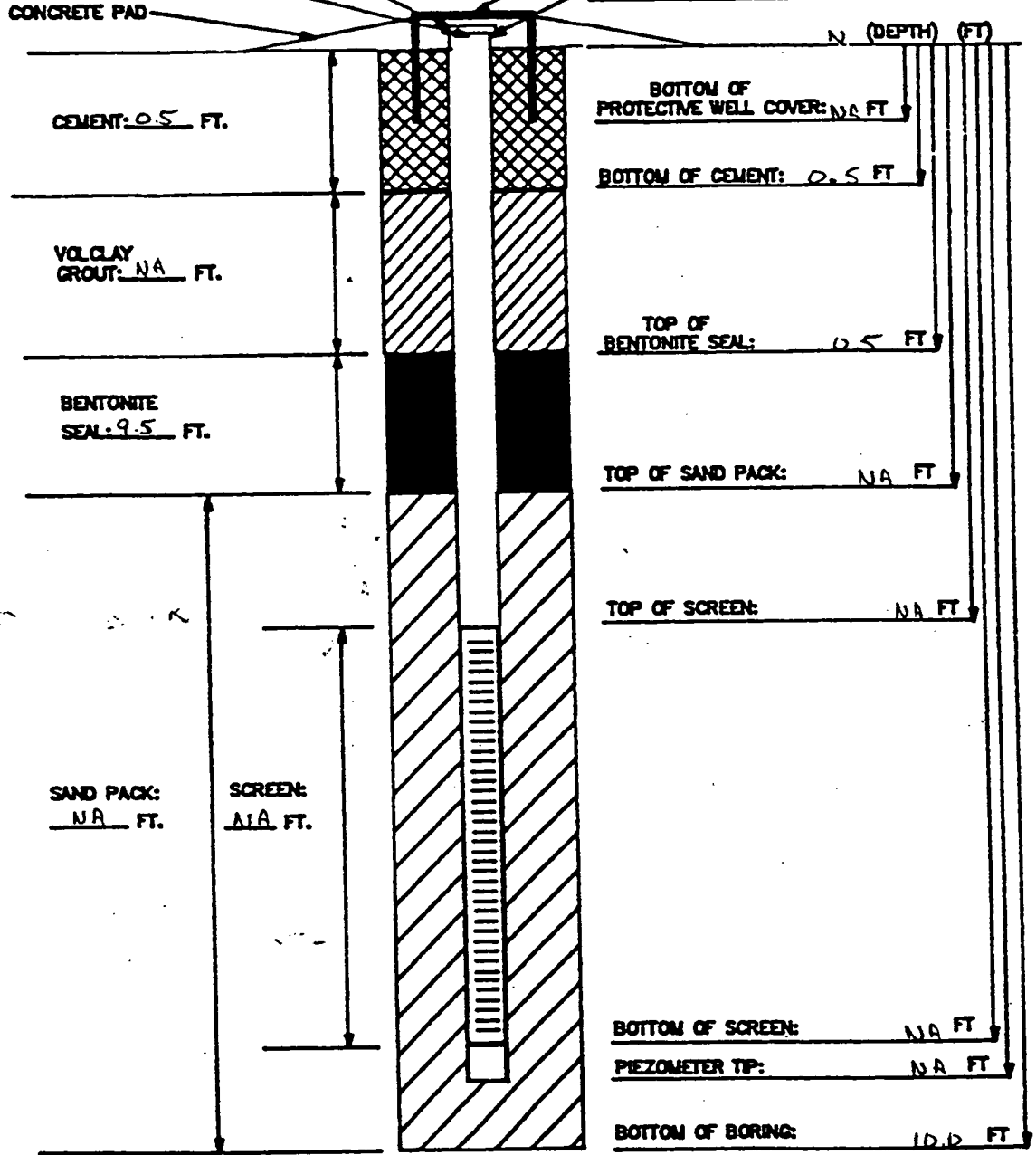
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-200 CPM

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
B 1591

INSTALLATION DATE: 9-23-90



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 10 gals
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Gear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-23-90
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 10-2-90
BORING NO. 1591
PIEZOMETER NO. NA DATE OF INSTALLATION 9-23-90

BOREHOLE DRILLING

DRILLING METHOD Auger Drilling
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT ~~6" Solid Stem~~ 8 in Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 ~~NA~~ ET	BOTTOM 0.5 ~~NA~~ ET	TOP	BOTTOM
BENTONITE	TOP 0.5ft	BOTTOM 10.0ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	~~10.0~~ NA J.L 9-23-90			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS

001039

409-11-86

Date	10/3/90			
Initial	G			
	Data Entered	1st Key In	2nd Key In	2nd Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
G NUMBER 1592	COORDINATES	DATE 9-24-90
EVATION:	GWL: Depth Date/Time	DATE STARTED 9/24/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/25/90
DRILLING METHODS Auger Drillers		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56660 1049 9-24-90	4	6	medium dense 4/3 10yr brown poorly graded sand some silt trace gravel moist - organics	SP	NA	Hnu = 0
	56661 1049 9-24-90	11	6	medium dense 5/4 10yr yellowish brown clayey silt ~~for~~ some gravel slightly moist - organics	ML	NA	α = 0
	56662 1049 9-24-90	17	6	SAA	ML	NA	βγ = 120 cpm
2	56663 1400 9-24-90	14	6	medium dense 6/1 10yr to 4/6 10yr gray to yellowish brown clayey silt trace gravel slightly moist, organics	ML	NA	Hnu = 0
	56664 1400 9-24-90	14	6	SAA	ML	NA	α = 0
3	56665 1400 9-24-90	7	6	SAA	ML	NA	βγ = 50-100 cpm
	56666 1506 9-24-90	9	6	SAA	ML	NA	Hnu = 0
4	56667 1506 9-24-90	13	6	medium dense 4/6 10yr dark yellowish brown ~~silt clay~~ clayey silt trace gravel moist	ML	NA	α = 0
	56668 1506 9-24-90	17	6	SAA	ML	NA	βγ = 60-80 cpm
5	56669 1650 9-24-90	5	6	SAA	ML	NA	Hnu = 0
	56670 1650 9-24-90	7	6	SAA	ML	NA	α = 0
6	56671 1650 9-24-90	9	6	SAA	ML	NA	βγ = 60-90 cpm
	56672 1656 9-24-90	7	6	SAA	ML	NA	Hnu = 0
7	56673 1656 9-24-90	10	6	medium dense 4/6 10yr to 5/6 7.5yr dark yellowish brown to strong brown clayey silt trace sand & gravel moist	ML	NA	α = 0
	56674 1656 9-24-90	12	6	SAA	ML	NA	βγ = 80-90 cpm

NOTES: CONTRACTOR:
DRILLER: J. Lang
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 80-150 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80-150 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS
BORING NUMBER 1592	COORDINATES
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time
DRILLING METHODS Auger drilling	

DATE 9-24-90
DATE STARTED: 9/24/90
DATE COMPLETED: 9/25/90
PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56675 1610 9-24-90	7	0	NR			
	56676 1610 9-24-90	10	6	medium dense 5/1 10yr gray clayey silt. Trace sand & gravel slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 40-60 CPM
9	56677 1610 9-24-90	11	6	SAA			
	56678 0921 9-25-90	18	0	NR	ML	NA	
10	56679 0921 9-25-90	20	6	Dense 5/1 10yr gray clayey silt some gravel Trace sand moist	ML	NA	Hnu = 0 α = 0 βγ = 100-200 CPM
				Bottom of Boring @ 10.0 FT End of Sampling @ 10.0 FT			
				TCLP ~~[illegible]~~ Samples are taken from Drummed cuttings TCLP Sample No. 56650 Total U Sample No. 56651 IT " " " " 56652 WMCO			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

CONTRACTOR: Penn Drill
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 80-200

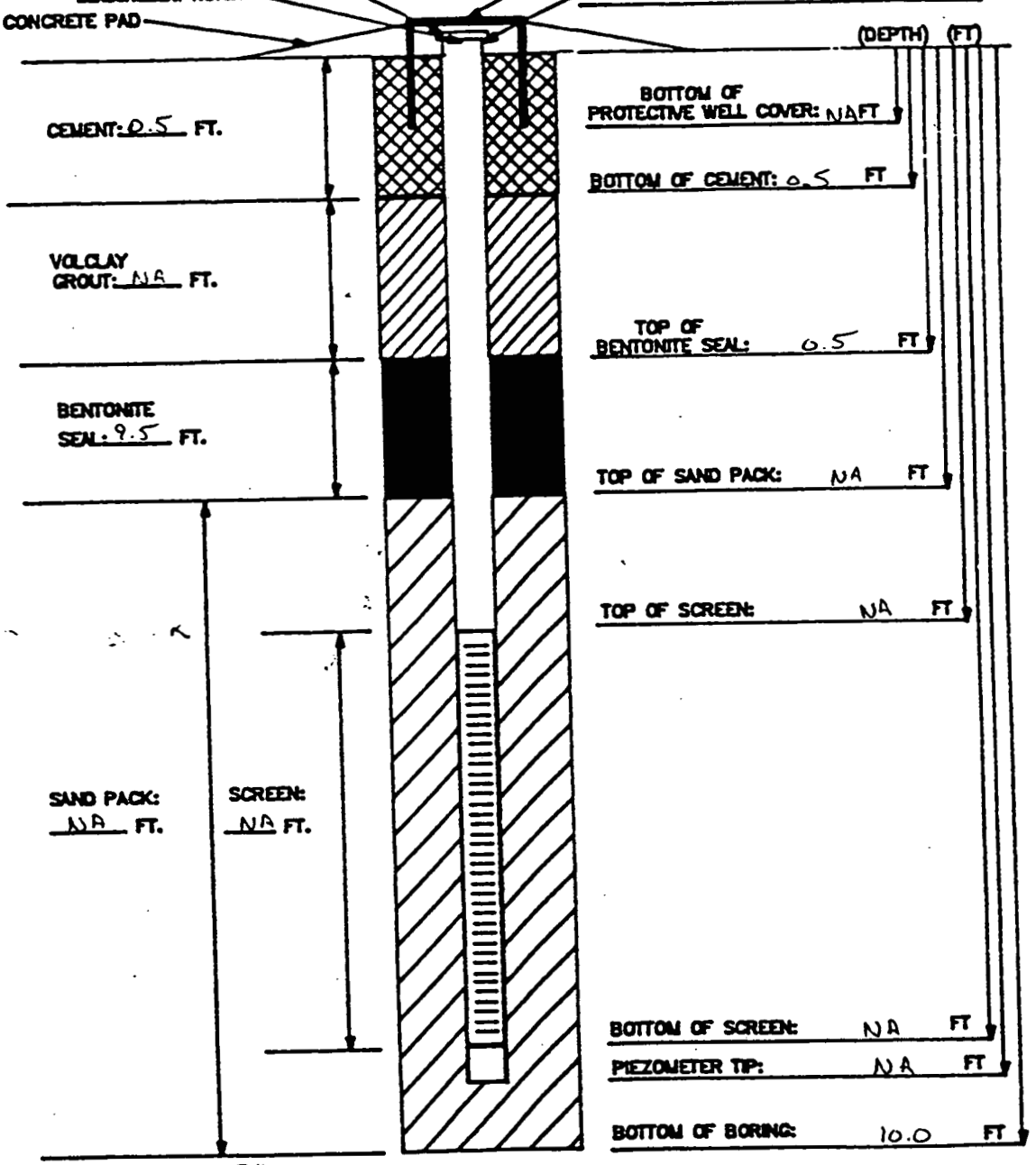
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80-200 CPM

5711

INSTALLATION DATE: 9-25-90

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
B" 1592



	HEIGHT	
TOP OF PROTECTIVE WELL COVER:	NA	FT
TOP OF PVC:	NA	FT

(DEPTH) (FT)

BOTTOM OF PROTECTIVE WELL COVER:	NA	FT
BOTTOM OF CEMENT:	0.5	FT
TOP OF BENTONITE SEAL:	0.5	FT
TOP OF SAND PACK:	NA	FT
TOP OF SCREEN:	NA	FT
BOTTOM OF SCREEN:	NA	FT
PIEZOMETER TIP:	NA	FT
BOTTOM OF BORING:	10.0	FT

BOREHOLE DIAMETER: 8" INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 10 gals
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Leaf

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. Lear
DATE 9-25-90
PROJECT NO. 602.3.7
CHECKED BY E. Trolinger
DATE 10-2-90
BORING NO. 1592
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 9-25-90

BOREHOLE DRILLING

DRILLING METHOD Auger Drilling
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT ~~6" Solid Stem~~ E.T. 8 in Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0 ~~NA~~ ET	BOTTOM 0.5 FT ~~NA~~ ET	TOP	BOTTOM
BENTONITE PELLETS	TOP 0.5 FT ~~0.0~~ A	BOTTOM 10.0 FT ~~9.5 FT~~	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐ NA
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐ NA

REMARKS

001043

409-11-86

FERNALD RI/FS

Date	12/12/90		5711
Initial	ET.		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6023.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1593	COORDINATES	DATE 11/1/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED ~~10~~ 11/1/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 11/1/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4

SCM 11-1-90

S.A.A.- Same as above

N.R. - No Return

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56682 11-1-90 0814	9	6	dense 2.5y 4/4 olive brown humus, 40% organic material, trace gravel, slightly moist	PT	NA	Hnu = 0
FULL HSL 1	56683 11-1-90 0814	19	6	dense 2.5y 5/6 light olive brown silt, some clay, trace sand, trace gravel, trace organic material, slightly moist	ML		α = 0
	56684 11-1-90 0814	27	6	SAA	ML		βγ = 120-140 cpm
	56685 11-1-90 0851	15	6	very dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
2 FULL HSL	56686 11-1-90 0851	28	6	SAA			α = 0
	56687 11-1-90 0851	32	6	SAA			βγ = 80-100 cpm
3	56688 11-1-90 0941	21	6	dense 2.5y 5/6 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
	56689 11-1-90 0941	25	6	dense 10yr 5/1 gray to 10yr 4/6 dark yellowish brown clayey silt, trace gravel, slightly moist. 60% brown, 40% gray			α = 0
4 FULL HSL	56690 11-1-90 0941	25	6	SAA, except 75% gray (10yr 5/1) and 25% brown (10yr 4/6)			βγ = 80-100 cpm
	56691 11-1-90 1020	5	6	medium dense 10yr 5/1 gray clayey silt, trace sand, trace gravel, slightly moist except for .25 IN. sand seam which is wet	ML	NA	Hnu = 0
5	56692 11-1-90 1020	8	6	SAA	ML	NA	α = 0
	56693 11-1-90 1020	13	0	NR	NA	NA	βγ = 80 cpm
6	56694 11-1-90 1023	9	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, trace sand, slightly moist except in small sand "seams", which are wet	ML	NA	Hnu = 0
	56695 11-1-90 1023	10	6	SAA	ML	NA	α = 0
7	56696 11-1-90 1023	14	0	NR	NA	NA	βγ = 80 cpm

NOTES: CONTRACTOR: DENBRIDGE
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #9
βγ: ASI #8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 120

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1593	COORDINATES	DATE 11/1/90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED (H) ~~10/31~~ (1) /90	DCM 11-1-90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 11/1/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56697 11-1-90 1027	9	6	medium dense 10yr 5/1 gray clayey silt, trace sand, trace gravel, slightly moist except for small sand "seams", which are wet.	ML	NA	Hnu = 0 α = 0 βγ = 60-70 cpm
	56698 11-1-90 1027	11	6	SAA	↓	↓	
	56699 11-1-90 1027	14	6	SAA			
9	56700 11-1-90 1051	9	6	dense 10yr 5/1 gray clayey silt, trace gravel, trace sand, slightly moist except for wet sand seams	ML	NA	Hnu = 0 α = 0 βγ = 80 cpm
FMC HSL 10	56701 11-1-90 1051	34	6	SAA	ML	NA	
				DRILLING/SAMPLING HALTED AT 10.0 FT; NO PIEZOMETER SET (AS PER WORK-PLAN). TCLP'S (# 56702) TAKEN AT 1130			Hnu = α = βγ =
				TOTAL U'S (IT # 56703, WMCO # 56868) TAKEN AT 1137			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI # 9
βγ: ASI #8

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 120 cpm

001045

402-11-86

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1593
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 11-1-90
CHECKED BY E. Trellinger DATE 12-2-90
DATE OF ~~INSTALLATION~~ PLUGGING 11-1-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS Drilling/Sampling halted at 10.0 feet; no piezometer set (as per workplan).

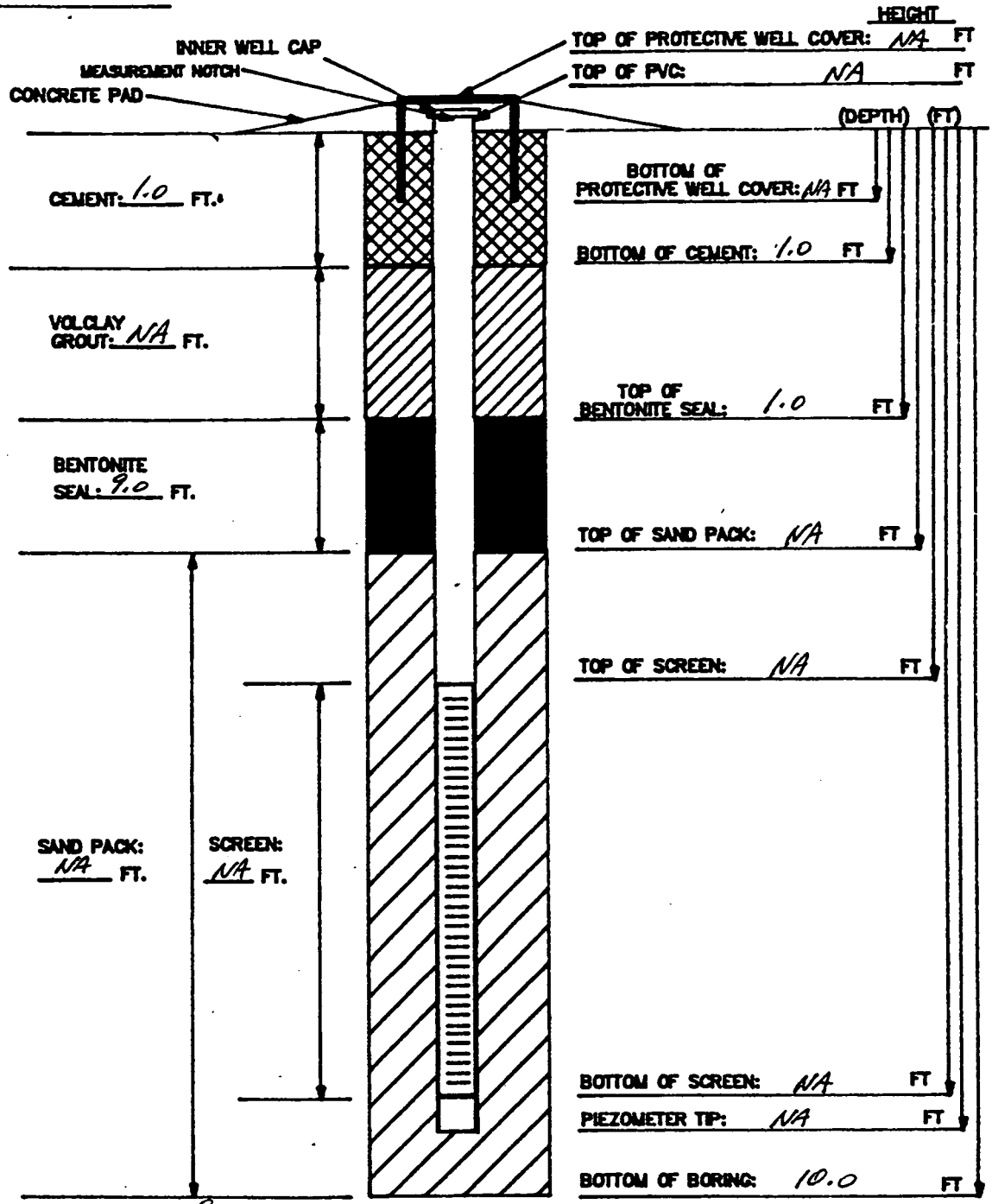
001046

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1593

~~INSTALLATION~~ PLUGGING DATE: 11-1-90



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4.5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD RI/FS

Date			5	7 1
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1594	COORDINATES	DATE	10/11/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	10/7/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	10/11/90
DRILLING METHODS CME 45 AUGER		PAGE 1	OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56704 10/7/90 0850	3	6	medium dense 2.5y 2/0 black humus, trace gravel, slightly moist	PT	NA	Hnu = 2 ppm α = 0 βγ = 120 cpm
Full HSL 1	56705 10/7/90 0850	11	6	medium dense 2.5y 5/4 light olive brown clayey silt, trace gravel, slightly moist	ML	NA	
	56706 10/7/90 0850	11	6	SAA	ML	NA	
	56707 10/7/90 0922	16	6	dense 2.5y 6/4 light yellowish brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 40 ppm α = 0 βγ = 80 cpm
2 Full HSL	56708 10/7/90 0922	9	6	SAA	↓	↓	
	56709 10/7/90 0922	32	6	SAA, except some 10yr 5/1 gray (15%)	↓	↓	
3	56710 10/7/90 1459	20	6	dense 10yr 5/1 with some 10yr 6/8 brownish yellow intermixed clayey silt; trace gravel, slightly moist	ML	NA	Hnu = 50 ppm α = 0 βγ = 100 cpm
	56711 10/7/90 1459	21	6	SAA	↓	↓	
4 Full HSL	56712 10/7/90 1459	22	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	↓	↓	
	56713 10/11/90 0854	8	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 80 cpm
5	56714 10/11/90 0854	13	6	SAA	↓	↓	
	56715 10/11/90 0854	35	0	NR	NA	NA	
6	56716 10/11/90 0859	14	6	dense 10yr 5/1 gray clayey silt, trace organic matter, trace gravel, slightly moist	ML	NA	Hnu = 0 α = 0 βγ = 60-80 cpm
	56717 10/11/90 0859	15	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist			
7	56718 10/11/90 0859	28	6	SAA	↓	↓	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI #7
βγ: ASI #17

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 250 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1594	COORDINATES	DATE 10 - 11 - 90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/7/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/11/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56719 10/11/90 0902	11	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 60 - 80 cpm
	56720 10/11/90 0902	11	6	SAA	ML	NA	
	56721 10/11/90 0902	21	0	NR	NA	NA	
9	56722 10/11/90 0920	18	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 100 cpm
	56723 10/11/90 0920	6	6	SAA			
10							
				DRILLING/SAMPLING HALTED AT 10.0 FT. AS PER WORKPLAN. NO PIEZOMETER SET. TCLP (# 56724) TAKEN AT 0930			Hnu = ∝ = βγ =
				TOTAL U'S (IT # 56725, WMCO # 56869) TAKEN AT 0939			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: DENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN
∝: ASI #
βγ: ASI #

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 250 cpm

001049

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. MASON
DATE 10-11-90
PROJECT NO. 602.3.7
CHECKED BY MG
DATE 10-23-90
BORING NO. 1594
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ PLUGGING 10-11-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~ →
FLUID NA ~~FROM~~ ~~TO~~ →

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~ →
SIZE NA ~~FROM~~ ~~TO~~ →

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS NO PIEZOMETER SET; DRILLING/SAMPLING STOPPED AT 10.0 FT. AS PER WORKPLAN.

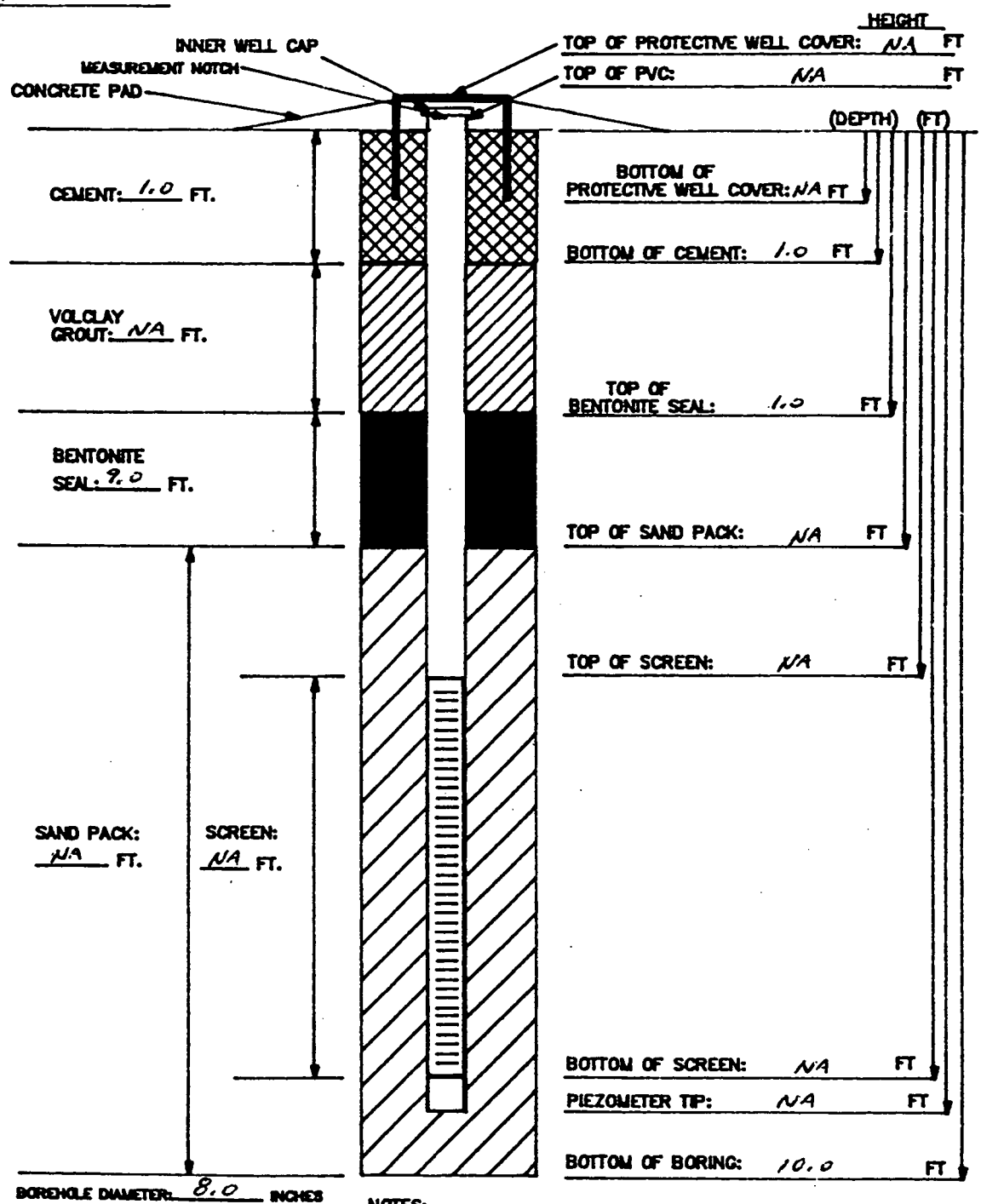
001050

409-[illegible]-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1594

INSTALLATION DATE: 10-11-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD
RI/FS

Date	10-23-90	5711		
Initial	MG			
	Field Check	1st Rev In	2nd Rev In	Final Check

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1595	COORDINATES	DATE 10-7-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/7/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/11/90	
DRILLING METHODS Auger Drilling		PAGE 1 OF 4	

SAA - Same as above
NR - No return

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56726 0932 10-7-90	2	6	Soft 2.5 10yr Black silty clay High organic content very moist	OL	0.5	Hnu = 0
	56727 0932 10-7-90	10	6	Hard 5/4 10yr yellowish brown clayey silt some gravel slightly moist	ML	>4.0	α = 0 βγ = 80-100cpm
	56729 0932 10-7-90	11	6	SAA	ML	>4.0	
2	56729 1320 10-7-90	5	6	Stiff 5/4 10yr To 5/1 10yr yellowish brown to gray clayey silt moist	ML	1.25	Hnu = 1.0 - 4.0 ppm
	56730 1320 10-7-90	8	6	Stiff 5/4 10yr to 5/1 10yr yellowish brown to gray clayey silt Trace gravel moist	ML	1.25	α = 0 βγ = 120-140
3	56731 1320 10-7-90	6	6	medium stiff 5/1 10yr gray silty clay trace gravel moist	CL	0.75	
	56732 1555 10-7-90	5	6	medium dense 4/2 5y olive gray silty clay Trace gravel wet	CL	<.25	Hnu = 0 - 25 ppm
4	56733 1555 10-7-90	4	6	very soft 5/1 10yr gray silty clay trace gravel wet	CL	<.25	α = 0 βγ = 100-120 cpm
	56734 1555 10-7-90	8	6	very soft 4/2 5y olive gray silty clay Trace gravel - verrious other colors	CL	<.25	
5	56735 0912 10-8-90	2	6	very soft 5/1 10yr gray silty clay trace gravel wet	CL	<.25	Hnu = 0 - 5 ppm
	56736 0912 10-8-90	4	6	stiff 5/1 10yr gray clayey silt some gravel moist	ML	1.25	α = 0 βγ = 100-120cpm
6	56737 0912 10-8-90	7	6	SAA	ML	1.25	
	56738 0912 10-8-90	9	0	NR	NA	NA	Hnu = <1 ppm
7	56739 0919 10-8-90	10	4	Stiff 5/1 10yr gray clayey silt some gravel moist	ML	1.5	α = 0 βγ = 100-120 cpm
	56740 0919 10-8-90	12	6	SAA	ML	1.5	

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K Myers
Sample Levels
Hnu: 0 - 25 ppm
α: 0
βγ: 100-500 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0 - ~~25~~ - ppm
α: 0
βγ: 100-500 cpm

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI / FS	
BORING NUMBER 1585	COORDINATES	DATE 10-11-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/7/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/11/90
DRILLING METHODS Auger Drilling		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56744 0940 10-11-90	11	6	medium stiff 5Y 10yr silty clay, gray, trace gravel wet	CL	.75	Hnu = 0-5 ppm
	56742 0940 10-11-90	12	6	Dense 5Y 10y silt sand gravel mix, gray, well graded, wet	GM	NA	α = 0
	56743 0940 10-11-90	18	6	stiff 5Y 10yr gray clayey silt some sand trace gravel wet	ML	1.75	βγ = 80-100 cpm
9	56744 1020 10-11-90	10	0	NR	NA	NA	Hnu = <1
	56745 1020 10-11-90	11	6	stiff 5Y 10yr to 5Y 4/2 gray to yellowish brown silty clay some gravel trace sand very moist	1.75	NA	α = 0
10				END of Sampling at 10.0 ft Boring Plugged and abandonned according to HSL Sampling Plan			βγ = 100-120
				Total U. and TCLP Samples Taken from Drummed cuttings TCLP Sample No. 56746 Total U " " 56747 IT " " " " 56770 WMLD			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR:
DRILLER:
ASSISTANT:
Sample Levels
Hnu: 0-25 ppm
α: 0
βγ: 100-120 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-500

402-11-86

3/4

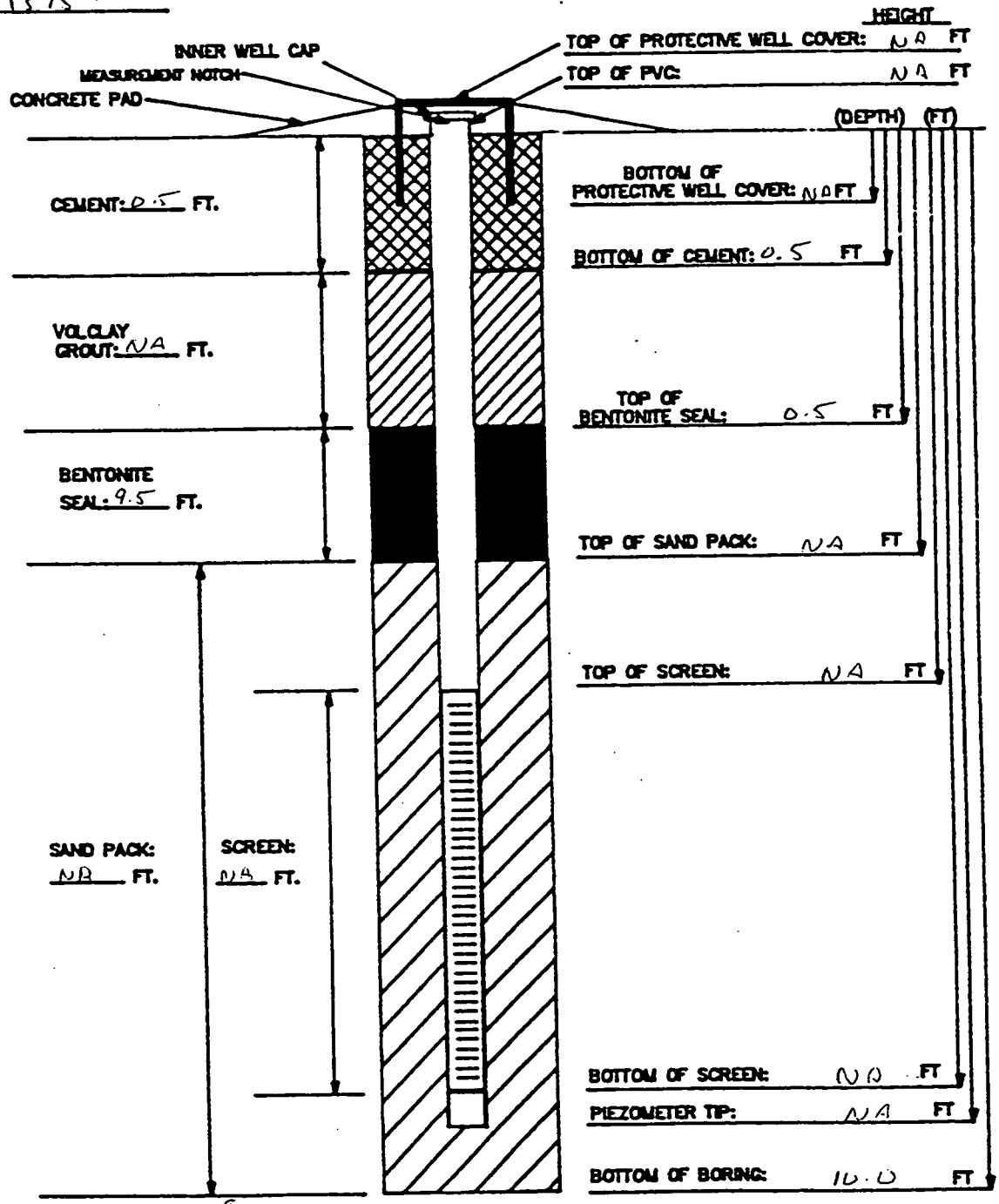
5711

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged Boring 1595

INSTALLATION DATE: 10-11-90 Plugged



MATERIALS USED:

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 3 GAL.
OTHER: N/A

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: N/A
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602 3.7 GEOLOGIST/ENGINEER: J. LEAR

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear DATE 10-11-90
PROJECT NO. 6.02.3.7
CHECKED BY MS DATE 11-01-90
BORING NO. 1555
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Logging 10-11-90

BOREHOLE DRILLING

DRILLING METHOD Auger Drilling
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 8in Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ Cement	TOP 0.0ft	BOTTOM 0.5ft	TOP	BOTTOM
BENTONITE	TOP 0.5ft	BOTTOM 10.0ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS

001055

FERNALD RI/FS

Date	10/29/90		5711	
Initial	MG			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1596	COORDINATES	DATE 10-5-90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/4/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/5/90
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (NR = NO RECOVERY; SAA = SAME AS ABOVE)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56748 10-4-90 1311	9	6	(visual observation) 10yr 2/1 black humus trace gravel, wet (rain in the A.M.)	PT	NA	Hnu = 0
FULL HSL 1	56749 10-4-90 1311	18	6	medium dense 2.5y 6/4 light yellowish brown clayey silt, some gravel, slightly moist	ML	NA	α = 0
	56750 10-4-90 1311	12	6	SAA	ML	NA	βγ = 120 cpm
	56751 10-4-90 1452	12	6	dense 2.5y 5/3 brown clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0
2 FULL HSL	56752 10-4-90 1452	16	6	dense 2.5y 5/8 yellowish brown to 10yr 5/1 gray clayey silt (50/50), trace gravel, slightly moist	ML	NA	α = 0
	56753 10-4-90 1452	24	6	dense 10yr 5/1 gray clayey silt, some gravel, slightly moist	ML	NA	βγ = 120 cpm
3	56754 10-5-90 0903	38	6	very stiff 10yr 5/1 gray clayey silt, some gravel, slightly moist; silt is fairly cohesive	ML	2.0	Hnu = 0
	56755 10/5/90 0903	24	6	SAA		2.5	α = 0
4 FULL HSL	56756 10/5/90 0903	36	6	very stiff 10yr 5/1 gray clayey silt, trace gravel, slightly moist; silt is fairly cohesive		2.0	βγ = 80 cpm
	56757 10/5/90 0917	3	6	medium stiff 10yr 5/1 gray clayey silt, trace gravel, trace sand, moist; silt is fairly cohesive	ML	.5	Hnu = 0
5	56758 10/5/90 0917	9	2	SAA	ML	.75	α = 0
	56759 10/5/90 0917	18	0	NR	NA	NA	βγ = 100 cpm
6	56760 10/5/90 0920	9	0	NR	NA	NA	Hnu = NA
	56761 10/5/90 0920	17	0				α =
7	56762 10/5/90 0920	10	0				βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: CHRIS COULTER
ASSISTANT: BRIAN STRAPAZZIN

Hnu: SN 1185/SN 211111
α: ASI # 13
βγ: ASI # 2

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 140 cpm

402-11-66

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1596	COORDINATES	DATE 10/5/90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/4/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/5/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56763 1015 190 0924	17	6	medium stiff 10yr 5/1 gray clayey silt, trace sand, trace gravel, moist; silt is cohesive	ML	.5	Hnu = 0 α = 0 βγ = 80 cpm
	56764 1015 190 0924	17	6	SAA	ML	.5	
	56765 1015 190 0924	15	0	NR	NA	NA	
9	56766 1015 190 1105	13	6	medium dense 10yr 5/1 gray clayey silt, trace sand, trace gravel, moist	ML	NA	Hnu = 0 α = 0 βγ = 80 cpm
	56767 1015 190 1105	15	6	SAA	ML	NA	
10				DRILLING/SAMPLING STOPPED AT 10.0 FT.;			
				NO PIEZOMETER SET (AS PER WORKPLAN)			Hnu = α = βγ =
				TCLP (#56768) TAKEN AT 1130			
				TOTAL V (ASI/IT #56769; WMCO #56871) TAKEN AT 1137			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: CHRIS COULTER
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185/SN 21111
α: ASI #13
βγ: ASI #2

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 140 cpm

001057

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1596
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 10-5-90
CHECKED BY MS DATE 11-03-90
DATE OF ~~INSTALLATION~~ PLUGGING 10 - 5 - 90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

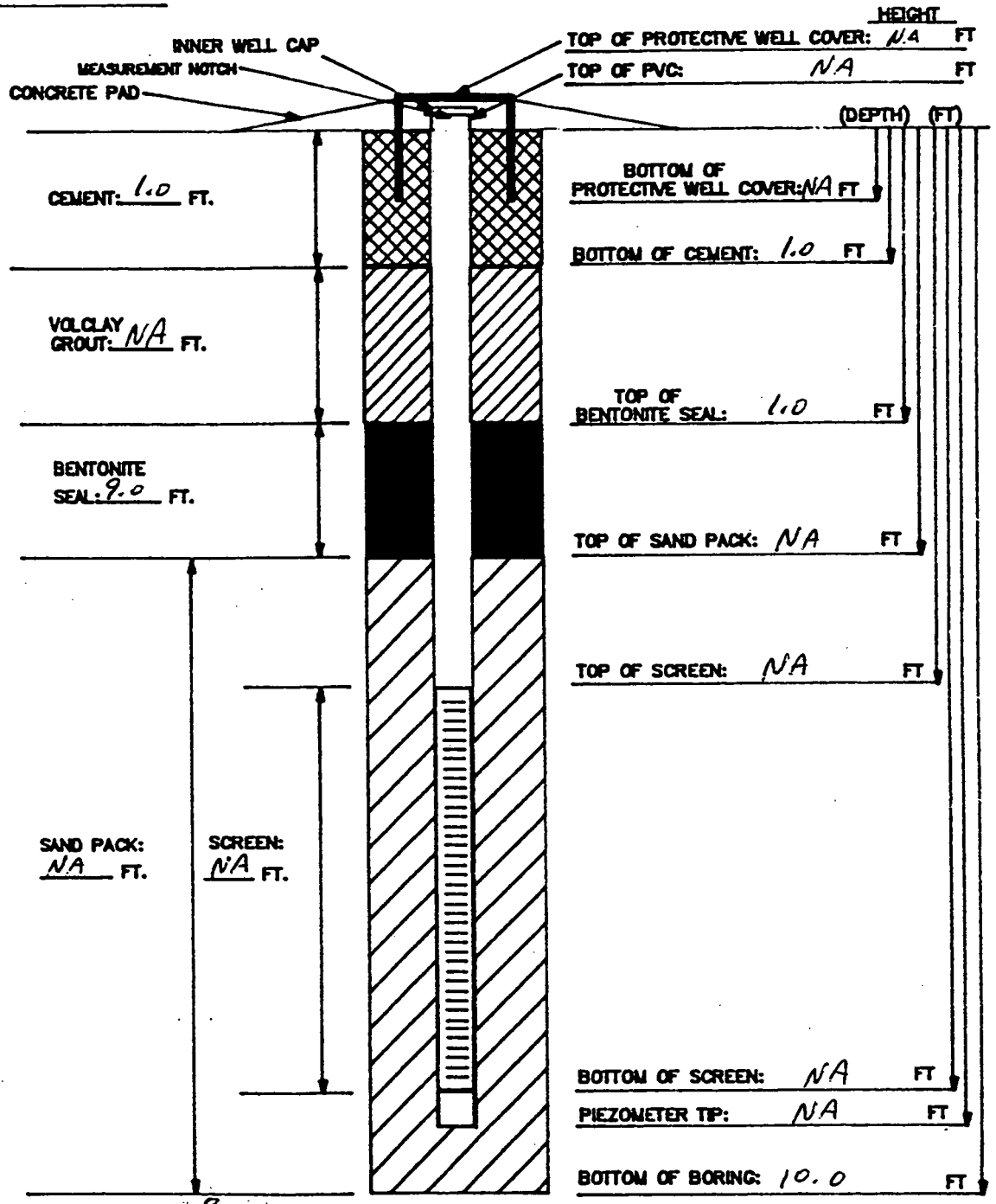
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS DRILLING/SAMPLING STOPPED AT 10.0 FT.; NO PIEZOMETER SET (AS PER WORKPLAN)

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1596

INSTALLATION DATE: 10 - 5 - 90



MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 1.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

ERNALD
RI/FS

Date	10/28/90			
Initial	MG			
	Field Data	1st Key In	2nd Key In	Field Data Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1597	COORDINATES	DATE 10-3-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/3/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/5/90	
DRILLING METHODS Auger Drilling		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56770 1320 10-4-90	4	6	medium dense 4/2 10yr dark grayish brown silty sand Trace gravel wet	SM	NA	Hnu = 0
	56771 1320 10-4-90	7	6	very stiff 4/2 10yr 5/1 10yr 5/4 10yr clayey silt some sand dark grayish brown, gray, yellowish brown moist	ML	3.50	α = 0
	56772 1320 10-4-90	8	6	SAA	ML	3.75	βγ = 50-100 cpm
2	56773 1350 10-4-90	5	3	medium dense 4/2 10yr dark grayish brown well graded subangular sand some silt wet	SW	NA	Hnu = 0
	56774 1350 10-4-90	8	6	medium dense 5/1 10yr, 4/2 10yr gray to dark grayish brown clayey sand Trace gravel moist wet	SC	NA	α = 0
3	56775 1550 10-4-90	11	6	very stiff 5/1 10yr to 4/2 10yr - gray to dark grayish brown silt clay ~~moist~~ wet	CL	3.0	βγ = 50-100 cpm
	56776 1501 10-4-90	3	6	very stiff 5/1 10yr to 5/2 10yr gray to yellowish brown silty clay trace gravel wet	CL	2.50	Hnu = 0
4	56777 1501 10-4-90	9	6	SAA	CL	2.25	α = 0
	56778 1501 10-4-90	14	6	very stiff 5/1 10yr gray silty clay some gravel wet	CL	2.75	βγ = 100-120 cpm
5	56779 1655 10-4-90	9	0	NR	NA	NA	Hnu = 0
	56780 1655 10-4-90	12	0	NR	NA	NA	α = 0
6	56781 1655 10-4-90	15	4	medium stiff 5/1 10yr gray clayey silt trace gravel moist	ML	.75	βγ = 100-120
	56782 1600 10-4-90	5	6	stiff 5/1 10yr gray clayey silt trace gravel moist	ML	1.50	Hnu = 0
7	56783 1600 10-4-90	9	6	SAA	ML	1.50	α = 0
	56784 1600 10-4-90	11	6	SAA	ML	1.50	βγ = 100-120 cpm

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Lang
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-800 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-800 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI / FS		
BORING NUMBER 1597	COORDINATES	DATE 10-5-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/4/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 10/5/9	
DRILLING METHODS Auger Drilling		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	56785 1605 10-4-90	13	6	stiff 5/10yr gray clayey silt trace gravel some sand moist	ML	1.50	Hnu = 0
	56786 1605 10-4-90	15	6	stiff 5/10yr to 5/1 5y gray silty clay trace gravel moist	CL	2.50	α = 0 βγ = 100-120
9	56787 1605 10-4-90	14	6	SAA			
	56788 0905 10-5-90	9	6	stiff 5/10yr 5/10yr gray silty clay some gravel moist	CL	1.50	Hnu = 0
10	56789 0905 10-5-90	14	6	SAA	CL	1.50	α = 0 βγ = 120-150
				End of sampling: Boring plugged and abandonned according to HSL			
				Sampling Plan TCLP & Total U taken from Drummed Cuttings TCLP Sample No. 56790 Total U. Sample No. 56791 (IT) " " " " 56872 (WMCO)			Hnu = α = βγ =
							Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Dean Drilling
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-800 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-800 cpm

402-11-86

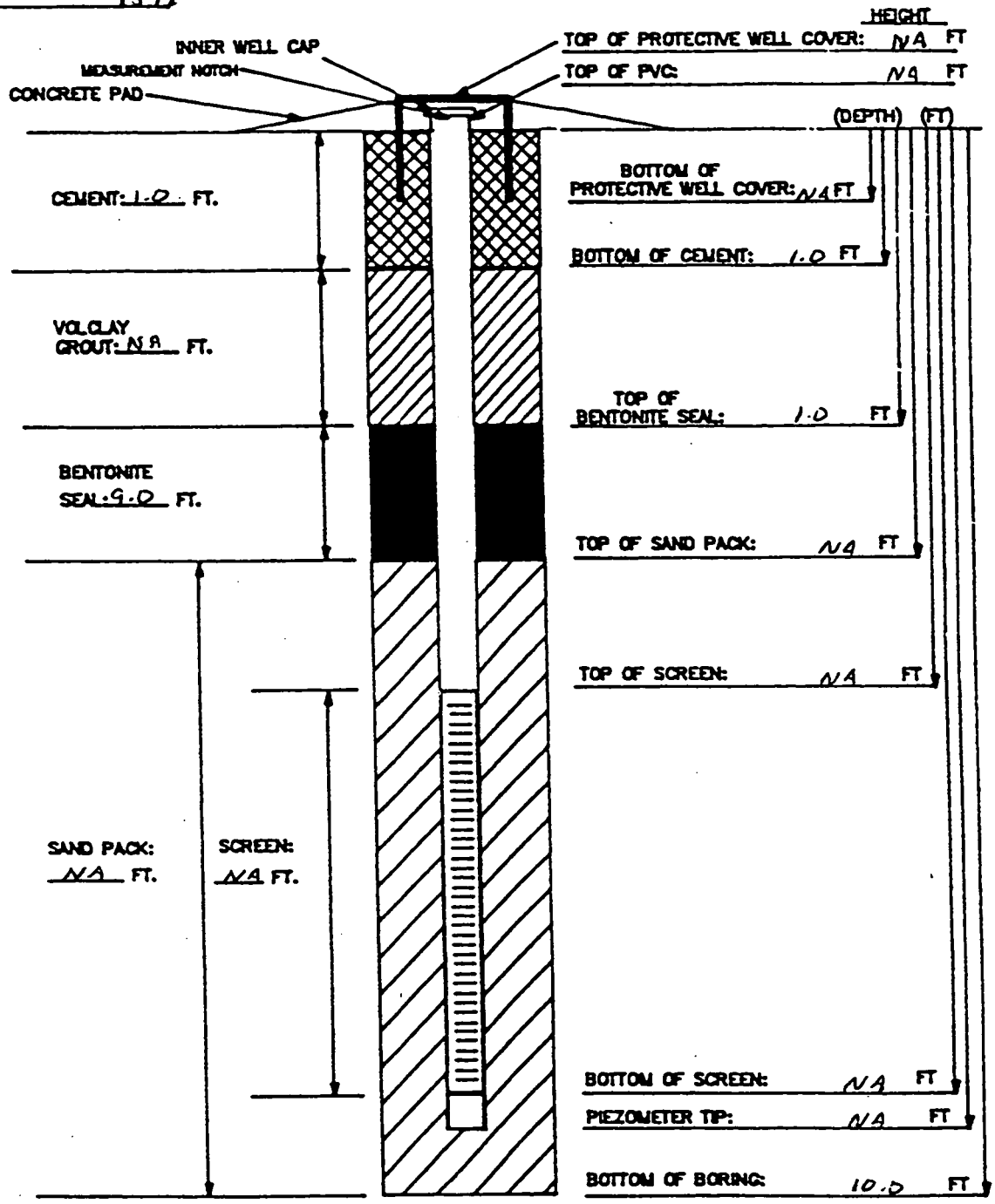
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1597

INSTALLATION DATE: 10-5-90

5711



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 5

BAGS OF VOLCLAY GROUT:

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 6.5 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-3-7

GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC - RI/FS
FIELD ENG./GEO. J. Lear DATE 10-5-90
PROJECT NO. 602.3.7
CHECKED BY MS DATE 11-01-90
BORING NO. 1597
PIEZOMETER NO. NA
DATE OF ~~INSTALLATION~~ Plugging 10-5-90

BOREHOLE DRILLING

DRILLING METHOD Auger Drilling	TYPE OF BIT 6 in Solid Stem
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: ~~GROUT/SLURRY~~ cement	TOP 0.0 ft	BOTTOM 1.0 ft	TOP	BOTTOM
BENTONITE	TOP 1.0 ft	BOTTOM 10.0 ft	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐

REMARKS

001063

409-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1599	COORDINATES	DATE	10/24/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED	10/18/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED	10/23/90
DRILLING METHODS CME 45		PAGE 1 OF 4	

NA = NO RECOVERY
SAA = SAME AS ABOVE

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	56814 10/18/90 1417	21	6	very dense 10yr 5/3 brown poorly graded gravel, some sand, trace silt, wet	GP	NA	Hnu = .5 ppm, α = 0, βγ = 100 cpm
Full HSL 2	56815 10/18/90 1417	32	6	SAA	GP	NA	
	56816 10/18/90 1417	29	0	NR	NA	NA	
3	56817 10/18/90 1457	NA	0	NOTHING RETRIEVABLE FROM THIS INTERVAL; 10.0 INCH CASING DRIVEN TO 4.0 FT SO THAT FILL GRAVEL (AS DESCRIBED ABOVE IN THE 1.0–1.5 FT. DESCRIPTION) WOULD NOT CAVE IN.	NA	NA	Hnu = NA, α = , βγ =
JCM 10-23-90 Full HSL	56818 10/18/90 1457		0				
4	56819 10/18/90 1457		0				
4	56820 10/23/90 0937	3	6	medium dense (by visual observation) 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0, α = 0, βγ = 80 cpm
Full HSL 5	56821 10/23/90 0937	3	0	NR	NA	NA	
JCM 10-23-90 Full HSL	56822 10/23/90 0937	3	0	NR	NA	NA	
Full HSL 6	56823 10/23/90 1045	3	6	medium dense (by visual observation) 10yr 5/1 gray clayey silt, trace gravel, ~~slightly~~ JCM 10-23 moist	ML	NA	Hnu = 0, α = 0, βγ = 60–80 cpm
	56824 10/23/90 1045	5	0	NR	NA		
7	56825 10/23/90 1045	7	0	NR	NA		
	56826 10/23/90 1419	4	6	medium dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist			Hnu = 0, α = 0, βγ = 80 cpm
	56827 10/23/90 1419	7	0	NR	NA	NA	
8	56828 10/23/90 1419	9	6	NR	NA	NA	

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 140 cpm

Hnu: SN 1185
α: ASI #7
βγ: ASI #17

NOTE: FIRST FOOT OF BORING IS CONCRETE

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1599	COORDINATES	DATE 10/24/90
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/18/90
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/23/90
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	56829 10-23-90 1431	18	6	dense/loose SIL gray clayey silt, trace gravel, slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 80 cpm
9 PEL HSL	56830 10-23-90 1431	22	6	SAA	ML	NA	
PEL HSL JCM 10-24-90 10	56831 10-23-90 1431	29	0	NR	NA	NA	
	56832						Hnu = ∝ = βγ =
	56833						
JCM 10-18-90							
				DRILLING/SAMPLING HALTED AT 10.0 FT; NO PIEZOMETER SET (AS PER WORKPLAN)			Hnu = ∝ = βγ =
				TCLP (# ~~1500~~ JCM 10-24-90 56832) TAKEN AT 1500			
				TOTAL U's (# # 56833 & WMLO # 56834) TAKEN AT 1515			Hnu = ∝ = βγ =
							Hnu = ∝ = βγ =

NOTES: CONTRACTOR: PENN DRILL
DRILLER: B. YOST
ASSISTANT: B. SZRAPAZEUV

Hnu: SN 1185
∝: ASI # 7
βγ: ASI #17

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 140 cpm

001065

402-11-88

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1599
PIEZOMETER NO. NA

FIELD ENG./GEO. J. MASON DATE 10-23-90
CHECKED BY M.S. DATE 11-01-90
DATE OF ~~INSTALLATION~~ PLUGGING 10-23-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT HOLLOW AUGER
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP ~~NA~~ 0.0	BOTTOM ~~NA~~ 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

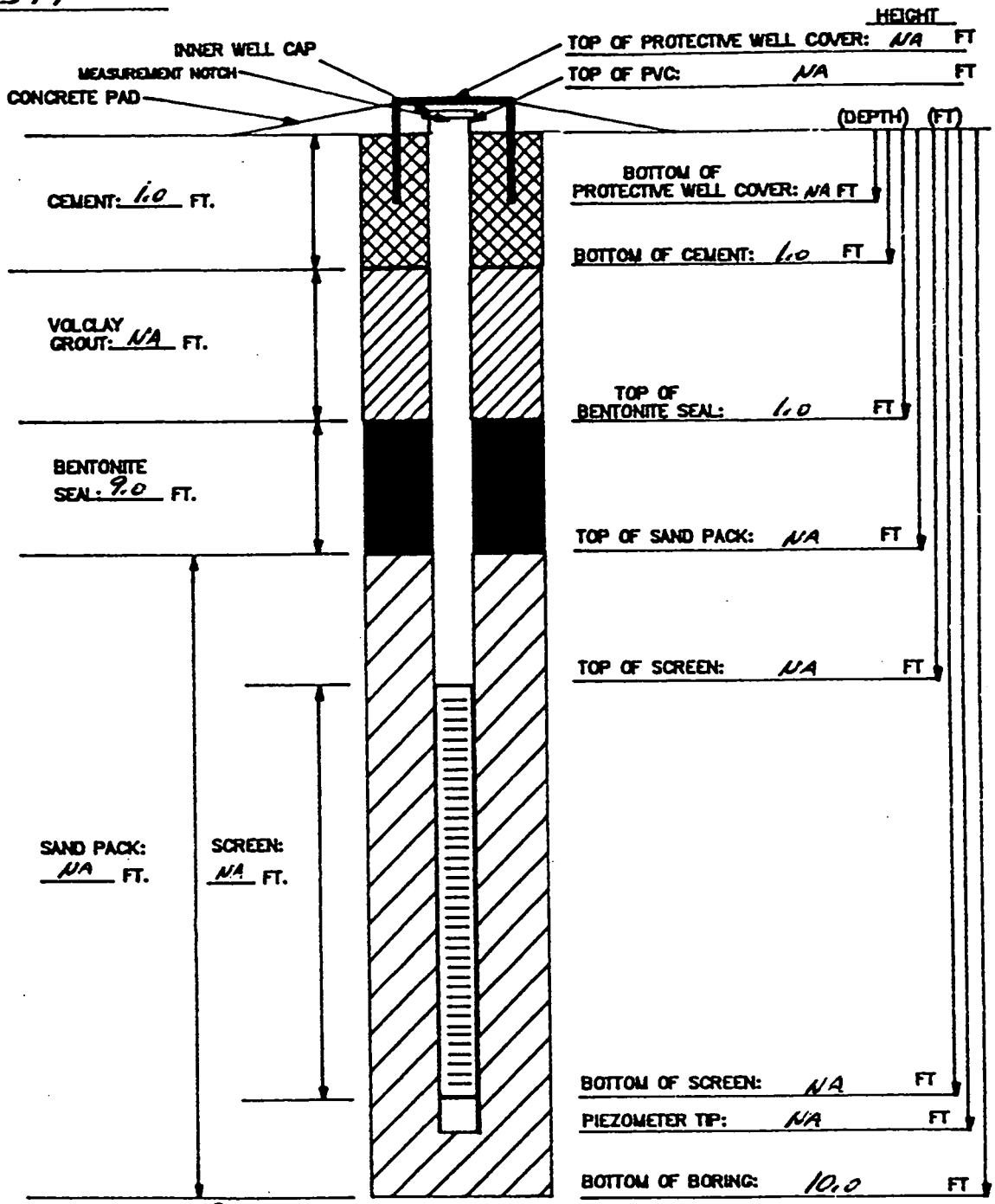
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS DRILLING HALTED AT 10.0 FT.; NO PIEZOMETER SET (AS PER WORKPLAN).

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1599

INSTALLATION DATE: 10-23-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

5711

P. - 600

FERNALD RI/FS

5711 -

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1600	COORDINATES	DATE 10-25-90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/24/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/25/90	
DRILLING METHODS CME 45 AUGER		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	NA	NA	NA	FIRST FOOT IS CONCRETE	NA	NA	Hnu = NA α = βγ =
2	NA	NA	NA	1.5 TO 4.0 FT. IS FILL GRAVEL; THIS WAS AUGERED OUT OF BOREHOLE UNTIL SOIL ENCOUNTERED.	NA	NA	NA Hnu = α = βγ =
3							Hnu = α = βγ =
4	56836 10-24-90 1450	12	6	dense 10yr 5/1 gray clayey silt; trace gravel, slightly moist	ML	NA	
FULL HSL 5	56837 10-24-90 1450	17	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 60-80cpm
	56838 10-24-90 1450	22	0	NR	NA	NA	
6	56839 10-24-90 1545	15	6	dense 10yr 5/1 gray clayey silt, trace gravel, slightly moist	ML	NA	0ppm
FULL HSL	56840 10-24-90 1545	20	6	SAA	ML	NA	Hnu = 0 α = 0 βγ = 80cpm
7	56841 10-24-90 1545	24	0	SAA JCM 10-24-90	ML ~~NA~~	NA	
	56842 10-25-90 0828	22	6	medium stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, medium plasticity	CL	.75	Hnu = 0 α = 0 βγ = 60-80 cpm

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-130cpm

Hnu: SN 1185
α: ASI #7
βγ: ASI #19

NR = "no recovery"
SAA = "same as above"

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1600	COORDINATES	DATE 10/25/90	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10/24/90	
ENGINEER/GEOLOGIST J. MASON	Depth Date/Time	DATE COMPLETED 10/25/90	
DRILLING METHODS CME 45 AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
FULL HSL 8	56843 10-25-90 0828	29	6	Stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, medium plasticity	CL	1.5	Hnu = 0 α = 0 βγ = 60-80 cpm
	56844 10-25-90 0828	38	6	SAA	CL	1.5	
9	56845 10-25-90 0906	14		Stiff 10yr 5/1 gray silty clay, trace gravel, slightly moist, medium plasticity	CL	1.5	
	56846 10-25-90 0906	32		SAA		1.5	Hnu = 0 α = 0 βγ = 60-80 cpm
FULL HSL 10	56847 10-25-90 0906	24		SAA		1.5	
				DRILLING/SAMPLING HALTED AT 10.0 FT; NO PIEZOMETER SET AS PER WORKPLAN. TCLP (#56848) TAKEN AT 0918			Hnu = α = βγ =
				TOTAL U's (IT # 56849 & WMCO #56850) TAKEN AT 0925			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: PENNDRILL
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON

Hnu: SN 1185
α: ASI # 7
βγ: ASI # 19

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-300 cpm

402-11-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. MASON DATE 10-25-90
PROJECT NO. 602.3.7 CHECKED BY M.D. DATE 11-01-90
BORING NO. 1600
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ PLUGGING 10-25-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 10.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.0			
GWL AFTER INSTALLATION	NA			

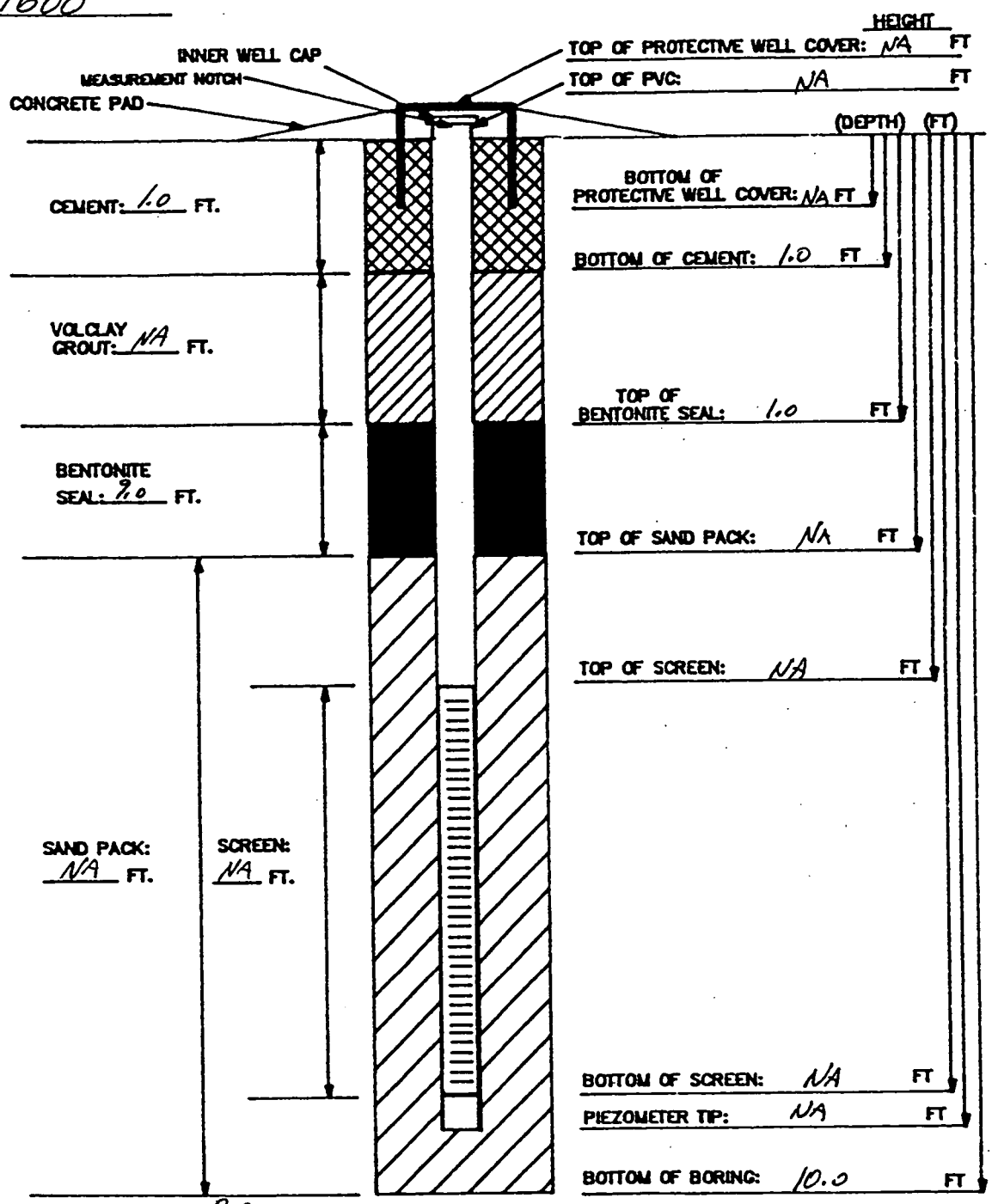
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS Drilling/Sampling halted at 10.0 FT; no piezometer set (as per workplan).

409-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1600

~~INSTALLATION~~ DATE: 10-25-90
PLUGGING



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. MASON

FERNALD
RI/FS

Date	11/8/90			
Initials				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1601	COORDINATES	DATE 9-13-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/13/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/13/90	
DRILLING METHODS Split Spoon Sampling		PAGE 1 OF 3	

SAA - Same as above
NR - No Return

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S2780 0915 9-13-90	15	6	medium dense 5/4 10yr yellowish brown gravelly silt slightly moist	GM	NA	Hnu = 0
	S2781 0918 9-13-90	11	6	SAA	GM	NA	α = 0
1	S2782 0922 9-13-90	7	0	NR	NA	NA	βγ = 80 cpm
	S2783 0930 9-13-90	4	6	medium dense 5/4 10yr yellowish brown gravelly silt wet	GM	NA	Hnu = 0
2	S2784 0936 9-13-90	7	6	stiff 4/4 10yr dark yellowish brown silty clay. wet	CL	1.75	α = 0 βγ = 80 cpm
	S2785 0938 9-13-90	7	6	medium dense 4/4 10yr dark yellowish brown poorly graded clayey sand wet	SC	NA	
3	S2786 1030 9-13-90	6	0	NR	NA	NA	Hnu = 0
	S2787 1035 9-13-90	7	6	medium stiff 5/4 5yr to 5/1 10yr reddish brown to gray silty clay some gravel wet	CL	1.0	α = 0 βγ = 100 cpm
4	S2788 1039 9-13-90	5	6	SAA	CL	1.0	
5				Sampling ends at 4.5 ft Boring plugged and Abandoned according to HSL Sampling Plan			Hnu = α = βγ =
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Long
ASSISTANT: k. Myers

Hnu: 0
α: 0
βγ: 80-100 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 80-100 cpm

402-11-88

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-13-90
PROJECT NO. 602-3.7 CHECKED BY _____ DATE _____
BORING NO. 1601
PIEZOMETER NO. NA DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD Auger Sampling	TYPE OF BIT NA
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 1.0 ft.	BOTTOM 4.5 ft.	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5 ft.			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS ½ bucket (5 gallon) bentonite pellets used
⅓ bag cement used to plug hole

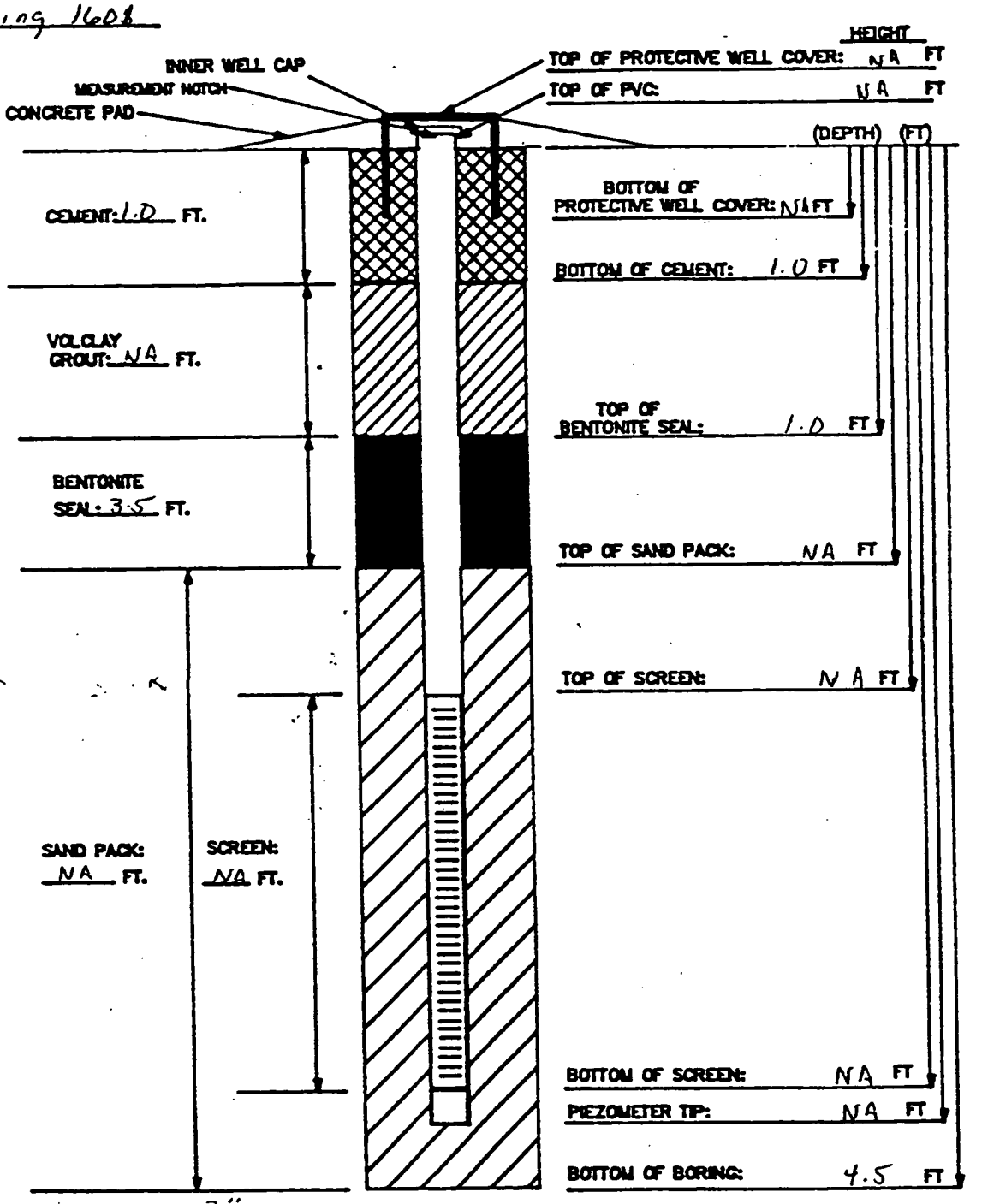
001073

409-11-88

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
Boring 1608

INSTALLATION DATE: NA



BOREHOLE DIAMETER: 3" INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/3 BAG
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

Date	9/13/90			
Initial	ET			
	Field Check	1st Rev'n	2nd Rev'n	Final Check

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1602	COORDINATES	DATE 9-11-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/11/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/11/90
DRILLING METHODS Split Spoon Sampling		PAGE 1 OF 3

SAA - Same as above

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			12	1st foot is concrete			Hnu = 0 α = 0 βγ = 110 cpm
ET 0X	18175 0936 9-11-90	6	6	medium dense 4/4 10yr dark yellowish brown gravelly well graded angular sand moist	SW	NA	
ET 1X	18176 0955 9-11-90	16	6	SAA	SW	NA	Hnu = 0 α = 0 βγ = 110 cpm
	18177 1015 9-11-90	11	0	NR	NA	NA	
2X	18178 1030 9-11-90	11	6	very stiff 4/6 10yr dark yellowish brown silty clay trace gravel semi moist	CL	3.25	
	~~18179~~ ~~52775~~ 1050 9-11-90	14	6	SAA	CL	3.25	Hnu = 0 α = 0 βγ = 80 cpm
3X	52776 1100 9-11-90	16	6	SAA	CL	3.0	
	52777 1116 9-11-90	12	6	SAA	CL	3.5	
ET 4X	52778 1125 9-11-90	21	6	SAA	CL	2.75	Hnu = 0 α = 0 βγ = 110 cpm
	52779 1132 9-11-90	31	6	SAA	CL	3.0	
ET 5X				Sampling ends at 5.5ft			
				Boring Plugged & Abandoned according to HSC Sampling Plan			Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 30-60 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 30-60 cpm

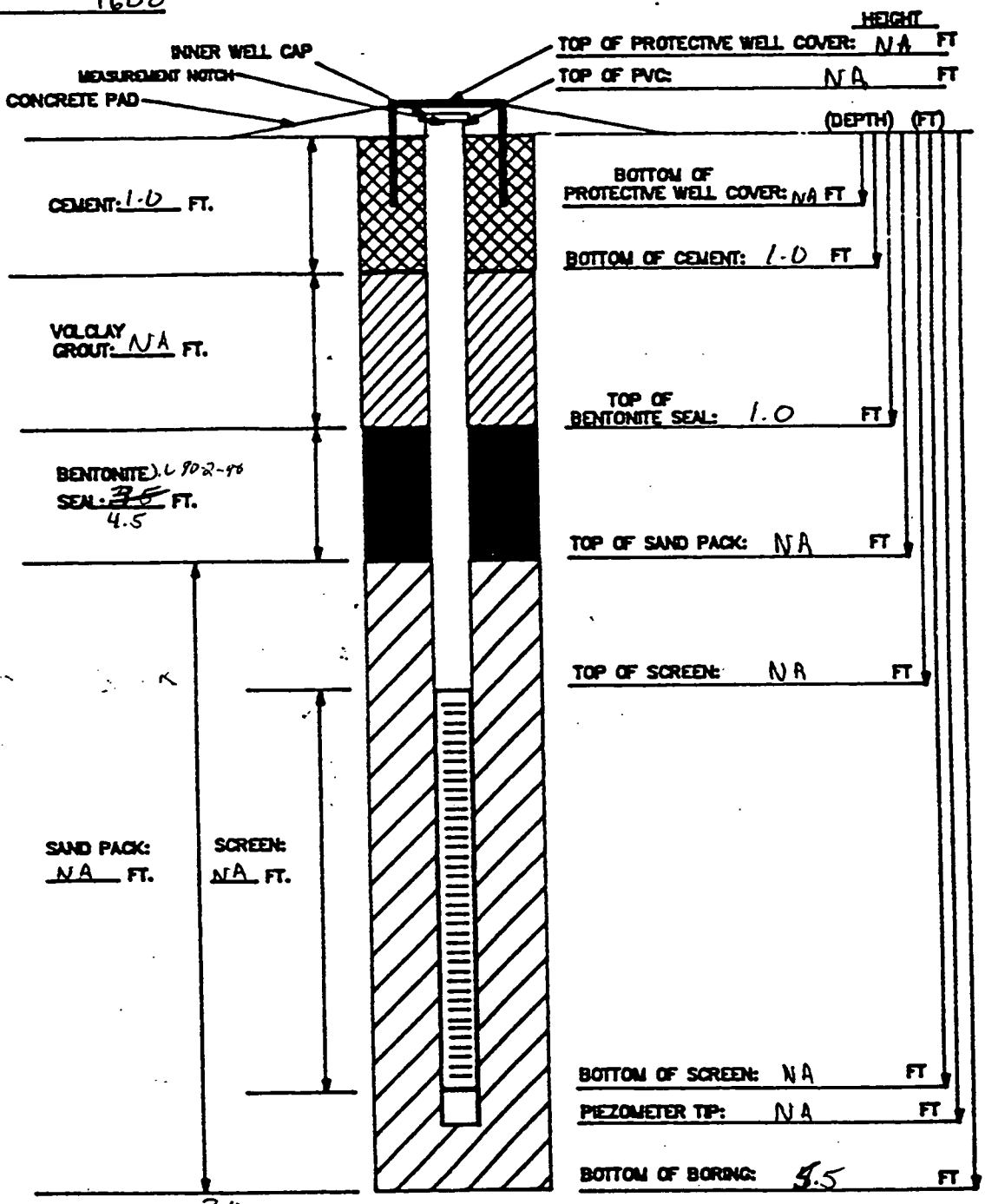
402-11-88

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Boring 1602

INSTALLATION DATE: 9-11-90



BOREHOLE DIAMETER: 3.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NO

BENTONITE PELLETS (5-GALLON BUCKETS): 1/2

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 31 lbs

AMOUNT OF WATER USED: 2 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-3-7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-11-90
PROJECT NO. 602-3.7 CHECKED BY _____ DATE _____
BORING NO. 1602
PIEZOMETER NO. NA DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED: None	CASING SIZE (S) USED: NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
BENTONITE	TOP 1.0 ft	BOTTOM 5.5	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	5.5 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Boring used for soil sampling only
1/2 bucket Bentonite pellets used (5 gal) 1/3 bag 94 lb concrete used

001077

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

	Date	Initial	Field Check	1st Ke In	2nd Ke In	Next Ccp Ver
	10/3/90	ET				

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS		
BORING NUMBER 1603	COORDINATES	DATE 9-10-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/10/90	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/10/90	
DRILLING METHODS Auger Sampling 3" Splitspoons		PAGE 1 OF 3	

SAA - Same as above
NR - No Return

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
					1st foot is concrete ↓			Hnu = ∝ = βγ =
ET	0	18166 0935 9-10-90	9	0	NR			
ET	1	18167 0945 9-10-90	24	6	Dense 4/6 10yr dark yellowish brown well graded sandy gravel moist	GW	NA	Hnu = 0 ∝ = 3 βγ = 80 CPM
		18168 0953 9-10-90	10	0	NR			
ET	2	18169 0903 9-10-90	7	4	Dense 4/6 10yr dark yellowish brown well graded sandy gravel moist	GW	NA	
		18170 0909 9-10-90	20	6	very dense 4/6 10yr dark yellowish brown clayey silt trace gravel moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 50 CPM
ET	3	18171 0916 9-10-90	30	6	very dense 5/5 7.5YR strong brown clayey silt trace gravel moist	ML	NA	
		18172 0945 9-10-90	28	3	SAA	ML	NA	
ET	4	18173 1013 9-10-90	26	6	very dense 5/1 10yr gray clayey silt trace sand slightly moist	ML	NA	Hnu = 0 ∝ = 0 βγ = 20 CPM
		18174 1042 9-10-90	24	6	SAA	ML	NA	
ET	5				Sampling Ends at 5.5ft			
					Boring Plugged and Abandoned according to HSL sampling plan			Hnu = ∝ = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0
∝: 0
βγ: 80 CPM

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
∝: 0
βγ: 80 CPM

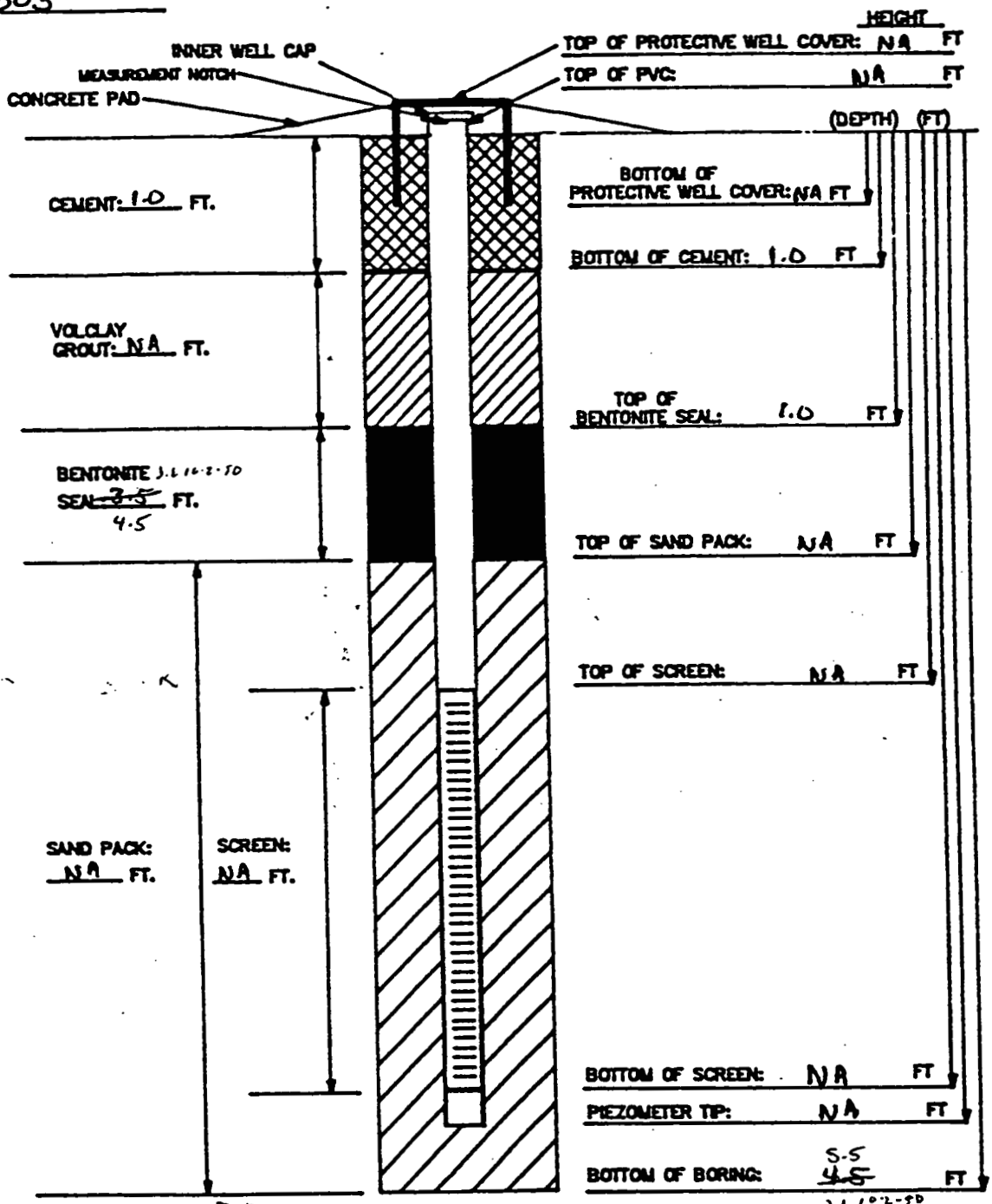
402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1603

INSTALLATION DATE: 9-10-90 Plugging



BOREHOLE DIAMETER: 3.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 1/2

BAGS OF VOLCLAY GROUT: NA

AMOUNT OF CEMENT: 1/3

AMOUNT OF WATER USED: 2 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-3.7

GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-10-90
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1603
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger - SPLIT SPOON DRIVING
DRILLING FLUID (S) USED: None
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM	TOP NA	BOTTOM NA
BENTONITE	TOP 1.0 ft	BOTTOM 5.5 ft	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	5.5 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Boring was used for soil sampling only ~~at 4.5 ft~~
1/2 bucket bentonite pellets used to plug hole (5 gal)
1/3 bag (94 lb) concrete used to plug top of hole

001080

409-11-55

FERNALD
RI/FS

Date	11/9/90			
Initial	ET			
	Field Check	1st Ver In	2nd Ver In	Final Ver Input

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1604	COORDINATES.	DATE 9-9-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/6/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/9/90
DRILLING METHODS Split spoon sampling		PAGE 1 OF 3

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 IN	RECOVERY (IN)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
					1st foot is concrete			Hnu = 0 α = 0 βγ = 150 cpm
ET	0.5	18157 9-9-90 0930	7	6	Dense 4/4 10yr dark yellowish brown wellgraded angular sand some gravel moist	SP	NA	
ET	1.2	18158 9-9-90 0935	18	6	SAA	SP	NA	Hnu = 0 α = 0 βγ = 200 cpm
		18159 9-9-90 0940	17	0	NR	NA	NA	
ET	2.3	18160 9-9-90 0945	20	0	NR	NA	NA	
		18161 9-9-90 1015	52	6	very dense 4/6 10yr dark yellowish brown sandy silt trace gravel moist	SM	NA	Hnu = 0 α = 0 βγ = 80 cpm
ET	3.4	18162 9-9-90 1045	55	6	very dense dark yellowish brown silty sand trace gravel slightly moist	SM	NA	
		18163 9-9-90 1100	50	6	very dense 5/1 10yr gray silty clay trace gravel slightly moist	ML	NA	
ET	4.5	18164 9-9-90 1117	18	6	very stiff 5/1 10yr gray silty clay trace gravel slightly moist	CL	2.0	Hnu = 0 α = 0 βγ = 80 cpm
		18165 9-9-90 1122	15	6	medium dense 4/6 10yr dark yellowish brown sandy silt some gravel moist	ML	NA	
ET	5.6				Sampling completed at 5.5ft No Piezometer installed			
					Boring Plugged & Abandoned To HSL Sampling Plan			Hnu = α = βγ =

NOTES: CONTRACTOR:
DRILLER:
ASSISTANT:

Hnu: 0 ppm
α: 0 cpm
βγ: 150 cpm

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 150 cpm

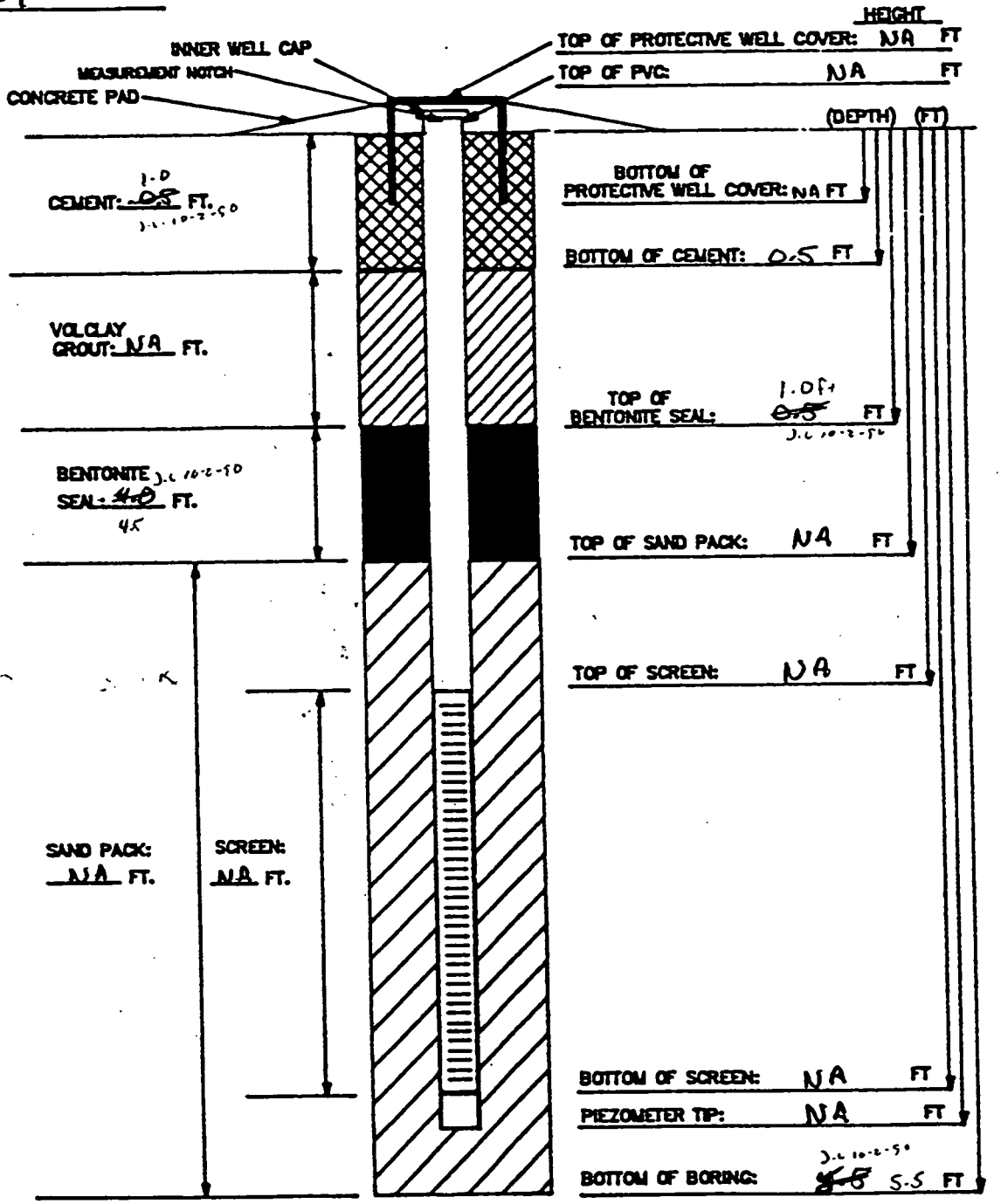
402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL NO.~~ Boring NO. 1604

PLUGGING ~~INSTALLATION~~ DATE: 9-9-90



BOREHOLE DIAMETER: 3.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NONE USED
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: None used
AMOUNT OF CEMENT: 1/3 BAG
AMOUNT OF WATER USED: 3 GALS.
OTHER: none.

NOTES: DOES NOT APPLY

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-9-90
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1604
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger SPLIT SPOON DRIVING	TYPE OF BIT NA
DRILLING FLUID (S) USED: None	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION N/A	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS N/A	JOINING METHOD NA
TOTAL PERFORATED AREA N/A	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. _____	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP ~~0.5ft~~ 1.0ft J.L.	BOTTOM 5.5ft	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	4.5ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☑

REMARKS Boring was used for soil sampling only ~~0.0-4.5ft~~ J.L. 10-2-90
1/2 5 gal bucket of bentonite pellets used 1/3 94lb bag concrete used to plug hole

001083

409-11-86

FERNALD
RI/FS

Date	9/3/90			
Initial	CT			
	Field Check	1st Ry In	2nd Ry In	Hold Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1605	COORDINATES	DATE 9-18-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 9/18/90
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 9/18/90
DRILLING METHODS Spl.t spoon Sampling		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION SAA = Same as above NR = No Recovery	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S2789 1455 09-18-90	6	6	Dense 4/6 10yr dark yellowish brown silty gravel trace sand moist	ML	NA	Hnu = 0 α = 0 βγ = 150-200 cpm
1	S2790 1455 9-18-90	16	6	Dense 4/4 10yr olive brown - 3/4 10yr dark brown clayey silt Trace gravel organics Semi moist	OL	NA	
	S2791 1455 9-18-90	26	6	Dense 4/6 10yr dark yellowish brown silty gravel trace sand moist	GM	NA	
	S2792 1455 9-18-90	20	0	NR	NA	NA	Hnu = 0 α = 0 βγ = 150-200 cpm
2	S2793 1515 9-18-90	6	6	medium stiff 5/6 10yr gray to 4/6 10yr dark yellowish brown silty clay Trace gravel moist	CL	.75	
	S2794 1515 9-18-90	7	0	NR JLR-18-90	NA	NA	
3	18201 1515 9-18-90	10	6	medium dense 4/6 10yr ~~clayey~~ dark yellowish brown clayey silt trace gravel moist	ML	NA	Hnu = 0 α = 0 βγ = 100-150 cpm
	18202 1545 9-18-90	6	0	NR	NA	NA	
4	18203 1545 9-18-90	6	6	Soft 5/6 10yr yellowish brown to 5/1 10yr gray silty clay trace gravel moist	CL	.5	
				Sampling completed at 4.5 ft boring plugged and abandoned according to HSL Sampling Plan			Hnu = α = βγ =
5							
							Hnu = α = βγ =

NOTES: CONTRACTOR: Penn Drilling
DRILLER: J. Long
ASSISTANT: K. Myers

Hnu: 0
α: 0
βγ: 100-200 cpm

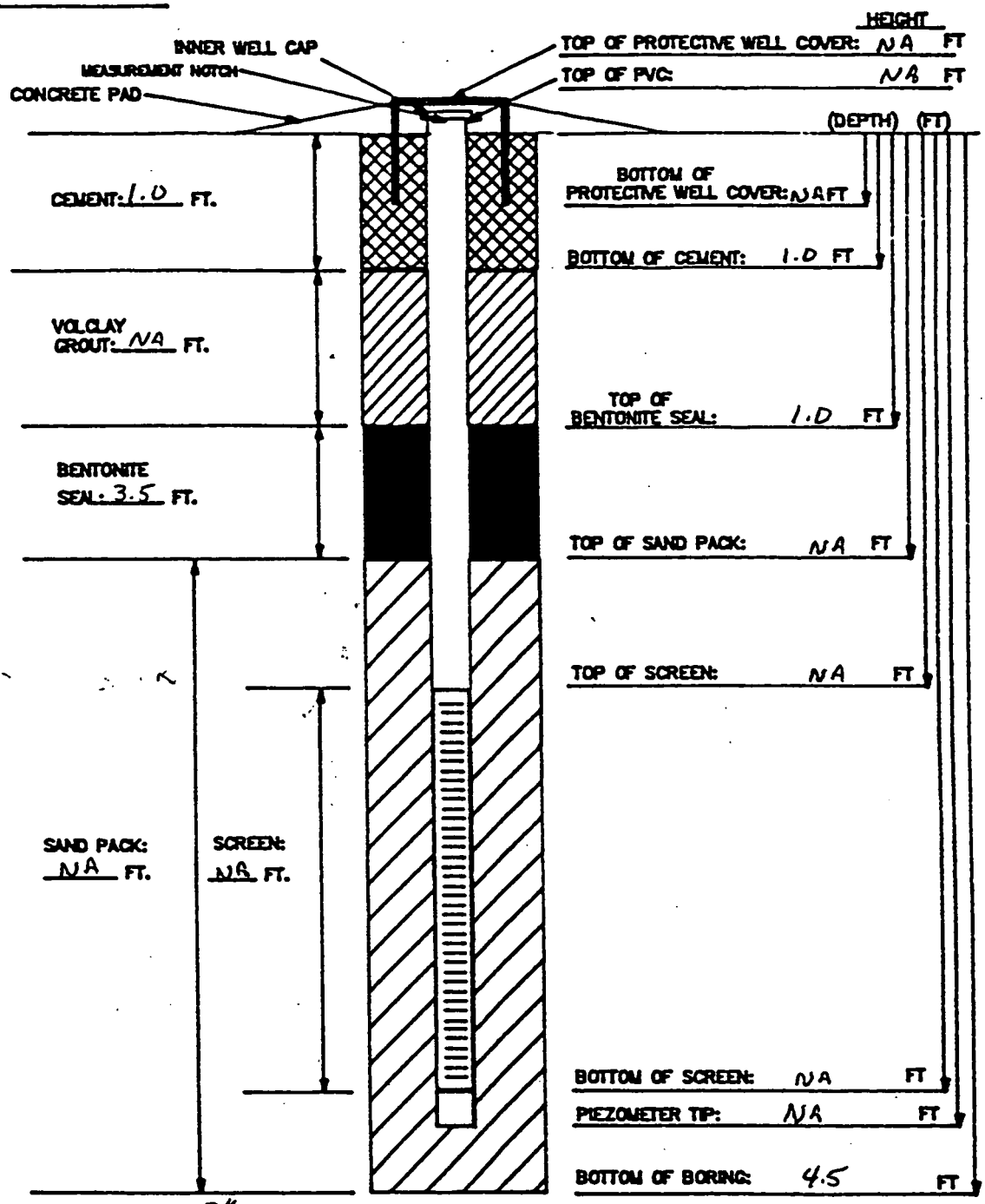
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION
COLOR I.D. BY MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu: 0
α: 0
βγ: 100-200 cpm

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. _____

INSTALLATION DATE: NA



BOREHOLE DIAMETER: 3" INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): ½
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 31 lbs
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES: NA
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: L02.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 9-18-90
PROJECT NO. 6022.3.7 CHECKED BY _____ DATE _____
BORING NO. 1605
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD NA	TYPE OF BIT NA
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 1.0 ft.	BOTTOM 4.5 ft.	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA	NA		
BOTTOM OF BOREHOLE	4.5 ft.			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 1/2 bucket bentonite Pellets used (5 gal)
1/3 bag 94lb cement used

001086

409-11-85

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: LD2.3.7.	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1606	COORDINATES: N.480574.87, E.1381630.23	DATE: 2-17-91	
ELEVATION: 580.33 concrete floor	GWL: Depth 7.06 Date/Time 2-28-91, 1345	DATE STARTED: 2-17-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 2-19-91	
DRILLING METHODS: Auger CME 45		PAGE 1 OF 5	

N.R - No Recovery

S.A.A. - Same as above

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	NA	0.0-1.0' is concrete	NA	NA	
1 Tot U	57183 2250 2-17-91	6	6	Hard, (2.5Y, 5/2) grayish brown, clayey silt, some sand, Trace gravel, moist.	ML	3.0	Hnu - 0 ppm
	57184 2250 2-17-91	12	6	Hard, (2.5Y, 5/2) grayish brown, silty clay Trace sand & gravel, med Plast. moist.	CL	2.5	Bg - 2500cpm
2 Tot U	57185 2250 2-17-91	13	6	Hard, (2.5Y, 5/2 to 10YR, 4/1) grayish brown to darkgray, silty clay, med Plast. Sl. moist	CL	2.0	α - 0cpm
Full RAD 3	57186 2300 2-18-91	8	6	Firm, (2.5Y, 4/1) dark gray, silty clay, trace gravel, med. Plasticity, moist	CL	2.0	Hnu - 0-5ppm
	57187 2300 2-18-91	13	6	S.A.A.	CL	1.5	Bg - 2600cpm
	57188 2300 2-17-91	14	6	S.A.A.	CL	1.5	α - 0 cpm
4 HSL	57189 1805 2-18-91	24	6	Firm, (2.5Y, 3/2) very dark grayish brown, med Plast., moist	CL	1.5	Hnu - 0-5 ppm
HSL	57190 1805 2-18-91	25	6	S.A.A	CL	1.5	Bg - 2800cpm
5 Full Rad	57191 1805 2-18-91	25	6	S.A.A	CL	2.0	α - 1cpm
	57192 1805 2-18-91	26	6	Firm (2.5Y, 4/1) dark gray clay, med Plast. moist.	CL	1.75	
6	57193 2145 2-18-91	3	2	Firm, (2.5Y, 4/1) dark gray, silty clay, trace gravel, med Plasticity, moist	CL	1.5	Hnu - 8.0 ppm
	57194 2145 2-18-91	4	6	S.A.A.	CL	1.5	Bg - 2800cpm
7	57195 2145 2-18-91	7	6	S.A.A.	CL	1.5	α - 2 cpm

NOTES:

Drilling Contractor - Penn Drilling
Drilling Equipment - CME 45
Driller - Bob Yost
Asst - Bill Anderson

Background
Hnu - 0ppm
Bg - 2000-5000cpm
α - 0-5cpm

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI/FS	
BORING NUMBER: 1606	COORDINATES: See p.1	DATE 2-18-91
ELEVATION: See p.1	GWL: Depth See p.1 Date/Time See p.1	DATE STARTED 2-15-91
ENGINEER/GEOLOGIST J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 2-19-91
DRILLING METHODS: Hollow Stem Auger CME 45		PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	57196 2-18-91 2150	6	6	Firm. (10yr. 4/1 To 10yr. 5/4) dark gray to yellowish brown. silty clay trace gravel med. plasticity, moist.	CL	1.5	Hnu - 8.0 ppm
	57197 2-18-91 2150	10	6	S.A.A.	CL	2.0	Bγ - 2800 cpm
	57198 2-18-91 2150	10	0	N.R.	NA	NA	α - 2 cpm
9	57199 2-18-91 2155	20	6	Hard, (10yr. 5/4) yellowish brown, silty clay. some gravel low plast. moist	CL	2.0	Hnu - 5 ppm
	57200 2-18-91 2155	21	2	Hard (10yr. 5/1 To 10yr. 5/4) silty clay, some gravel, low plast. moist.	CL	2.25	Bγ - 3000 cpm
10	57201 2-18-91 2155	18	0	N.R	NA	NA	α - 0 cpm
11	57202 2-18-91 2205	5	4	Hard, (10yr. 5/1 To 10yr. 5/4) gray to yellowish brown silty clay, Trace gravel med plast., sl. moist.	CL	2.0	Hnu - 2 ppm
	57203 2-18-91 2205	9	6	Hard (10yr. 5/1 To 10yr. 5/4) gray To yellowish brown, silty clay, med plas. moist.	CL	2.0	Bγ - 2400 cpm
	57204 2-18-91 2205	10	6	11.5 ft. Firm. (10yr. 5/1) gray silty clay, med plas. moist.	CL	1.75	α - 3 cpm
12	57205 2-18-91 2210	15	6	firm. (10yr. 5/1 To 10yr. 5/4) gray to yellowish brown, silty clay. Trace sand & gravel low plas. sl. moist	CL	1.5	Hnu - 0
	57206 2-18-91 2210	18	6	S.A.A	CL	1.5	Bγ - 2600 cpm
13	57207 2-18-91 2210	18	6	firm (10yr. 5/1) gray silty clay. Trace sand and gravel med plas. sl. moist	CL	1.5	α - 2 cpm
	57208 2-18-91 2218	18	6	S.A.A	CL	1.5	Hnu - <1.0 ppm
14	57209 2-18-91 2218	19	6	S.A.A	CL	1.5	Bγ - 2500 cpm
	57210 2-18-91 2218	20	6	S.A.A.	CL	1.0	α - 5 cpm
15							

NOTES: Drilling contractor - Penn Drilling
Drilling Equipment - CME 45
Driller - Bob Yost
Asst. - Bill Anderson

Background
Hnu - 0 ppm
Bγ - 2000-5000 cpm
α - 0-5 cpm

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1606	COORDINATES: See p.1	DATE: 2-18-91
ELEVATION: See p.1	GWL: Depth See p.1 Date/Time See p.1	DATE STARTED: 2-15-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 2-18-91
DRILLING METHODS: CME 45 Auger		PAGE 3 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	57211 2-18-91 2320	3	6	Soft, (10yr, 5/1) gray, silty clay. Trace gravel med plasticity, moist.	CL	.5	Hnu - 0 ppm
	57212 2-18-91 2320	5	0	N.R	NA	NA	Bq - 2600cpm
16	57213 2-18-91 2320	8	0	N.R	NA	NA	α - 5cpm
	57214 2-18-91 2328	5	6	Soft, (10yr, 5/1) gray silty clay, Trace gravel med. Plasticity, moist	CL	.5	Hnu - 0 ppm
17	57215 2-18-91 2328	7	6	S.A.A.	CL	.5	Bq - 2500cpm
	57216 2-18-91 2328	11	0	N.R.	NA	NA	α - 3 cpm
18	57217 2-18-91 2340	11	6	Soft (10yr, 5/1) gray, silty clay, Trace gravel, med To high plast. moist	CL	.5	Hnu - 0 ppm
	57218 2-18-91 2340	12	6	S.A.A	CL	.5	Bq - 2500cpm
19	57219 2-18-91 2340	45	6	S.A.A	CL	.5	α - 4cpm
	57220 2-18-91 2340	50	6	S.A.A	CL	.5	
20				Drilling and Sampling Ends at 20.0' As per work Plan Sample No. 57224 Total U.I. " " 57222 " WMCO " " 57223 TCLP			

NOTES: Drilling Contractor - Penn Drilling
Drilling Equipment - CME 45 Auger
Driller - Bob Yost
Asst - Bill Anderson

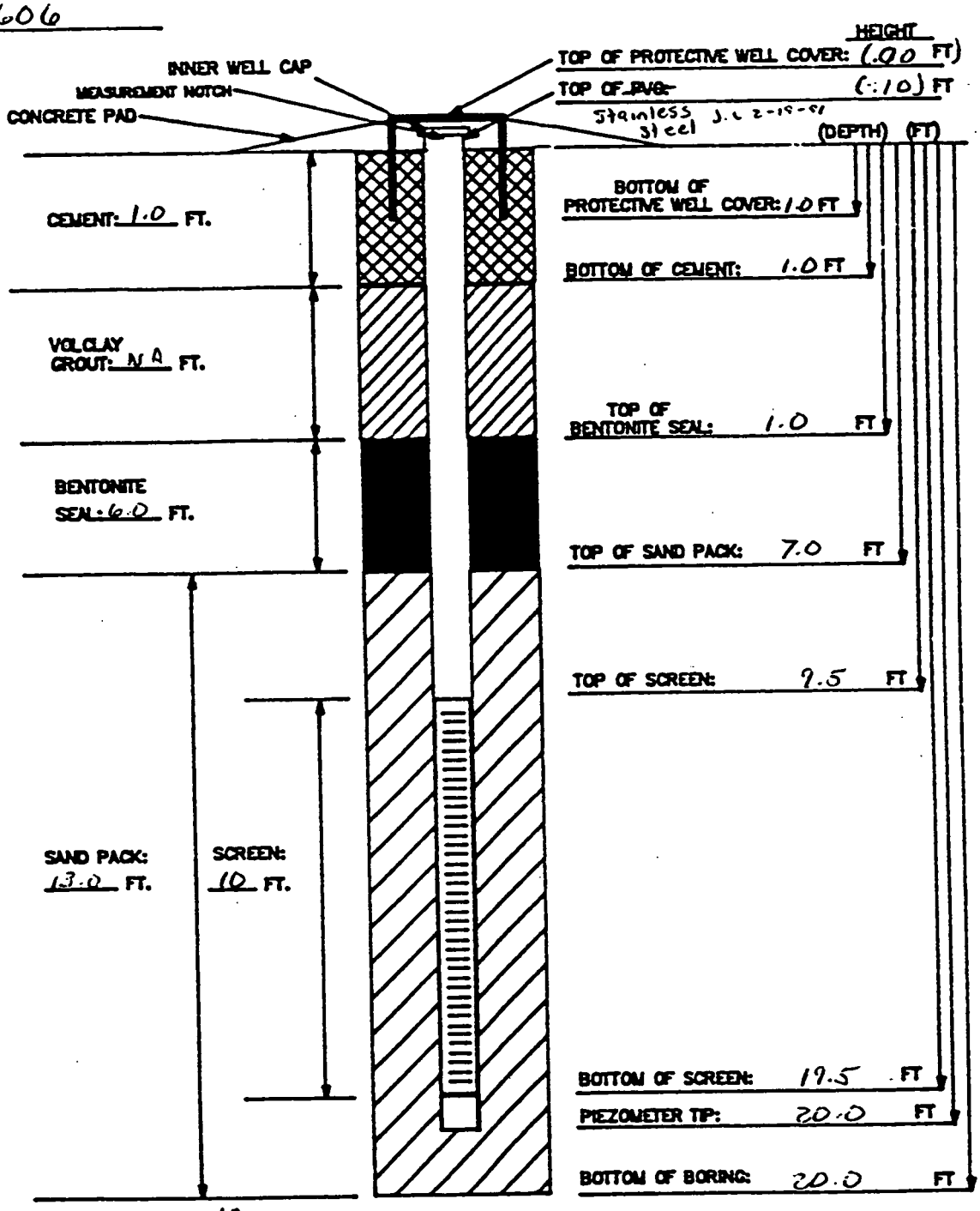
Background
Hnu - 0 ppm
Bq - 2000-5000 cpm
α - 0-5 cpm

402-11-86

INSTALLATION DATE: 2-19-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1606



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10 bags 10-20 (50 lbs)
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: N A
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 2 gals
OTHER: N A

NOTES: 4.0 stainless steel J.L 2-19-91
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. -010
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.37 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 2-19-91
PROJECT NO. 602.3.7 CHECKED BY E.T. DATE 2/27/91
BORING NO. 1606
PIEZOMETER NO. 1606 DATE OF INSTALLATION 2-19-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Auger, Hollow Stem
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID None FROM ~~TO~~	SIZE None FROM ~~TO~~
FLUID None FROM ~~TO~~	SIZE None FROM ~~TO~~

PIEZOMETER DESCRIPTION

TYPE Stainless steel	RISER PIPE MATERIAL Stainless Steel SCH 5
DIAMETER OF PERFORATED SECTION 4.0 ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 7/16 I.D. 4.0
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 ft
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD Threaded flush Jointed
TOTAL PERFORATED AREA 10.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 ft	OTHER PROTECTION well cap: bolted
PROTECTIVE PIPE O.D. 9.75 in	protective lid

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT.) E.T. 3/3/91	
TOP OF RISER PIPE	0.0		580.33	
GROUND SURFACE	0.0		580.33	
BOTTOM OF PROTECTIVE PIPE	E.T. ~~(OT)~~ -1.0 2/27/91		579.33	
BOREHOLE FILL MATERIALS:				
E.T. 2/27/91 ~~GROUT/SLURRY~~/cement	TOP 0.0	BOTTOM 1.0	TOP 580.33	BOTTOM 579.33
BENTONITE	TOP 1.0	BOTTOM 7.0	TOP 579.33	BOTTOM 573.33
SAND	TOP 7.0	BOTTOM 20.0	TOP 573.33	BOTTOM 560.33
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP 570.83	BOTTOM 560.83
PIEZOMETER TIP	20.0		560.33	
BOTTOM OF BOREHOLE	20.0		560.33	
GWL AFTER INSTALLATION	7.06 FT 2/28/91 @ 1345 E.T. 3/2/91 will be taken later		VARIABLE	

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS No water encountered during sampling but may occur at a later date

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 502.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1607	COORDINATES N.480305.77, E.1381636.76	DATE	02-01-91
ELEVATION 580.24 concrete floor	GWL: Depth 7.45 ft Date/Time 2-5-91 @1500	DATE STARTED: 02-01-91	
ENGINEER/GEOLOGIST M. GARMAN, J. LEAR	Depth NA Date/Time NA	DATE COMPLETED: 02-03-91	
DRILLING METHODS HOLLOW STEM AUGER		PAGE	1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (/6 IN)	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
	NA 02-01 2200	NA	NA	0.0 - 1.0' INTERVAL IS CONCRETE	NA	NA		NA
	NA 02-01 2200	NA	NA		NA	NA		
1	57226 02-01 2330	12	6	VERY HARD (10YR, 5/4) YELLOWISH BROWN SILTY CLAY. SOME SAND. TRACE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	>4.0		HNU = 0 α = 0 Bγ = 300cpm
	57227 02-01 2330	18	6	VERY HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	>4.0		
2	57228 02-01 2330	15	6	SAA	CL	>4.0		
	57229 02-01 2340	11	6	HARD (5Y, 4/1) DARK GRAY CLAY. SOME SILT. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	3.0		HNU = 0 α = 0 Bγ = 280cpm
3	57230 02-01 2340	13	6	SAA	CL	2.0		
	57231 02-01 2340	18	6	SAA	CL	2.0		
4	57232 02-02 1655	14	6	FIRM (2.5Y, N4/) DARK GRAY CLAY. SOME SILT. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 α = 0 Bγ = 300cpm
	57233 02-02 1655	12	6	SAA	CL	1.5		
5	57234 02-02 1655	15	6	SAA	CL	1.5		
	57235 02-02 1655	16	6	FIRM (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, LOW PLASTICITY. SLIGHTLY MOIST.	CL	1.5		
6	57236 02-02 1740	3	6	SAA	CL	1.5		HNU = 0 α = 0 Bγ = 350cpm
	57237 02-02 1740	2	3	SAA	CL	1.5		
7	57238 02-02 1740	3	0	NR	NA	NA		

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB MOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

Bγ = 350-450 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 6023.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1607	COORDINATES See p.1	DATE	02-02-91
ELEVATION See p.1	GWL: Depth See p.1 Date/Time See p.1	DATE STARTED:	02-01-91
ENGINEER/GEOLOGIST J. LEAR/M. GARMAN	Depth NA Date/Time NA	DATE COMPLETED:	02-03-91
DRILLING METHODS. HOLLOW STEM AUGER		PAGE	2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
8	57239 02-02 1745	4	6	FIRM (2.5Y, 5/2) GRAYISH BROWN MOTTLED CLAY. SOME SILT. TRACE FINE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0 α = 0 BG = 350 cpm
	57240 02-02 1745	4	6	SAA	CL	2.0		
	57241 02-02 1745	4	4	SAA	CL	2.0		
9	57242 02-02 1750	7	6	FIRM (2.5Y, 5/2) GRAYISH BROWN MOTTLED SILTY CLAY. TRACE FINE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 BG = 350 cpm
	57243 02-02 1750	10	6	SAA	CL	2.0		
10	57244 02-02 1750	16	3	FIRM (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. TRACE FINE SAND AND GRAVEL. SLIGHTLY MOIST.	ML	NA		
	57245 2-02 2210	8	6	Hard (2.5Y, 5/2) grayish brown, clayey silt, trace sand & gravel, slightly moist.	ML	3.5		HNU = 0 α = 0 BG = 350 cpm
11	57246 02-02 2210	15	6	Hard (2.5Y, 5/4) light olive brown clayey silt, some sand, trace gravel, slightly moist.	ML	3.0		
	57247 02-02 2210	16	6	S.A.A.	ML	3.0		
12	57248 02-02 2215	10	6	Hard (10YR, 5/1) gray, clayey silt, trace gravel, slightly moist.	ML	2.5		HNU = 0 α = 0 BG = 350-500 cpm
	57249 02-02 2215	15	6	S.A.A.	ML	2.5		
13	57250 02-02 2215	15	0	N.R.	NA	NA		
	57251 0202 2225	12	6	Firm, (10YR, 5/1) gray, silty clay, med plasticity, slightly moist.	CL	1.5		HNU = 0 α = 0 BG = 350-500 cpm
14	57252 02-02 2225	14	6	S.A.A.	CL	1.75		
	57253 02-02 2225	17	6	S.A.A.	CL	1.5		
15								

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST.: M. REBOLD

BACKGROUND:
HNU = 0
α = 0
BG = 350-500 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1607	COORDINATES See p.1	DATE 02-02-91	
ELEVATION See p.1	GWL: Depth See p.1 Date/Time See p.1	DATE STARTED: 02-01-91	
ENGINEER/GEOLOGIST J. LEAR \ M. GARMAN	Depth NA Date/Time NA	DATE COMPLETED: 02-03-91	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15	57254 02-02 2335	4	6	FIRM (10YR, 5/1) GRAY SILTY CLAY. TRACE SAND. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0
	57255 02-02 2335	3	0	NR	NA	NA		α = 0
16	57256 02-02 2335	5	0	NR	NA	NA		Bγ = 350 cpm
	57257 02-02 2340	4	6	FIRM (10YR, 5/1) GRAY SILTY CLAY. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0
17	57258 02-02 2340	5	6	SAA	CL	1.0		α = 0
	57259 02-02 2340	8	6	SAA	CL	1.0		Bγ = 340 cpm
18	57260 02-02 2345	12	6	SAA	CL	1.0		HNU = 0
	57261 02-02 2345	17	6	SAA	CL	1.0		α = 0
19	57262 02-02 2345	31	6	VERY HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	>4.0		Bγ = 380 cpm
	57263 02-02 2345	39	6	SAA	CL	>4.0		
20				BOTTOM OF BORING AT 20.0 FT 4.0 IN. I.D. STAINLESS STEEL PIEZOMETER INSTALLED.				

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0

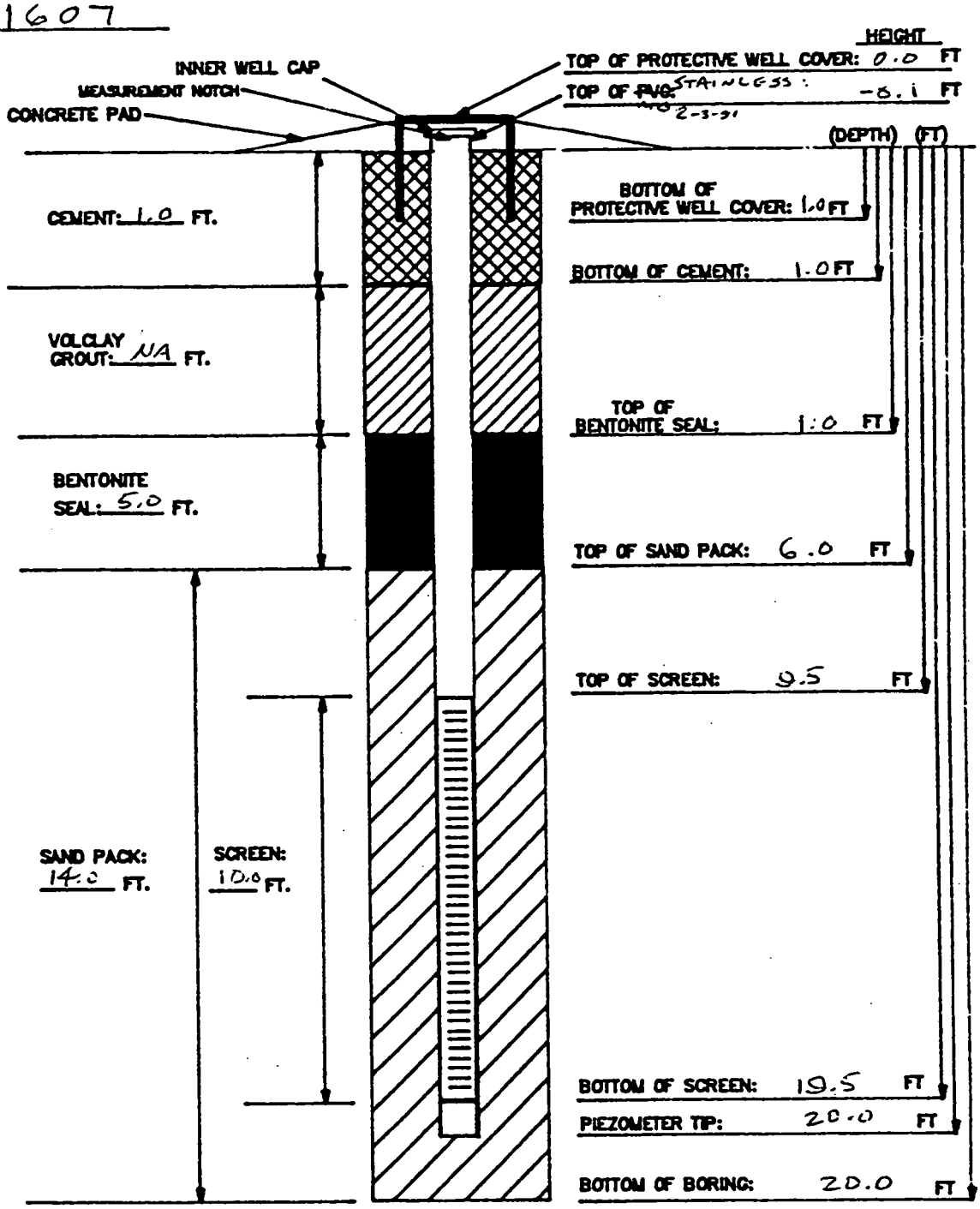
α = 0

Bγ = 350 - 500 cpm

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1607

INSTALLATION DATE: 02-03-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: 5 80lb. bags 10\20
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: .5 bag (100 lbs)
AMOUNT OF WATER USED: 3 gallons
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE-40~~ 4-INCH STAINLESS STEEL PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~2-INCH LD. SCHEDULE-40~~ STAINLESS PVC PIPE WITH 0.010-INCH SLOTS. AG 2-3-91
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: DRY / 2-3-91
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK. AG 2-3-91
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 002.3.7 GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME EMPC RI/FS FIELD ENG./GEO. M. GARMAN DATE 02-03-91
PROJECT NO. 602.3.7 CHECKED BY _____ DATE _____
BORING NO. 1607
PIEZOMETER NO. 1607 DATE OF INSTALLATION 02-03-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE ~~FROM~~ ____ TO ____	SIZE NONE ~~FROM~~ ____ TO ____
FLUID NONE ~~FROM~~ ____ TO ____	SIZE NONE ~~FROM~~ ____ TO ____

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL	RISER PIPE MATERIAL STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0 IN I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 7/16 IN. I.D. 4.0 IN
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 9.4 FT
AVERAGE SIZE OF PERFORATIONS 0.010 IN.	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 10.0 FT	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT	OTHER PROTECTION WELL CAP, BOLT
PROTECTIVE PIPE O.D. 9.75 IN.	ON PROTECTIVE LID

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.)	
TOP OF RISER PIPE	-0.1		580.14	
GROUND SURFACE	0.0		580.24	
BOTTOM OF PROTECTIVE PIPE	1.0		579.24	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT AC 2-3-91	TOP 0.0	BOTTOM 1.0	TOP 580.24	BOTTOM 579.24
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP 579.24	BOTTOM 574.24
SAND	TOP 6.0	BOTTOM 20.0	TOP 574.24	BOTTOM 560.24
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP 570.74	BOTTOM 560.74
PIEZOMETER TIP	20.0		560.24	
BOTTOM OF BOREHOLE	20.0		560.24	
GWL AFTER INSTALLATION	DRY 7.45 on 2/15/91 @1500		VARIABLE	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 4.0 IN I.D. STAINLESS STEEL PIEZOMETER WAS SET IN DRY HOLE OF 10.0 IN. DIAM. AS PER WORK PLAN.

001036

409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1608	COORDINATES:	DATE: 2-20-91	
ELEVATION:	GWL: Depth 7.76' Date/Time 2-23-91, 1345	DATE STARTED: 2-20-91	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-26-91	
DRILLING METHODS: CME 45 Auger		PAGE 1 OF 5	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	NA	0.0 - 1.0' is concrete	NA	NA	
1 Tot V.	57270 2120 2-20-91	5	6	very stiff, (10yr, 5/8) yellowish brown clayey silt some sand, low plasticity, moist.	ML	2.5	Hnu - 0 ppm
	57271 2120 2-20-91	6	6	Soft, (10yr, 4/1) to (10yr, 3/4) Dark gray to dark yellowish brown clay, some sand, med Plast., moist	CL	.5	BZ - 800 cpm α - 0 cpm
2 Tot V	57272 2120 2-20-91	13	6	Hard, (10yr, 4/1 To 2.5y. 5/4) silty clay dark gray to light olive brown, low plas. sl. moist	CL	>4.0	
Full Rod 3	57273 2130 2-20-91	9	6	very stiff, (10yr/3/1), very dark gray, silty clay, low plasticity, moist	CL	2.5	Hnu - 0 ppm
	57274 2130 2-20-91	12	6	S.A.A	CL	2.5	BZ - 800 cpm
	57275 2130 2-20-91	17	6	S.A.A	CL	2.0	α - 0 cpm
4 HSL	57276 1800 2-25-91	12	6	Stiff. (10yr. 5/1) gray. silty clay, low to med Plast. sl. moist.	CL	1.5	Hnu - 0 ppm
HSL	57277 1800 2-25-91	15	6	S.A.A.	CL	1.5	BZ - 500 cpm
5 Full Rod	57278 1800 2-25-91	18	6	S.A.A	CL	1.5	α - 0 cpm
	57279 1800 2-25-91	23	6	S.A.A. Add 2.5y.5/4 light olive brown	CL	1.25	
6	57280 2030 2-25-91	4	6	very stiff (10yr. 5/1 to 2.5y. 5/4) clayey silt Trace sand and gravel V. Low Plast. Sl. moist gray to yellowish brown	ML	2.0	Hnu - 0 ppm
	57281 2030 2-25-91	5	6	S.A.A	ML	2.0	BZ - 500 cpm α - 0 ppm
7	57282 2030 2-25-91	9	0	N.R	NA	NA	

NOTES:
Drilling contractor: Penn Drilling
Drilling equipment - CME 45 Auger
Driller - Bob Yost
Asst - Bill Anderson

SAA - Same as above
N.R. No recovery

Background
Hnu - 0 ppm
BZ - 500-1000 cpm
α - 0-5 cpm

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1608	COORDINATES:	DATE: 2-25-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-26-91
DRILLING METHODS: CME 45 Auger		PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	57283 2135 2-25-91	15	6	Very stiff (10yr, 5/8) clayey silt, trace sand and gravel, Low Plast. Sl. moist. yellowish brown	ML	3.0	Hnu - 0 ppm Bq - 800 cpm α - 0 cpm
	57284 2135 2-25-91	11	6	S.A.A.	ML	2.5	
9	57285 2135 2-25-91	9	2	S.A.A.	ML	3.0	
	57286 2140 2-25-91	12	6	Very stiff (10yr, 5/1) clayey silt, Low Plast. moist. gray	ML	2.0	Hnu - 0 ppm Bq - 800 cpm α - 0 cpm
Full Rod 10	57287 2140 2-25-91	15	6	S.A.A	ML	2.0	
	57288 2140 2-25-91	18	0	N.R.	NA	NA	
11	57289 2215 2-25-91	4	6	Stiff (10yr, 4/1 To 10yr 4/6) dark gray to dark yellowish brown silty clay, some sand, med plast. moist	CL	1.5	Hnu - 0 ppm Bq - 800 cpm α - 0 cpm
	57290 2215 2-25-91	6	4	Stiff, (10yr, 5/1) gray, clayey silt, trace sand, low plast. moist	ML	2.0	
	57291 2215 2-25-91	10	0	N.R.	NA	NA	
12	57292 2220 2-25-91	6	6	Stiff, (10yr, 5/4) yellowish brown, silt V. Low plast. V. moist.	ML	1.5	Hnu - 0 ppm Bq - 800 cpm α - 0 cpm
	57293 2220 2-25-91	9	6	Stiff (10yr, 5/1) gray, silt some clay low plast. moist	ML	2.0	
13	57294 2220 2-25-91	11	6	S.A.A.	ML	2.0	
	57295 2225 2-25-91	14	6	S.A.A.	ML	1.5	Hnu - 0 ppm Bq - 800 cpm α - 0 cpm
14	57296 2225 2-25-91	9	6	S.A.A.	ML	1.0	
15	57297 2225 2-25-91	8	0	N.R.			

NOTES:
Drilling Contractor - Penn Drilling
Drilling Equipment - CME 45 Auger
Driller - Bob Yost
Asst - Bill Anderson

Background
Hnu - 0 ppm
Bq - 500-1000 cpm
α - 0-5 cpm

402-11-88

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 662.3.7	PROJECT NAME: SMPC RI/FS		
BORING NUMBER: 1608	COORDINATES:	DATE	2-25-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:	2-20-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED:	2-26-91
DRILLING METHODS: CME 45 Auger		PAGE 3	OF 5

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15 full Rad	57298 2235 2-25-91	2	6	Stiff, (10yr, 5/1) clayey silt, Trace gravel med Plast. moist gray	ML	1.5	Hnu - 0 ppm BY - 800 cpm
	57299 2235 2-25-91	4	6	S.A.A	ML	1.5	α - 0 cpm
16	57300 2235 2-25-91	4	0	N.E	NA	NA	
	57301 2240 2-25-91	6	6	m. stiff (10yr, 5/1) gray clayey silt, Trace sand, gravel med plast. moist	ML	.75	Hnu - 0 ppm BY - 800 cpm
17	57302 2240 2-25-91	7	6	S.A.A	ML	.75	α - 0 cpm
	57303 2240 2-25-91	8	6	S.A.A	ML	.75	
18	57304 2245 2-25-91	15	6	S.A.A. Add High Plasticity	ML	.50	Hnu - 0 ppm BY - 800 cpm
	57305 2245 2-25-91	25	6	S.A.A.	ML	.75	α - 0 cpm
19	57306 2245 2-25-91	36	6	S.A.A.	ML	.75	
full Rad 20	57307 2245 2-25-91	40	6	S.A.A.	ML	.75	
				Drilling and Sampling ends at 20.0' As per work plan Sample No. 57308 Total U. IT " " 57309 Total U. WMCO " " 57310 TCLP			

NOTES:
Drilling Contractor - Penn Drilling
Drilling equipment - CME 45 Auger
Driller - Bob Yost
Asst - Bill Anderson

Back ground
Hnu - 0 ppm
BY - 500 - 1000 cpm
α - 0 - 5 cpm

402-11-86

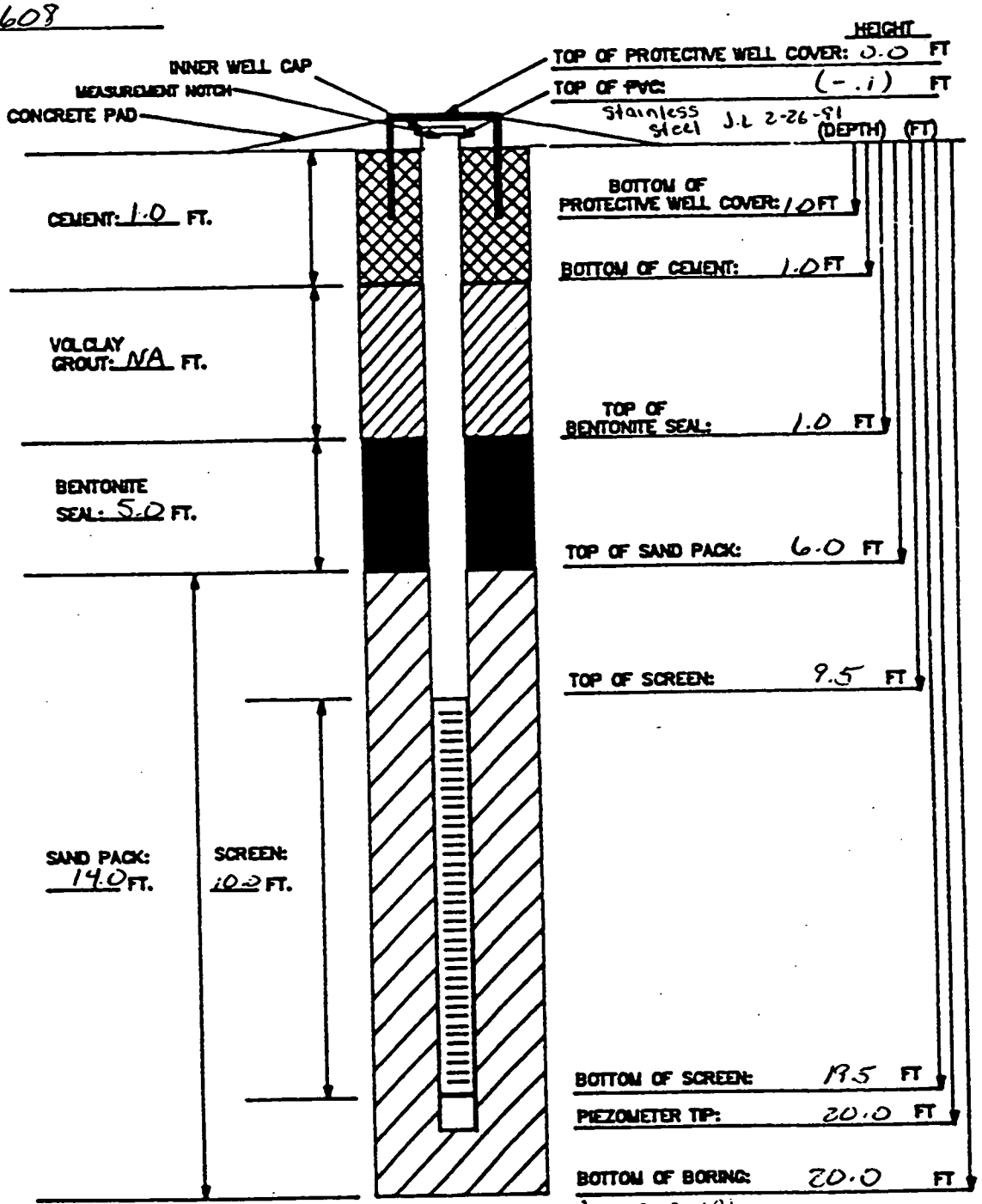
4/5

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1608

INSTALLATION DATE: 2-26-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20 8 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 2 gals
OTHER: NA

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.~~ 4 in Stainless steel
2) SCREEN IS ~~2-INCH LD. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.~~ .010
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 2-26-91
PROJECT NO. 602.3.7 CHECKED BY E.T. DATE 3/3/91
BORING NO. 1608
PIEZOMETER NO. 1608 DATE OF INSTALLATION 2-26-91

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT 10 in Hollow Auger
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA.
FLUID None FROM ~~TO~~	SIZE None ~~FROM~~ TO
FLUID None ~~FROM~~ TO	SIZE None ~~FROM~~ TO

PIEZOMETER DESCRIPTION

TYPE 4in Stainless steel	RISER PIPE MATERIAL Stainless steel Sch 5
DIAMETER OF PERFORATED SECTION 4 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 7/16 I.D. 4.0
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 ft
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Threaded flush Jointed
TOTAL PERFORATED AREA 10 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 ft	OTHER PROTECTION Well cap bolted
PROTECTIVE PIPE O.D. 9.75 in	Protection lid

TO BE COMPLETED

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	(-.1)			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.0			
BOREHOLE FILL MATERIALS:				
JL 2-26-91 ~~GROUT/SLURRY~~/cement	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP 6.0	BOTTOM 20.0	TOP	BOTTOM
JL 2-26-91 ~~GRAVEL~~	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	will be taken later			

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS No water incurred during sampling but may show at later date due to Nature of Silty Soil

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1609 #1	COORDINATES		DATE 01-22-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 01-22-91
ENGINEER/GEOLOGIST J. LEAIR, M. GAIRMAN	Depth	Date/Time	DATE COMPLETED 01-22-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	NA 01-22 1850	NA	NA	0.0 - 1.0 FT IS CONCRETE.	NA	NA		NA
	NA 01-22 1850	NA	NA		NA	NA		
1 TOTALU SAMPLE	57314 01-22 2200	11	6	DENSE (10YR 5/2) GRAYISH BROWN SANDY WELL GRADED GRAVEL. SOME SILT. SLIGHTLY MOIST.	GW	NA		HNU = 0 α = 0 Bγ = 100 cpm
	57315 01-22 2200	14	6	DENSE (10YR 5/3) BROWN WELL GRADED SAND. SOME SILT. SOME GRAVEL. SLIGHTLY MOIST.	SW	NA		
2 TOTALU S	57316 01-22 2200	19	6	SAA	SW	NA		
	57317 01-22 2205	21	6	DENSE (10YR 5/4) YELLOWISH BROWN SILTY FINE TO MEDIUM GRAINED SAND. TRACE GRAVEL. SLIGHTLY MOIST.	SM	NA		HNU = 0 α = 0 Bγ = 150 cpm
3	57318 01-22 2205	20	6	SAA	SM	NA		
	57319 01-22 2205	24	3	SAA	SM	NA		
4 ISL SAMPLE	57320 01-22 2210	20	6	MEDIUM DENSE (10YR 5/4) YELLOWISH BROWN SILTY FINE TO MEDIUM GRAINED SAND. TRACE GRAVEL. SLIGHTLY MOIST.	SM	NA		HNU = 0 α = 0 Bγ = 150 cpm
ISL SAMPLE	57321 01-22 2210	11	6	SAA	SM	NA		
5	57322 01-22 2210	14	5	SAA	SM	NA		
	57323 01-22 2210	8	0	NR	NA	NA		
6	57324 01-22 2300	11	6	LOOSE (10YR 5/4) YELLOWISH BROWN SILTY SAND. TRACE COARSE GRAVEL. SLIGHTLY MOIST. FRAGMENTS OF RED PLASTIC AND OFF-WHITE TERRA COTTA. MAY BE PIPE?	SM	NA		HNU = 0 α = 0 Bγ = 180 cpm
	57325 01-22 2300	7	6	SOFT (10YR 5/4) MOTTLED GRAYISH BROWN SILTY CLAY. MEDIUM PLASTICITY. MOIST	CL	0.25 ~~0.5~~ (TSF)		
7	57326 01-22 2300	3	0	NR	NA	NA		

NOTES. HIT PIPE AT 6.0. 6.5 FT. HOLE PLUGGED AND ABANDONED.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST. MARK REIBOLD

BACKGROUND:

HNU = 0

α = 0

Bγ = 3000 - 5000 cpm

001102

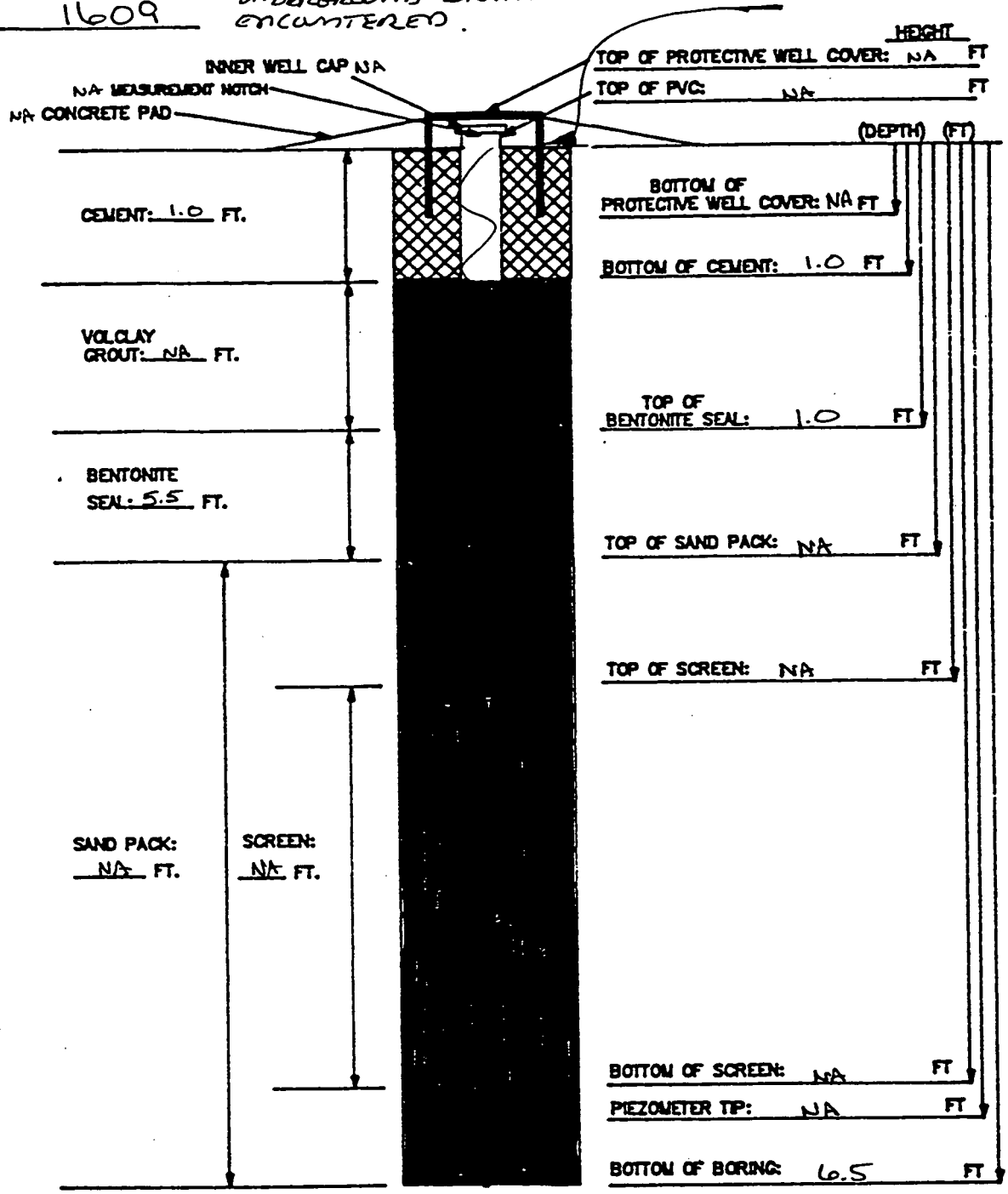
FERNALD RI/FS

INSTALLATION DATE: 01-22-91

~~INSTALLATION DIAGRAM~~ > BORING ABANDONED. UNDERGROUND DRAIN LINE ENCOUNTERED.

~~MONITORING WELL NO.~~ 1609

* CEMENTED TO SURFACE FLUSH WITH FLOOR.



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1.5 BAGS
AMOUNT OF WATER USED: 15 GALLONS
OTHER:

NOTES: NA
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.7 GEOLOGIST/ENGINEER: M. GARMAN

FIGURE 2-3 FLUSH PIEZOMETER COMPLETION

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 6023.7
BORING NO. 1609
PIEZOMETER NO. NA

FIELD ENG./GEO. MARK GARMAN DATE 1-22-91
CHECKED BY S.T. DATE 2-3-91
DATE OF ~~INSTALLATION~~ PLUGGED & ABANDON 1-22-91

BOREHOLE DRILLING

DRILLING METHOD Auger CME 45	TYPE OF BIT Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE ABANDONED BORING	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION CEMENTED TO SURFACE
PROTECTIVE PIPE O.D. NA	TO RE-ESTABLISH FLOOR SURFACE

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( ) ESTABLISHED @ LATER DATE.	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE PELLETS & WATER	TOP 1.0	BOTTOM 6.5	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	7.5 FT			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS BORING 1609 WAS PLUGGED AND ABANDONED AFTER DRAIN LINE ENCOUNTERED ON 1st ATTEMPT. ON 2nd ATTEMPT DRAIN-LINE ENCOUNTERED AGAIN AND NO SAMPLES WERE TAKEN. 2nd ATTEMPT COLLAPSED ON REMOVAL OF SAMPLE SPOONS ONLY CEMENTED BACK TO SURFACE. NOT RE-NUMBERED.

FERNALD RI/FS

Date	2/6/91			
Initial	E.T.			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1610	COORDINATES		DATE 01-19-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 01-19-91
ENGINEER/GEOLOGIST M. GARMAN, J. LEAR	Depth	Date/Time	DATE COMPLETED 01-20-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (/6 IN)	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONTAMINANTS (ppm)	NA WELL CONSTRUCTION	REMARKS
	NA 1-19-91 1830	NA	6	0.0 TO 0.5 FT IS CONCRETE	NA	NA		NA
TOTALS SAMPLE 1	57358 01-19 2141	4	6	MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN SILTY SAND. SOME GRAVEL. DRY.	SM	NA		HNU = 0
	57359 01-19 2141	9	6	SAA	SM	NA		α = 0
	57360 01-19 2141	16	2	SAA	SM	NA		βγ = 200-300 cpm
2	57361 01-19 2146	17	6	SAA	SM	NA		HNU = 0
	57362 01-19 2146	15	6	SAA	SM	NA		α = 0
3	57363 01-19 2146	14	6	SAA	SM	NA		βγ = 260 cpm
	57364 01-19 2146	14	3	SAA	SM	NA		
4	57365 01-19 2153	12	6	LOOSE (10YR, 5/3) BROWN SILTY, GRAVELLY SAND. DRY.	SM	NA		HNU = 0
TSL SAMPLE	57366 01-19 2153	8	6	SAA	SM	NA		α = 0
5	57367 01-19 2153	5	6	SAA	SM	NA		βγ = 250 cpm
	57368 01-19 2153	3	6	SAA	SM	NA		
6	57369 01-19 2257	2	6	VERY LOOSE (10YR, 5/3) BROWN SILTY, GRAVELLY SAND. DRY.	SM	NA		HNU = 0
	57370 01-19 2257	1	6	SAA	SM	NA		α = 0
7	57371 01-19 2257	1	2	VERY LOOSE (10YR, 5/3) BROWN CLAYEY, SANDY SILT. TRACE GRAVEL. SLIGHTLY MOIST.	ML	NA		βγ = 250 cpm

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST: MARK REBOLD

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
βγ = 3000-5000 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1610	COORDINATES		DATE 01-19-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 01-19-91
ENGINEER/GEOLOGIST M. GARMAN, J. LEAR	Depth	Date/Time	DATE COMPLETED: 01-20-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE, NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
8	57372 01-19 2305	2	3	LOOSE (10YR, 5/2) GRAYISH BROWN CLAYEY SILT. TRACE FINE SAND. SLIGHTLY MOIST.	SM	NA		HNU = 0 α = 0 Bγ = 280 cpm
	57373 01-19 2305	3	0	NR	NA	NA		
	57374 01-19 2305	5	0	NR	NA	NA		
9	57375 01-19 2309	10	6	HARD (10YR, 5/2) MOTTLED GRAYISH BROWN SILTY CLAY. LOW PLASTICITY. SLIGHTLY MOIST.	CL	4.0		HNU = 0 α = 0 Bγ = 300 cpm
	57376 01-19 2309	16	6	HARD (10YR, 5/2) MOTTLED GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		
10	57377 01-19 2309	9	3	SAA	CL	2.0		
	57378 01-20 1718	12	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. TRACE FINE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5		HNU = 0 α = 0 Bγ = 300 cpm
11	57379 01-20 1718	11	3	SAA	CL	2.5		
	57380 01-20 1718	7	0	NR	NA	NA		
12	57381 01-20 1724	12	6	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. SOME SAND AND GRAVEL. VERY MOIST.	ML	NA		HNU = 0 α = 0 Bγ = 280 cpm
20 NE	57382 01-20 1724	17	6	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. TRACE SAND AND GRAVEL. VERY MOIST TO WET.	ML	NA		
13	57383 01-20 1724	22	6	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. TRACE FINE GRAVEL. MOIST TO VERY MOIST.	ML	NA		
	57384 01-20 1735	27	6	DENSE (2.5Y, 5/2) GRAYISH BROWN CLAYEY SILT. TRACE FINE GRAVEL. MOIST.	ML	NA		HNU = 0 α = 0 Bγ = 260 cpm
14	57385 01-20 1735	24	6	SAA	ML	NA		
15	57386 01-20 1735	18	6	DENSE (2.5Y, 5/2) MOTTLED GRAYISH BROWN SILT. SOME CLAY. MOIST.	ML	NA		

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment CME 45

Driller: BOB HOST

ASST. M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

Bγ = 3000 - 5000 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1610	COORDINATES		DATE 01-20-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 01-19-91
ENGINEER/GEOLOGIST M. GARMAN	Depth	Date/Time	DATE COMPLETED: 01-20-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15	57387 01-20 1755	5	0	NR	NA	NA		HNU = NA
	57388 01-20 1755	4	0	NR	NA	NA		α = NA BT = NA
16	57389 01-20 1755	5	0	NR	NA	NA		
	57390 01-20 1800	7	6	FIRM (2.5Y, N4/) DARK GRAY SILTY CLAY. TRACE FINE GRAVEL. SLIGHTLY MOIST TO MOIST. MEDIUM PLASTICITY.	CL	2.0		HNU = 0
17	57391 01-20 1800	43	6	SAA	CL	1.5		α = 0 BT = 280 cpm
	57392 01-20 1800	50/3in	3	VERY DENSE (2.5Y, N4/) DARK GRAY SILT. TRACE CLAY. TRACE COARSE GRAVEL. SLIGHTLY MOIST.	ML	NA		
18	57393 01-20 1840	50/5in	5	VERY DENSE (2.5Y, N4/) DARK GRAY SILT. TRACE SILT. TRACE FINE GRAVEL. SLIGHTLY MOIST.	ML	NA		HNU = 0 α = 0 BT = 260 cpm
	57394 01-20 1840	NA	0	NR AFTER 3 ATTEMPTS	NA	NA		
19	57395 01-20 1840	NA	0	NR AFTER 3 ATTEMPTS	NA	NA		
	57396 01-20 1840	NA	0	NR AFTER 3 ATTEMPTS	NA	NA		
20				DRILLING ENDED AT 20.0 FT. 4.0 IN. I.D. STAINLESS STEEL PIEZOMETER INSTALLED.				

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST: MARK REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

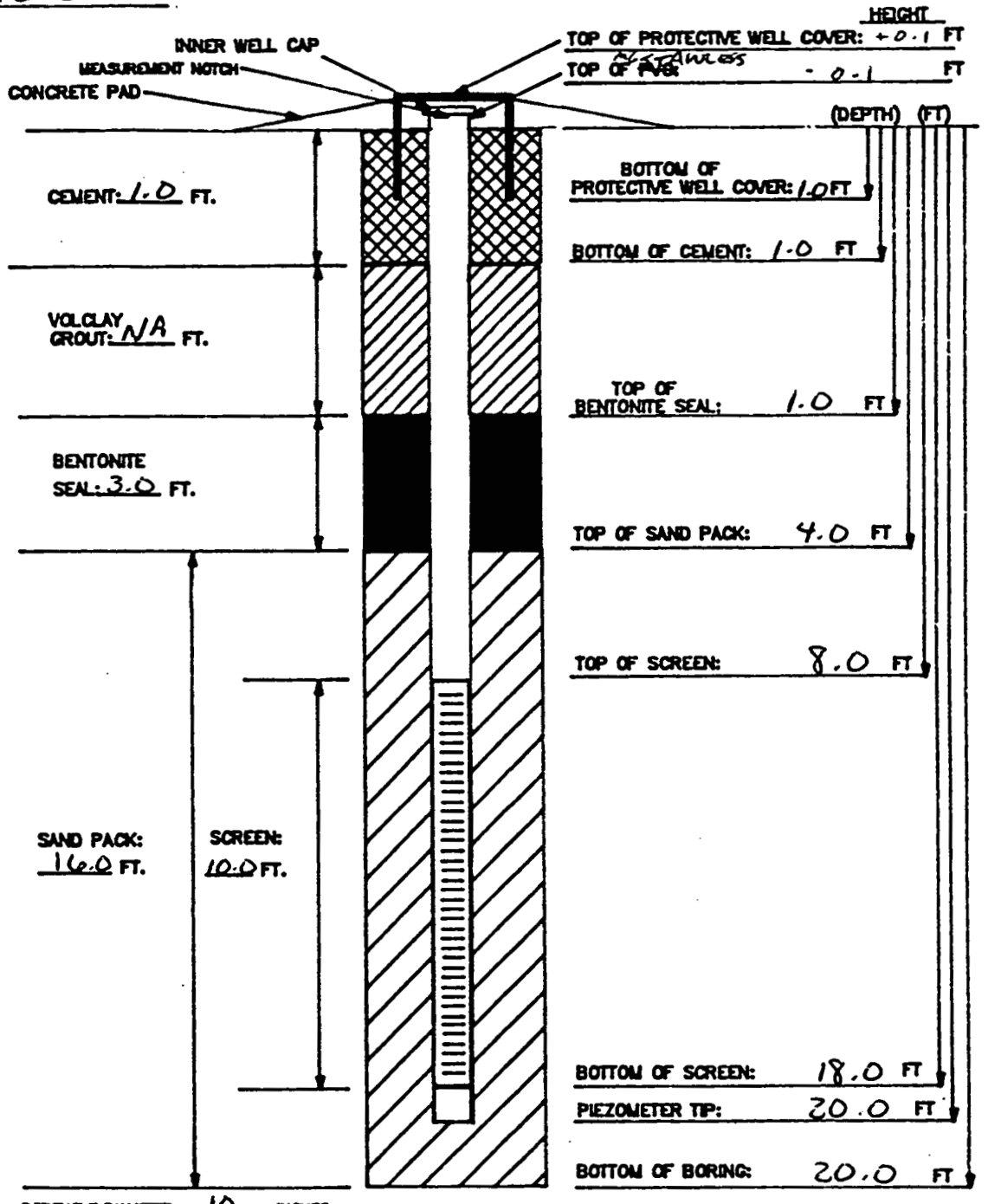
BT = 3000 cpm

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1610

INSTALLATION DATE: 01-20-91



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	+0.1 FT	
TOP OF ~~PVC~~ STAINLESS	-0.1 FT	
BOTTOM OF PROTECTIVE WELL COVER:	1.0 FT	
BOTTOM OF CEMENT:	1.0 FT	
TOP OF BENTONITE SEAL:	1.0 FT	
TOP OF SAND PACK:	4.0 FT	
TOP OF SCREEN:	8.0 FT	
BOTTOM OF SCREEN:	18.0 FT	
PIEZOMETER TIP:	20.0 FT	
BOTTOM OF BORING:	20.0 FT	

BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 5-80 lbs 10 to 20 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1 bucket
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 2 gals
OTHER:

NOTES: NA

1) RISER PIPE IS ~~2-INCH SCHEDULE-40~~ 4-INCH STAINLESS STEEL ~~PVC PIPE; FLUSH-THREADED JOINTS~~ S.S. 1-22-91
2) SCREEN IS ~~2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS~~.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 9.5 FT / 1-21-91
5) TOP OF ~~PVC~~ IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME SMPC RI/FS FIELD ENG./GEO. M. Garman DATE 1-20-91
PROJECT NO. 602.3.7. CHECKED BY E. Trollinger DATE 2-3-91
BORING NO. 1610
PIEZOMETER NO. 1610 DATE OF INSTALLATION 01-20-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA FROM ~~TO~~

TYPE OF BIT 10 in hollow Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 316 Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 7/16 IN I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 8 ft section
JOINING METHOD Flush Joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT
PROTECTIVE PIPE O.D. 9/14 IN

OTHER PROTECTION FLUSH MOUNT WELL COVER

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 0.1			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	0.9			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT (NG 01-20-91)	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.0	TOP	BOTTOM
SAND	TOP 4.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 18.0	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	9.5			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 10 INCH DIAM. HOLLOW STEM AUGERS AND 4.0 IN I.D. STAINLESS STEEL PIEZOMETER MATERIALS WERE USED. AS PER WORK PLAN

Initial	Date	12/21/90		
	E.T.			
Field Check	1st Key In	2nd Key In	Hard Copy Verification	

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1611	COORDINATES:	DATE: 12-11-90 ; 12-12-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-11-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth Date/Time	DATE COMPLETED: 12-13-90	
DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING)		PAGE 1 OF 5	

BE ADJUSTED 2-1-90

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6-inches)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	57095 1355 12-11-90	N/A	6	CONCRETE	N/A	N/A	Hnu = 0.0 α = 0 γB = 40-100 cpm READINGS FOR 1.0-1.5 FT
1.0	57096 1358 12-11-90	N/A	6				
TOT. U. 1.5	57097 1358 12-11-90	3	6	VERY LOOSE, BROWNISH YELLOW (10YR 6/6), WELL-GRADED SANDY GRAVEL, SUBROUNDED TO ROUNDED, TRACE OF SILT, MOIST	GW	N/A	
2.0	57098 1358 12-11-90	2	3	SAA	GW	N/A	Hnu = 0.0 α = 0 γB = 900 cpm
TOT. U. 2.5	57099 1358 12-11-90	3	⊖	N/A (NR)	N/A	N/A	
3.0	57100 1434 12-11-90	4	6	STIFF, LIGHT OLIVE BROWN (2.5Y 5/6), GRAVELLY CLAY, SOME SAND, TRACE OF SILT, MOIST TO WET, LOW PLASTICITY	CL	1.25	
3.5	57101 1434 12-11-90	4	6	SAA	CL	1.25	Hnu = 0.0 α = 0 γB = 1000 cpm
4.0	57102 1434 12-11-90	6	6	STIFF, LIGHT OLIVE BROWN (2.5Y 5/4), SANDY CLAY, SOME GRAVEL, SILT, LOW PLASTICITY, MOIST TO WET	CL	1.9	
HSL 4.5	57103 0910 12-12-90	11	4	VERY STIFF, OLIVE YELLOW (2.5Y 6/8), SANDY CLAY, SOME SILT, LOW PLASTICITY, MOIST	CL	2.5	
HSL 5.0	57104 0910 12-12-90	9	6	VERY STIFF, VERY DARK GRAY (2.5Y 3/0), CLAY, TRACE OF SILT, MOIST	CL	3.5	Hnu = 0.0 α = 0 γB = 2000-2400 cpm
FULL END. 5.5	57105 0910 12-12-90	9	6	VERY STIFF, YELLOWISH BROWN (10YR 5/6), SILTY CLAY, TRACE OF SAND, GRAVEL, LOW PLASTICITY, MOIST	CL	3.0	
6.0	57106 1017 12-12-90	2	⊖	N/A (NR)	N/A	N/A	
6.5	57107 1017 12-12-90	2	⊖	N/A (NR)	N/A	N/A	Hnu = 0.0 α = 0 γB = 1800-2200 cpm
7.0	57108 1017 12-12-90	3	6	STIFF, VERY DARK GRAY (10YR 3/1), CLAY, SOME SILT, TRACE OF COBBLE, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	1.25	
7.5	57109 1022 12-12-90	8	⊖	N/A (NR)	N/A	N/A	

NOTES: Contractor : Pennsylvania Drilling
Driller : D. NEWMAN
Drillers Assistant: B. JOHNSON
All Samples collected according to ASTM Standards Soil Classification Described

SAA: SAME AS ABOVE
NR: NO RECOVERY
N/A: NOT APPLICABLE

001110

Background Readings/Levels
Hnu = 0.0 ppm.
Alpha (α) = 0 cpm
Gamma - Beta = 1900-2100 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC: RI/FS Facility Testing)		
BORING NUMBER: 1611	COORDINATES:		DATE: 12-12-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-11-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 12-13-90
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)			PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	57110 1022 12-12-90	9	0	N/R	N/A	N/A	Hnu = 0.0
5.0	57111 1022 12-12-90	9	6	SOFT, VERY DARK GRAY (5Y 3/1), CLAY-SILT MIXTURE, NO PLASTICITY, DRY TO SLIGHTLY MOIST	ML	0.50	α = 0
7.5	57112 1022 12-12-90	15	6	SOFT, OLIVE YELLOW (2.5Y 6/6), CLAYEY SILT, NO PLASTICITY, DRY	ML	0.40	SB = 900-1400 cpm
9.0	57113 1029 12-12-90	22	0	N/R	N/A	N/A	Hnu = 0.0
9.5	57114 1029 12-12-90	23	0	N/R	N/A	N/A	α = 0
10.0	57115 1029 12-12-90	16	6	VERY SOFT, OLIVE YELLOW (2.5Y 6/6) SILT, SOME CLAY, NO PLASTICITY, TRACE OF PEBBLES, DRY	ML	0.25	SB = 1000 cpm
10.5	57116 1038 12-12-90	8	4	SAA	ML	0.25	Hnu = 0.0
11.0	57117 1038 12-12-90	9	6	SOFT, GRAYISH BROWN (2.5Y 5/2), CLAYEY SILT, TRACE OF SAND, NO PLASTICITY, DRY	ML	.30	α = 0
11.5	57118 1038 12-12-90	13	6	SOFT, GRAY (5Y 5/1), SILT, SOME SAND TRACE OF CLAY, PEBBLES, NO PLASTICITY, DRY	ML	.50	SB = 1200-1400
12.0	57119 1046 12-12-90	20	3	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5Y 5/6), GRAVEL-SILT-SAND-CLAY MIXTURE, MOIST TO WET	GC	N/A	Hnu = 0.0
12.5	57120 1046 12-12-90	18	6	SOFT, GRAY (2.5Y 5/0), SAND-SILT MIXTURE, SOME CLAY, VERY SLIGHT PLASTICITY, MOIST	SM	.40	α = 0
13.0	57121 1046 12-12-90	23	6	SAA	SM	.40	SB = 900-1000 cpm
13.5	57122 1057 12-12-90	23	0	N/R	N/A	N/A	Hnu = 0.0
14.0	57123 1057 12-12-90	18	0	N/R	N/A	N/A	α = 0
14.5	57124 1057 12-12-90	18	6	MEDIUM STIFF, GRAY (2.5Y 5/0), SAND-SILT MIXTURE, SOME CLAY, SLIGHT PLASTICITY, DRY TO MOIST	SM	.75	SB = 800-1200 cpm
15.0							

NOTES:

SEE PAGE 1

BACKGROUND
Hnu = 0.0 ppm
α = 0 cpm
SB = 2000 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.07	PROJECT NAME: FMPC RI/FS - (Facility Testing Program)		
BORING NUMBER: 1611	COORDINATES:		DATE: 12-12-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-11-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 12-13-90
DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling)			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	57125 1057 12-12-90	17	6	STIFF, GRAY (2.5Y 5/0), CLAY, SOME SILT AND SAND, LOW PLASTICITY, DRY	CL	2.0	Hum = 0.0 α = 0 βB = 800-1000 cpm
16.0	57126 1412 12-12-90	4	⊖	NR	N/A	N/A	
16.5	57127 1412 12-12-90	4	⊖	NR	N/A	N/A	
17.0	57128 1412 12-12-90	6	6	STIFF GRAY (10YR 5/1), SANDY CLAY, SOME GRAVEL AND COBBLES, SILT, LOW PLASTICITY, DRY TO SLIGHTLY MOIST	CL	2.0	Hum = 0.0 α = 0 βB = 1500-1700 cpm
17.5	57129 1426 12-12-90	8	⊖	NR	N/A	N/A	
18.0	57130 1426 12-12-90	12	3	MEDIUM STIFF, GRAY (5Y 5/1), SILTY CLAY, TRACE OF SAND, GRAVEL, LOW TO MEDIUM PLASTICITY, DRY	CL	.75	
18.5	57131 1426 12-12-90	14	6	SAA	CL	1.0	Hum = 0.0 α = 0 βB = 900-1100 cpm
19.0	57132 1441 12-12-90	6	⊖	NR	N/A	N/A	
19.5	57133 1441 12-12-90	19	6	STIFF, GRAY (5Y 5/1), SANDY CLAY, SOME SILT, TRACE OF PEBBLE, VERY LOW PLASTICITY, DRY.	CL	2.0	
20	57134 1441 12-12-90	21	6	VERY STIFF, DARK GRAY (5Y 4/1), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, DRY	CL	4.0	Hum = 0.0 α = 0 βB = 900-1100 cpm

NOTES:

BOTTOM OF BORING = 20.0 FT
PIEZOMETER TIP = 17.0 FT
WET ZONE @ 12.0 TO 12.5 FT

SEE PAGE 1 (BACKGROUND)
Hum = 0 ppm
α = 0 ppm
βB = 2200 cpm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 12-11-90
PROJECT NO. 607 3.7.4
CHECKED BY E. Trollinger DATE
BORING NO. 1611
PIEZOMETER NO. 1611
DATE OF INSTALLATION 12-13-90

BOREHOLE DRILLING

DRILLING METHOD AUGER (HOLLOW STEM)
TYPE OF BIT AUGER
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE 4 IN ID STAINLESS
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 5 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED, FLUSH-JOINTED

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A
OTHER PROTECTION FLUSH MOUNT LOCKING CAP

ITEM	DISTANCE ABOVE*/BELOW(-) GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	E.T. ~~N/A~~ -0.2 FT			
GROUND SURFACE	12/2/90 0.0			
BOTTOM OF PROTECTIVE PIPE	~~N/A~~ 0.7 FT			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (CEMENT)	TOP 0.0 FT	BOTTOM 0.5 FT	TOP	BOTTOM
BENTONITE	TOP 0.5 FT	BOTTOM 8.0 FT	TOP	BOTTOM
SAND	TOP 8.0 FT	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 15.0	TOP	BOTTOM
PIEZOMETER TIP	17.0 FT			
BOTTOM OF BOREHOLE	20.0 FT			
GWL AFTER INSTALLATION	14.2 FT			

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS
WET ZONE @ 12.0 - 12.5 FT.
PIEZOMETER TIP @ 17.0 FT

001113

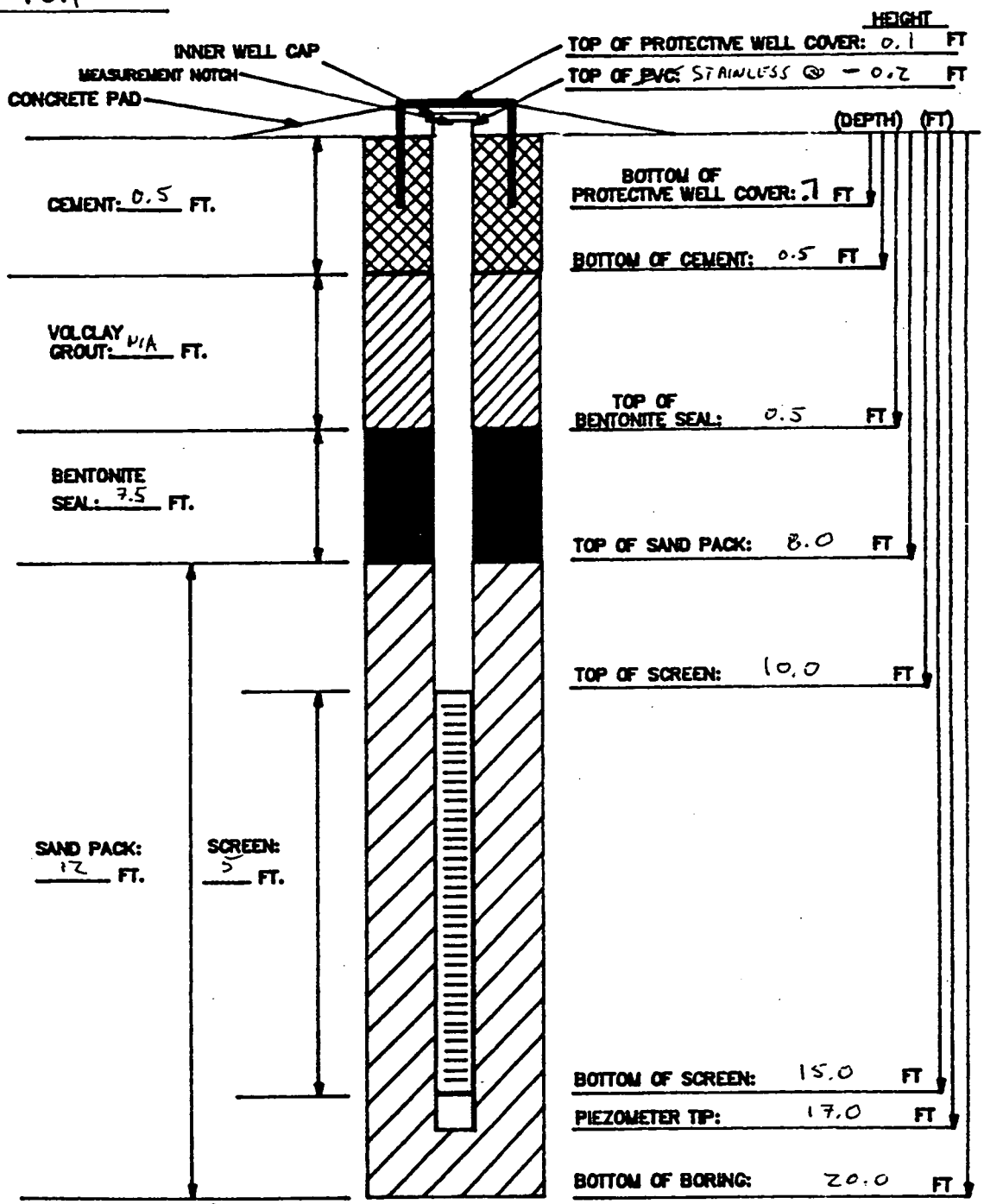
5/5

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1611

INSTALLATION DATE: 12-13-90



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 12 10/20 BOLS BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: NONE
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GAL.
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS.~~ 4-inch Sch 316 SS
2) SCREEN IS ~~2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS.~~ 4in SS .010 Slot
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF ~~PVC~~ STAINLESS STEEL IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602 3.7.4 GEOLOGIST/ENGINEER: M. SWANSON

FERNALD
RI/FS

	Date	12/16/90			
	Initial	E.T.			
		Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1612	COORDINATES		DATE 12-15-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-15-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 12-15-90
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
	12-15 1100	NA	NA	0.0 - 1.0 FT CONCRETE	NA	NA		HNU = NA α = NA βγ = NA
	12-15 1100	NA	NA		NA	NA		
1	12-15 1330	NA	NA	1.0 - 1.5 FT COARSE COBBLE FILL	NA	NA		HNU = 2 ppm α = 0 cpm βγ = 800 cpm
	57139 12-15 1340	5	6	FIRM (2.5Y, 4/2) DARK GRAYISH BROWN SILTY CLAY. SOME COARSE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.25		
2	57140 12-15 1340	3	0	NR	NA	NA		
	57141 12-15 1345	3	6	FIRM (2.5Y N4/) ~~VERY~~ DARK GRAY SILTY CLAY. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0.1 ppm α = 0 cpm βγ = 750 cpm
3	57142 12-15 1345	2	0	NR	NA	NA		
	57143 12-15 1345	4	0	NR	NA	NA		
4	57144 12-16 1020	6	6	FIRM (5Y, 4/1) DARK GRAY MOTTLED CLAY. SOME SILT, HIGH PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 ppm α = 0 cpm βγ = 410 cpm
HSL	57145 12-16 1020	7	6	SAA	CL	2.0		
5	57146 12-16 1020	7	6	SAA	CL	2.0		
	57147 12-16 1418	2	6	FIRM (2.5Y, 3/1) VERY DARK GRAY CLAY. SOME SILT, TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 ppm α = 0 cpm βγ = 500 cpm
6	57148 12-16 1418	3	0	NR	NA	NA		
	57149 12-16 1418	3	0	NR	NA	NA		
7	57150 12-16 1435	7	6	FIRM (2.5Y, 4/1) DARK GRAY SILTY CLAY. MOTTLED. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 ppm α = 0 cpm βγ = 450 cpm

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: ACKER

Driller: DAVE NEWMAN

ASST.: BOB JOHNSON

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

βγ = 540 - 820 cpm

001115

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1612	COORDINATES		DATE 12-16-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-15-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 12-19-90
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION (NR = NO RECOVERY; SAA = SAME AS ABOVE)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	57151 12-16 1435	13	0	NR	NA	NA		HNU = 0 ppm; α = 0 cpm; Bγ = 450 cpm
	57152 12-16 1435	15	0	NR	NA	NA		
9	57153 12-16 1455	25	6	VERY HARD (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, RUST STAINS. TRACE GRAVEL. LOW PLASTICITY. DRY	CL	>4.0		HNU = 0 ppm; α = 0 cpm; Bγ = 410 cpm
	57154 12-16 1455	15	6	SAA	CL	>4.0		
	57155 12-16 1455	25	6	VERY HARD (2.5YN5/) GRAY SILTY CLAY. RUST STAINS. TRACE GRAVEL. LOW PLASTICITY. DRY.	CL	>4.0		
10	57156 12-16 1510	7	6	SAA	CL	>4.0		HNU = 0 ppm; α = 0 cpm; Bγ = 400 cpm
	57157 12-16 1510	13	4	SAA	CL	>4.0		
11	57158 12-16 1510	15	0	NR	NA	NA		
12	57159 12-16 1518	13	6	HARD (2.5Y, N5/) GRAY SILTY CLAY. TRACE FINE GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.75		HNU = 0 ppm; α = 0 cpm; Bγ = 400 cpm
	57160 12-16 1518	13	2	SAA	CL	2.75		
	57161 12-16 1518	13	0	NR	NA	NA		
13	57162 12-16 1527	13	6	FIRM (2.5Y, N5/) GRAY SILTY CLAY. TRACE FINE GRAVEL. MEDIUM TO HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 ppm; α = 0 cpm; Bγ = 400 cpm
14	57163 12-16 1527	15	6	SAA	CL	1.5		
	57164 12-16 1527	16	6	SAA	CL	1.25		
15	57165 12-16 1615	9	6	FIRM (2.5Y, N5/) GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0 ppm; α = 0 cpm; Bγ = 450 cpm

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: ACKER

Driller: DAVE NEWMAN

ASST: BOB JOHNSON

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
Bγ = 700-1000 cpm

001116

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.37	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1612	COORDINATES		DATE 12-16-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-15-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 12-15-90
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION NR = NO RECOVERY SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15	57166 12-16 1615	13	6	SAA	CL	.75	NA	HNU = 0 ppm α = 0 cpm Bγ = 450 cpm
	57167 12-16 1615	15	6	SAA	CL	.75		
16	57168 12-16 1630	8	6	FIRM (2.5Y, N5/) GRAY SILTY CLAY. TRACE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.75		HNU = 0 ppm α = 0 cpm Bγ = 400 cpm
	57169 12-16 1630	9	0	NR	NA	NA		
17	57170 12-16 1630	11	0	NR	NA	NA		
	57171 12-16 1640	21	6	FIRM (2.5Y, N5/) GRAY SILTY CLAY. SOME FINE GRAVEL. MEDIUM PLASTICITY SLIGHTLY MOIST.	CL	.75		HNU = 0 ppm α = 0 cpm Bγ = 400 cpm
18	57172 12-16 1640	35	6	VERY DENSE (2.5Y, 3/2) VERY DARK GRAYISH BROWN GRAVEL-SAND-CLAY MIXTURE. SLIGHTLY MOIST TO MOIST.	GC	NA		
	57173 12-16 1640	50	0	NR	NA	NA		
19	57174 12-16 1700	~~450~~ AG 12-16-90	6	VERY DENSE (2.5Y, N5/) GRAY GRAVEL-SAND-SILT-MIXTURE. TRACE CLAY. SLIGHTLY MOIST.	GM	NA		HNU = 0 ppm α = 0 cpm Bγ = 400 cpm.
	57175 12-16 1700	52	0	NR	NA	NA		
20				BOTTOM OF BORING 4.0 IN. I.D. STAINLESS STEEL WELL SET AS PER WORK PLAN 19.6 FT - PIEZOMETER TIP				

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment ACKER

Driller: DAVE NEWMAN

ASST: BOB JOHNSON

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
Bγ = 650-1000 cpm

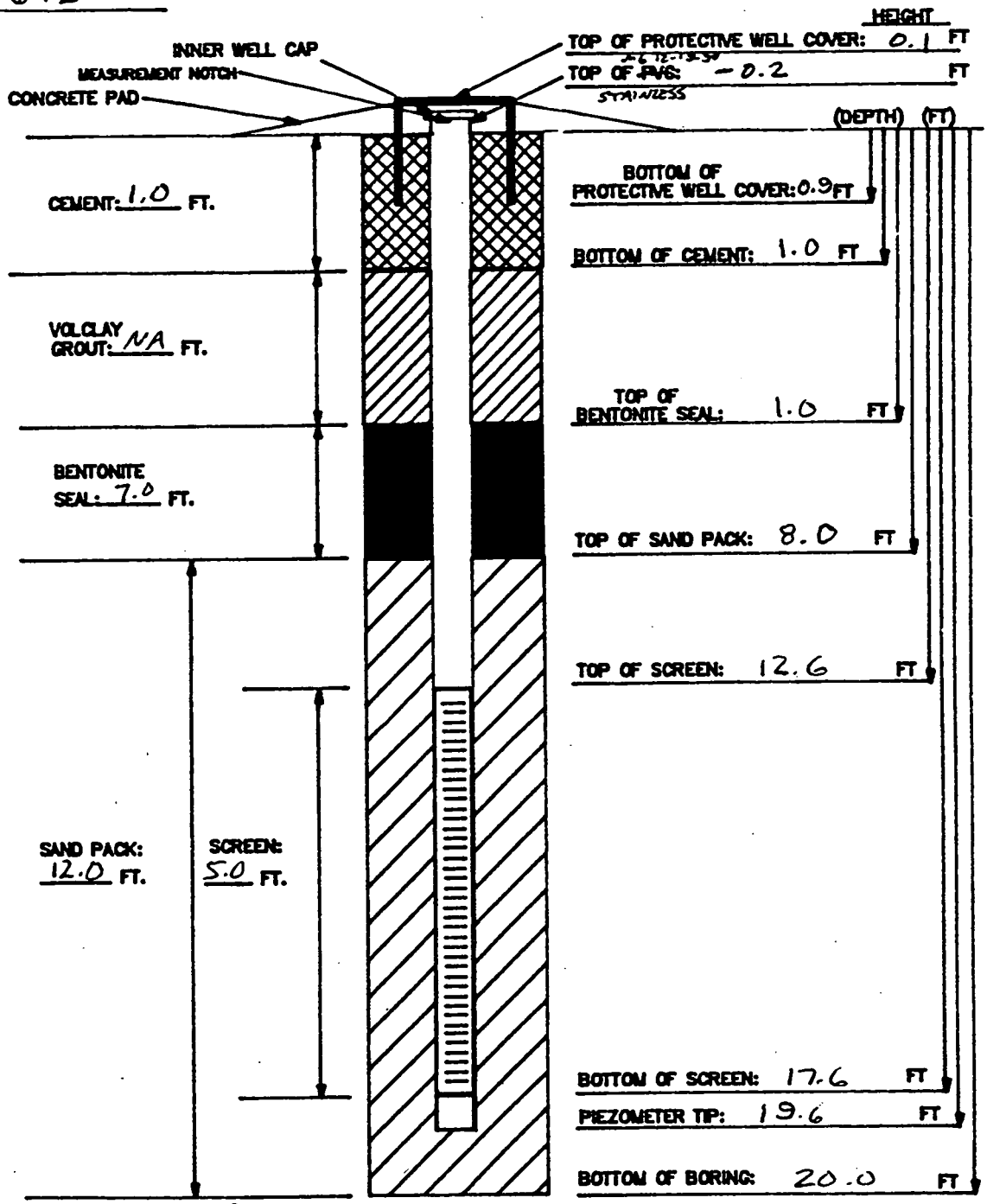
001117

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1612

INSTALLATION DATE: 12-19-90



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10 BAGS (80 lbs. EACH) 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 8
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: 1/2 BAG (100 lbs. each)
AMOUNT OF WATER USED: 5 gallons
OTHER:

NOTES: 4-INCH STAINLESS STEEL WAS USED AS PER WORK PLAN
1) RISER PIPE IS 2-INCH SCHEDULE 40 ~~PVC~~ STAINLESS PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 ~~PVC~~ STAINLESS PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: DRY, 12-19-90
5) TOP OF ~~PVC~~ STAINLESS IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3-7 GEOLOGIST/ENGINEER: Mark Tamm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS
FIELD ENG./GEO. M GARMAN DATE 12-17-90
PROJECT NO. 602.37
CHECKED BY E. Trollinger DATE 12-21-90
BORING NO. 1612
PIEZOMETER NO. 1612
DATE OF INSTALLATION 12-19-90

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
TYPE OF BIT AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~
SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 4.0 IN. I.D. STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0 IN I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 5.0 FT
RISER PIPE MATERIAL 4.0 IN I.D. STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 10 FT, 2 FT
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT
PROTECTIVE PIPE O.D. 10.75 in
OTHER PROTECTION EXPANDABLE RUBBER PLUG WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	-0.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	0.9			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT (as 12-19-90)	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 8.0	TOP	BOTTOM
SAND	TOP 8.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 12.6	BOTTOM 17.6	TOP	BOTTOM
PIEZOMETER TIP	19.6			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	DRY			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS HOLE WAS DRILLED WITH 10-INCH DIAMETER HOLLOW STEM AUGER. WELL IN 4.0 IN. I.D. STAINLESS STEEL. HOLE WAS DRY WHEN WELL WAS SET. AS PER WORK PLAN.

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1613	COORDINATES	DATE 01-29-91	
ELEVATION	GWL: Depth Date/Time	DATE STARTED: 01-29-91	
ENGINEER/GEOLOGIST M.GARMAN, J.LEAR	Depth Date/Time	DATE COMPLETED: 01-31-91	
DRILLING METHODS HOLLOW STEM AUGER 10 in		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 in)	RECOVERY (IN)	DESCRIPTION (SAA = SAME AS ABOVE; NR = NO RECOVERY)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION NA	REMARKS
	01-29 2115	NA	NA	0.0 - 1.0 FT. IS CONCRETE	NA	NA		NA
	01-29 2115	NA	NA		NA	NA		
1	57401 01-29 2245 (TOTHNU SAMPLE)	23	6	DENSE (10YR 5/3) BROWN SILTY GRAVEL. TRACE FINE SAND. TRACE CLAY. SLIGHTLY MOIST.	GM	NA		HNU = 0 α = 0 Bγ = 200cpm
	57402 01-29 2245	20	6	VERY HARD (10YR 3/1) VERY DARK GRAY SILTY CLAY. LOW PLASTICITY. DRY.	CL	>4.0		
2	57403 01-29 2245	17	6	SAA	CL	>4.0		
	57404 01-29 2250	19	6	SAA	CL	>4.0		HNU = 0 α = 0 Bγ = 200cpm
3	57405 01-29 2250	24	6	SAA	CL	>4.0		
	57406 01-29 2250	26	6	SAA	CL	>4.0		
4	57407 01-29 2300 (HSL SAMPLE)	37	6	HARD + SAA	CL	3.0		HNU = 0 α = 0 Bγ = 200cpm
	57408 01-29 2300 (HSL SAMPLE)	34	6	HARD + SAA	CL	3.0		
5	57409 01-29 2300	31	6	HARD (5Y 4/2) OLIVE GRAY CLAY SOME SILT. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	2.75		
	57410 01-29 2300	29	6	SAA	CL	2.75		
6	57411 01-30 1800	4	0	NR	NA	NA		HNU = NA α = NA Bγ = NA
	57412 01-30 1800	5	0	NR	NA	NA		
7	57413 01-30 1800	7	0	NR	NA	NA		

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0

α = 0

Bγ = 350 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER 1613	COORDINATES		DATE 01-30-91
ELEVATION	GWL: Depth	Date/Time	DATE STARTED: 01-29-91
ENGINEER/GEOLOGIST M. GARMAN \ J. LUTHE	Depth	Date/Time	DATE COMPLETED: 01-31-91
DRILLING METHODS HOLLOW STEM AUGER 18 in			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED GRANULARITY (TSF)	NA WELL CONSTRUCTION	REMARKS
8	57414 01-30 1810	8	6	HARD (5Y, 4/2) OLIVE GRAY SILTY CLAY. TRACE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0
	57415 01-30 1810	9	6	SAA	CL	2.0		α = 0
	57416 01-30 1810	11	4	SAA	CL	2.0		βγ = 220 cpm
9	57417 01-30 1820	14	6	DENSE (5Y, 5/2) OLIVE GRAY CLAYEY SILT. TRACE FINE GRAVEL. WET.	ML	NA		HNU = 0
120 OVE	57418 01-30 1820	17	6	DENSE (5Y, 5/3) OLIVE CLAYEY SILT. TRACE FINE SAND. SLIGHTLY MOIST.	ML	NA		α = 0
10	57419 01-30 1820	21	6	DENSE (5Y, 5/2) MOTTLED OLIVE SILT. SOME CLAY. SLIGHTLY MOIST.	ML	NA		βγ = 180 cpm
	57420 01-30 2130	7	6	DENSE (2.5Y, 5/6) LIGHT OLIVE BROWN SILT. TRACE FINE SAND. TRACE CLAY. TRACE GRAVEL. MOIST.	ML	NA		HNU = 0
11	57421 01-30 2130	21	2	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. SLIGHTLY MOIST.	ML	NA		α = 0
	57422 01-30 2130	28	0	NR	NA	NA		βγ = 180 cpm
12	57423 01-30 2140	32	6	VERY DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN SAND-SILT-CLAY MIXTURE. SOME GRAVEL. WET.	ML	NA		HNU = 0
120 OVE	57424 01-30 2140	46	6	VERY DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN SILT. SOME CLAY. TRACE FINE GRAVEL. SLIGHTLY MOIST.	ML	NA		α = 0
13	57425 01-30 2140	48	6	SAA	ML	NA		βγ = 200 cpm
	57426 01-30 2155	7	4	MEDIUM DENSE (2.5Y, 5/4) MOTTLED LIGHT OLIVE BROWN SILT. TRACE CLAY. TRACE GRAVEL. MOIST.	ML	NA		HNU = 0
14	57427 01-30 2155	10	0	NR	NA	NA		α = 0
	57428 01-30 2155	19	0	NR	NA	NA		βγ = 220 cpm
15								

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB YOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

βγ = 300-350 cpm

001121

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: GS ~~1649~~ 1613	COORDINATES		DATE 01-30-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 01-29-91
ENGINEER/GEOLOGIST J.LEAR, M.GARMAN	Depth	Date/Time	DATE COMPLETED 01-31-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE NR = NO RECOVERY	USCS SYMBOL	MEASURED (CONSISTENCY) (TSF)	NA WELL CONSTRUCTION	REMARKS
15	57429 01-30 2205	9	5	HARD (2.5Y, N5/) GRAY SILTY CLAY. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 Bγ = 200cpm
	57430 01-30 2205	11	0	NR	NA	NA		
16	57431 01-30 2205	14	0	NR	NA	NA		
	57432 01-30 2230	5	6	SOFT (2.5Y, N5/) GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. MOIST.	CL	0.5		HNU = 0 α = 0 Bγ = 180cpm
17	57433 01-30 2230	7	6	SAA	CL	0.5		
	57434 01-30 2230	9	2	SAA	CL	0.5		
18	57435 01-30 2235	11	6	SOFT (2.5Y, N5/) GRAY SILTY CLAY. TRACE FINE SAND AND GRAVEL. HIGH PLASTICITY. MOIST.	CL	0.5		HNU = 0 α = 0 Bγ = 180cpm
	57436 01-30 2235	12	6	SAA	CL	0.5		
19	57437 01-30 2235	19	6	SAA	CL	0.5		
	57438 01-30 2235	21	6	HARD (2.5Y, N5/) GRAY SILTY CLAY. TRACE FINE GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	4.0		
20				FINISHED DRILLING AT 20.0 FT 4.0 IN I.D. STAINLESS STEEL PIEZOMETER INSTALLED.				

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CME 45

Driller: BOB YOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

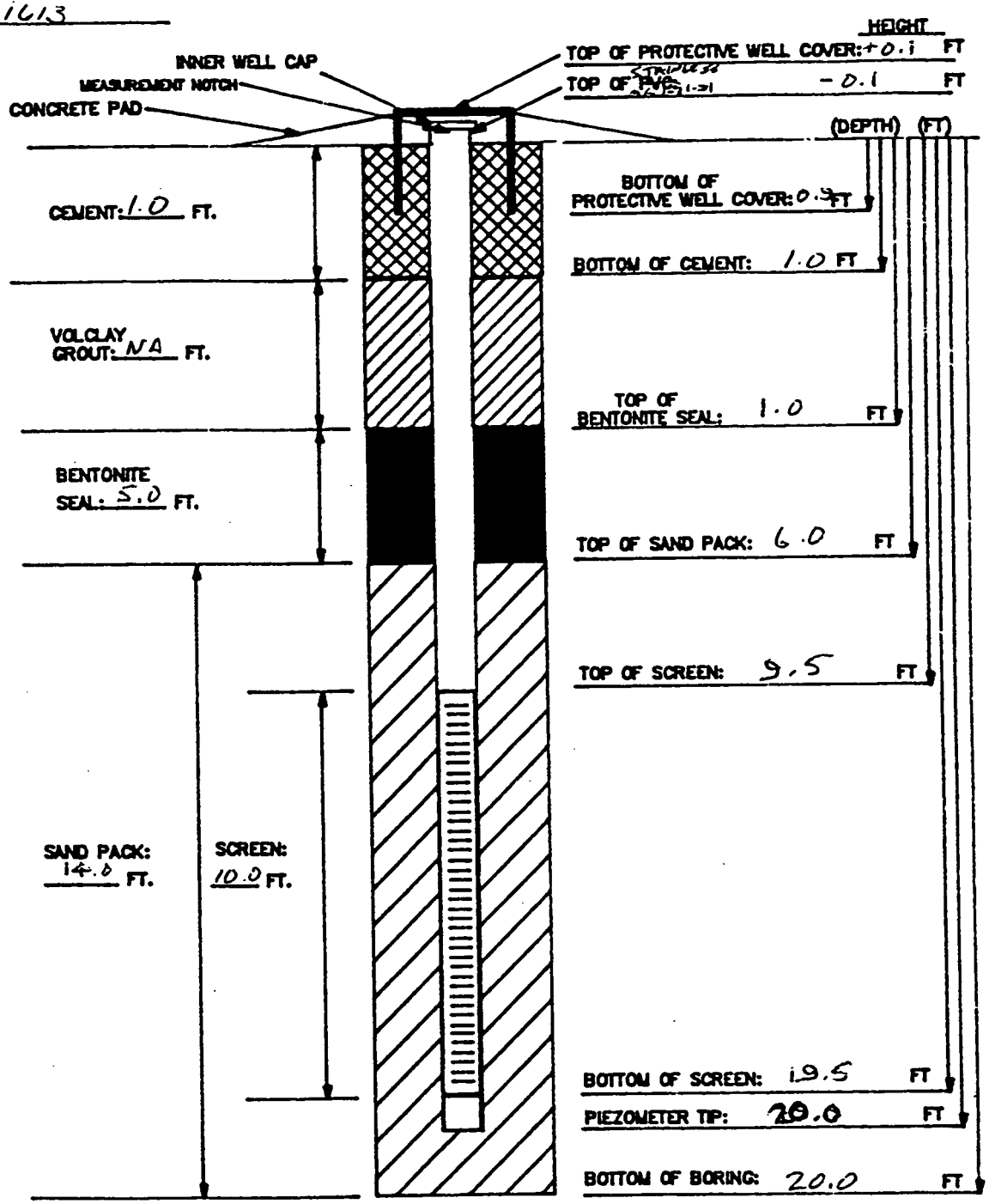
Bγ = 300-350 cpm

001122

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1613

INSTALLATION DATE: 1-31-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10-80 lb. BAGS 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 0.5 BAGS
AMOUNT OF WATER USED: 8 GALLONS
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ 4 inch Stainless Steel PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40~~ PVC PIPE WITH ~~0.020-INCH SLOTS~~ .010" slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 8.45 FT / 1-31-91
5) TOP OF ~~PVC~~ Stainless Steel IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear / Mark Gardman

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 1-31-91
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 2-3-91
BORING NO. 1613
PIEZOMETER NO. 1613 DATE OF INSTALLATION 1-31-91

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT 10 in Hollow Bit Auger
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED:
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 4 inch Stainless steel	RISER PIPE MATERIAL 4.0 in Stainless steel
DIAMETER OF PERFORATED SECTION 4.0 IN. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 7/16 in I.D. 4.0 in
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 9.5 FT
AVERAGE SIZE OF PERFORATIONS .010 in	JOINING METHOD flush Joint threaded
TOTAL PERFORATED AREA ~~9.75~~ 10.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT	OTHER PROTECTION flush Mount well cover
PROTECTIVE PIPE O.D. 9.25 IN	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	0.1			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	~~1.0~~ 0.9			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP 6.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	8.45			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS 10 INCH DIAM. HOLLOW STEM AUGERS AND 4.0 IN. I.D. STAINLESS STEEL PIEZOMETER MATERIALS WERE USED AS PER WORK PLAN HSL SECTORS 1 & 4.

LOCATION ~~BORING~~ 1614 CT
Well fit clarifier pit
water sample.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME FMPC RI\FS		
BORING NUMBER ~~1614~~ 1615	COORDINATES N 480305.19, E 1381672.31	DATE 02-05-91	
ELEVATION 580.31 concrete floor	GWL: Depth 5.7 FT. Date/Time 2/14/91 @ 1830	DATE STARTED: 02-04-91	
ENGINEER/GEOLOGIST M. GARMAN, J. LEAR	Depth NA Date/Time NA	DATE COMPLETED: 02-14-91	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	NA 02-04 2200	NA	NA	0.0 TO 1.0 FT. INTERVAL IS CONCRETE	NA	NA		NA
	NA 02-04 2200	NA	NA		NA	NA		
1	57445 02-05 1820	12	6	DENSE (10YR, 5/2) GRAYISH BROWN MEDIUM GRAVEL. SOME SAND. SOME SILT. MOIST.	GP	NA		HNU = 0 α = 0 BG = 300cpm
	57446 02-05 1820	14	6	DENSE (10YR, 5/3) BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. SLIGHTLY MOIST.	SW	NA		
2	57447 02-05 1820	17	4	SAA	SW	NA		
	57448 02-05 1825	13	6	SAA	SW	NA.		HNU = 0 α = 0 BG = 280cpm
3	57449 02-05 1825	15	6	SAA	SW	NA		
	57450 02-05 1825	17	2	SAA	SW	NA		
4	57451 02-05 1830	14	6	MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED SAND. SOME GRAVEL. SOME SILT. SLIGHTLY MOIST.	SW	NA	4 7	HNU = 0 α = 0 BG = 250cpm
	57452 02-05 1830	10	6	SAA	SW	NA		
5	57453 02-05 1830	9	6	SAA	SW	NA		
	57454 02-05 1830	9	6	SAA	SW	NA		
6	57455 02-05 2215	4	6	SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. HIGH PLASTICITY. MOIST. ODOR RESEMBLING DIESEL FUEL - NO HNU RESPONSE	CL	0.5		HNU = 0* α = 0 BG = 320cpm
	57456 02-05 2215	1	3	SAA	CL	0.5		
7	57457 02-05 2215	2	0	NR	NA	NA		

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment CME 45

Driller: BOB MOST

ASST: M. REBOLD

BACKGROUND:
HNU = 0 PPM
α = 0 cpm
BG = 300-450 cpm

001125

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.7	PROJECT NAME. FMPC RI\FS		
BORING NUMBER ~~1614~~ 1615	COORDINATES see p.1		DATE 02-05-91
ELEVATION see p.1	GWL: Depth see p.1	Date/Time see p.1	DATE STARTED: 02-04-91
ENGINEER/GEOLOGIST M. GARMAK, J. LEAR	Depth NA	Date/Time NA	DATE COMPLETED: 02-14-91
DRILLING METHODS. HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE (TYPE & NO)	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (PPM)	NA WELL CONSTRUCTION	REMARKS
	57458 02-05 2218	2	6	SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. MOIST TO VERY MOIST.	CL	0.25	NA	HNU = 0 α = 0 βγ = 340 cpm
8	57459 02-05 2218	1	0	NR	NA	NA		
	57460 02-05 2218	1	0	NR	NA	NA		
9 (H_2O ZONE)	57461 02-05 2220	2	6	VERY SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. LOW PLASTICITY. WET.	CL	<0.25		HNU = 0 α = 0 βγ = 330 cpm
	57462 02-05 2220	23	6	FIRM (10YR, 4/1) DARK GRAY SILTY CLAY. TRACE GRAVEL. MOIST TO VERY MOIST.	CL	0.5		
10	57463 02-05 2220	17	0	NR	NA	NA		
	57464 02-05 2355	11	6	HARD (10YR, 5/4) YELLOWISH BROWN SILTY CLAY. TRACE GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.5		HNU = 0 α = 0 βγ = 280 cpm
11	57465 02-05 2355	12	6	SAA	CL	2.5		
	57466 02-05 2355	14	0	NR	NA	NA		
12	57467 02-06 0003	5	6	FIRM (10YR, 5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM TO HIGH PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 βγ = 300 cpm
	57468 02-06 0003	6	4	SAA	CL	2.0		
13	57469 02-06 0003	10	0	NR	NA	NA		
	57470 02-06 0005	5	6	FIRM (10YR, 5/1) GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 α = 0 βγ = 280 cpm
14	57471 02-06 0005	9	0	NR	NA	NA		
	57472 02-06 0005	8	0	NR	NA	NA		
15								

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment CME 45

Driller: BOB HOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

βγ = 300-450 cpm

001126

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.37	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1614 & 1615	COORDINATES: see p.1		DATE: 02-06-91
ELEVATION: See p.1	GWL: Depth see p.1	Date/Time see p.1	DATE STARTED: 02-04-91
ENGINEER/GEOLOGIST: M. GARMAN, J. LEAR	Depth NA	Date/Time NA	DATE COMPLETED: 02-14-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15	57473 02-06 0045	5	6	FIRM (10YR, 5/1) GRAY SILTY CLAY. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0 α = 0 Bγ = 300 cpm
	57474 02-06 0045	4	0	NR	NA	NA		
16	57475 02-06 0045	7	0	NR	NA	NA		
	57476 02-06 0050	6	5	FIRM (10YR, 5/1) GRAY SILTY CLAY. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST TO MOIST.	CL	1.0		HNU = 0 α = 0 Bγ = 280 cpm
17	57477 02-06 0050	9	0	NR	NA	NA		
	57478 02-06 0050	11	0	NR	NA	NA		
18	57479 02-06 0055	12	6	FIRM (10YR, 5/1) GRAY SILTY CLAY. TRACE FINE SAND AND GRAVEL. MEDIUM TO HIGH PLASTICITY. MOIST.	CL	1.0		HNU = 0 α = 0 Bγ = 300 cpm
	57480 02-06 0055	17	6	SAA	CL	1.0		
19	57481 02-06 0055	23	6	SAA	CL	1.5		
	57482 02-06 0055	39	6	HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE FINE SAND AND GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		
20				DRILLING AND SAMPLING COMPLETED AT 20.0 FT. 4 IN. I.D. STAINLESS STEEL PIEZOMETER INSTALLED.				

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CME 45

Driller: BOB GOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

Bγ = 300 - 450 cpm

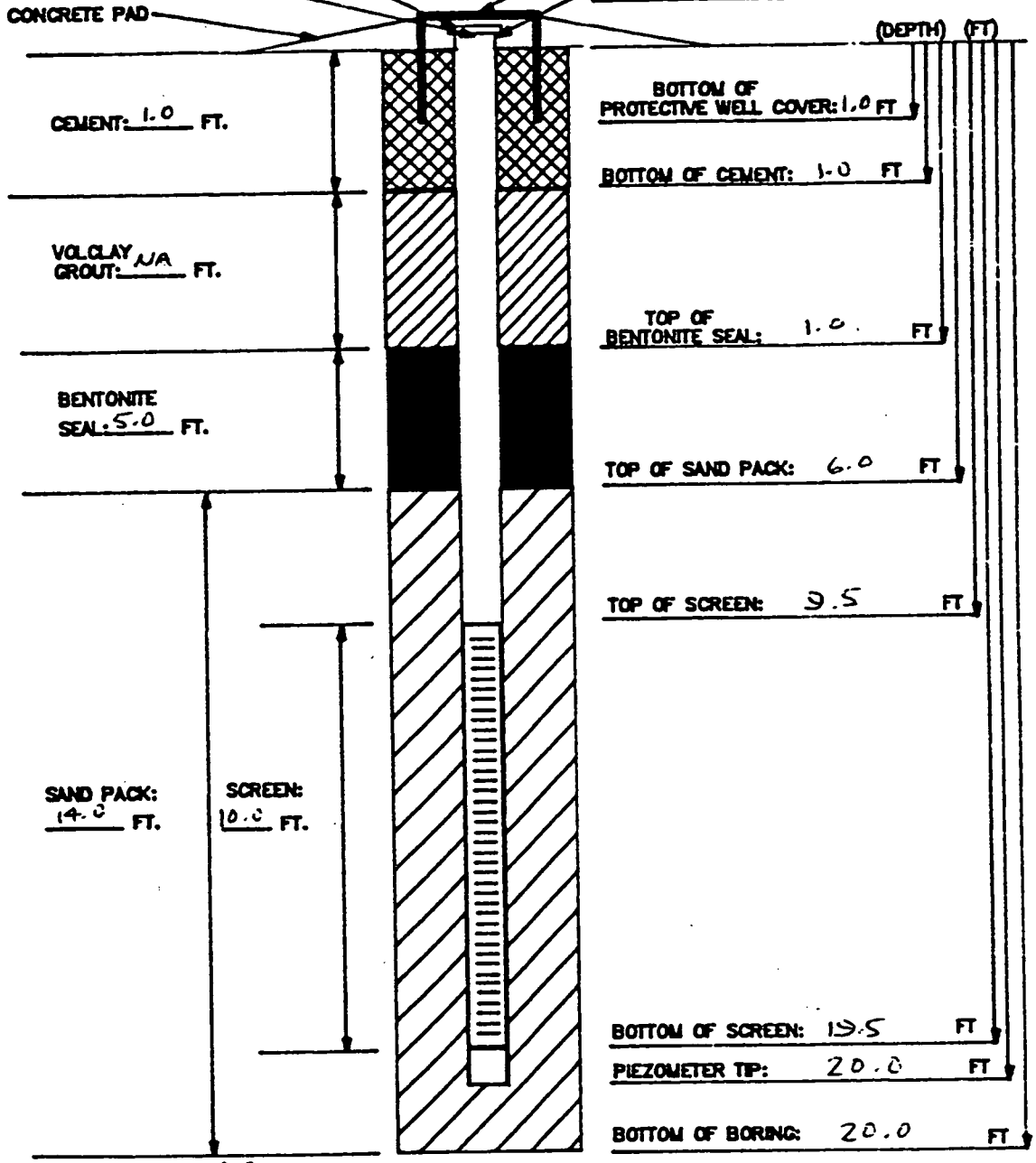
001127

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
~~1614~~ 1615
CT 3/3/91

INSTALLATION DATE: 02-14-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 5 - 80 lb. BAGS 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 9 GALLONS
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.~~ 4-INCH 12 STAINLESS STEEL
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.~~ 4-INCH 12 STAINLESS STEEL
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 5.7 FT TOC / 2-14-91
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.7

GEOLOGIST/ENGINEER: [signature]

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS
PROJECT NO. 602.3.7
BORING NO. ~~1614~~ 1615 ET 3/3/91
PIEZOMETER NO. ~~1614~~ 1615

FIELD ENG./GEO. M. GARMAN DATE 02-12-91
CHECKED BY E. Trollinger DATE 3/3/91
DATE OF INSTALLATION 02-14-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~
SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0 IN. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 7/16 IN. I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 9.4 FT
JOINING METHOD FLUSH JOINT THREADED

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT
PROTECTIVE PIPE O.D. 9.75 IN.

OTHER PROTECTION WELL CAP, BOLT-ON PROTECTIVE LID

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION E.T. 3/3/91 (FT.)	
TOP OF RISER PIPE	- 0.1		580.21	
GROUND SURFACE	0.0		580.31	
BOTTOM OF PROTECTIVE PIPE	1.0		579.31	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT (AG 2-12-91)	TOP 0.0	BOTTOM 1.0	TOP 580.31	BOTTOM 579.31
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP 579.31	BOTTOM 574.31
SAND	TOP 6.0	BOTTOM 20.0	TOP 574.31	BOTTOM 560.31
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP 570.81	BOTTOM 560.81
PIEZOMETER TIP	20.0		560.31	
BOTTOM OF BOREHOLE	20.0		560.31	
GWL AFTER INSTALLATION	5.7 @ TOC		VARIABLE	

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 4.0 IN. I.D. STAINLESS STEEL PIEZOMETER AND 10 INCH AUGER MATERIALS USED AS PER WORK PLAN.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

Jnw 10.8.91 5711

X See backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1616	COORDINATES: ~~N48049.40~~ ~~E(3718)3.30~~ KM 8-7-91	DATE	6-8-91
ELEVATION: 571.09 ft. above sea level	GWL: Depth 36.2' Date/Time 6-30-91/1500 KM 8-7-91	DATE STARTED	6-8-91
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth 36.2' Date/Time 6-21-91/1845 KM 8-7-91	DATE COMPLETED:	7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 1	OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	64011 6/8/91 1600	N/A SLANT BORINGS		Hard olive brown (2.5Y, 4/4) SANDY CLAY with some root fragments, dry	CL	>4.5	Top: Hnu: 0 ppm, βγ: 400 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, βγ: 400 cpm, α: 0 cpm
2.5			4.17	Hard olive brown (2.5Y, 4/4) SANDY CLAY with trace coarse gravel, dry	CL	>4.5	Top: Hnu: 0 ppm, βγ: 400 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, βγ: 400 cpm, α: 0 cpm
4.17	Sequence 1			No Recovery			
5	64012 6/8/91 1700		0	No Recovery			Top: Hnu: ppm, βγ: cpm, α: cpm; Bottom: Hnu: ppm, βγ: cpm, α: cpm; Note: Gravel Jammed in cutting shoe
	Sequence 2						
8	64013 6/11/91 1730		4.4	Dark Yellowish brown (10YR, 4/4) very stiff SANDY CLAY with gravel, trace organic matter, damp, low plasticity	CL	2.5 to 3.5	Top: Hnu: .2 ppm, βγ: 200 cpm, α: N/A cpm; Bottom: Hnu: .2 ppm, βγ: 200 cpm, α: 0 cpm; Top: Hnu: .2 ppm, βγ: 200 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, βγ: 200 cpm, α: 0 cpm
12.4	Sequence 3			No Recovery			Top: Hnu: ppm, βγ: cpm, α: cpm; Bottom: Hnu: ppm, βγ: cpm, α: cpm
13				continued on following page			

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Bob Johnson
Assistants: Mark Rebold, Brian Meuller

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104 6/11	0 .2 ppm
BETA-GAMMA	73937 6/11	400 200 cpm
ALPHA	73908	0 cpm

001150

REVIEWED BY QA VR DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See BackSide

Fm 10.991

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES: ~~N480469.46 E1378315.20~~ K.M. 8-9-91	DATE 6/12/91
ELEVATION: 571.0 ft. above sea level	GWL: Depth 36.2' Date/Time 6-20-91 1500	DATE STARTED: 6/8/91
ENGINEER/GEOLOGIST: G.M. and K.M	Depth 36.2' Date/Time 6-21-91 1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 2 OF 9

DEPTH DRILLED AT ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (BPF)	REMARKS
13	64014 6/12/91 1723 Sequence 4		0	No Recovery			Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm. Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm
18	64015 6/14/91 0925	N/A SLANT BORINGS	4.4	Dark Yellowish brown (10YR, 4/4) stiff SANDY CLAY with gravel, damp, medium plasticity	CL	1.25	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
17				Light olive brown (2.5Y, 5/4) medium dense CLAYEY SAND with a little gravel, moist	SC	N/A	
20.9				Light olive brown (2.5Y, 5/4) very stiff CLAYEY SILT with pale yellow (2.5Y, 7/3) mottling	ML	2.0	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
22.4	Sequence No. 5			No Recovery			
23	64016 6/14/91 1730		5.0	Pale Yellow (5Y, 7/3) to olive (5Y, 5/4) mottled very stiff CLAYEY SILT with trace gravel, damp, non plastic	ML	2.0	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
26				Pale Yellow (5Y, 7/3) to olive (5Y, 5/4) mottled very stiff CLAYEY SILT with trace gravel, moist, non plastic	ML	2.0	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
28	Sequence 6						

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Brian Meaner

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104 6/14	.1 .2 ppm
BETA-GAMMA	73937 6/14	150 280 cpm
ALPHA	67583	0 cpm

11-20-91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

* See Backside

Jw 10.9.91

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES: N480468.40 E4378315.30 K.M. 8-9-91	DATE: 6/15/91
ELEVATION: 571.03 ft. above sea level	GWL: Depth 36.2' Date/Time 6-20-91 / 1800	DATE STARTED: 6/8/91
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth 36.2' Date/Time 6-21-91 / 1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 3 OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
28	64017 6/15/91 1630	N/A SLANT BORINGS	5.0	Pale Yellow (2.5Y, 7/3) to light Yellowish brown (2.5Y, 6/4) mottled Very Stiff CLAYEY SILT, damp, non plastic	ML	2.5	Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm
31.3	Sequence 7			Dark Yellowish brown (10YR, 4/4) Soft SANDY CLAY, moist, low plasticity	CL	.5	Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm
33	64018 6/15/91 1220		5.0	Dark Yellowish brown (10YR, 4/4) medium dense CLAYEY SAND, moist	SC	N/A	Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm
38	Sequence 8						Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm
	64019 6/15/91 1355		4.6	Dark Yellowish brown (10YR, 4/4) medium dense CLAYEY SAND with a little light gray (5Y, 7/1) mottling, moist	SC	N/A	Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm
42.6 43	Sequence 9			No Recovery			Top Hnu: .1 ppm βγ: 260 cpm α: 0 cpm; Bottom Hnu: .1 ppm βγ: 260 cpm α: 0 cpm

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Brian Meurer

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104	.1 ppm
BETA-GAMMA	73937	260 cpm
ALPHA	55361	0 cpm

REVIEWED BY GA/MB DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Backside Jmw 10.9.91

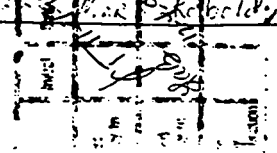
PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES: ~~N480469.40 E1376311.30~~ K.M. 8-9-91	DATE: 6/19/91
ELEVATION: 571.03 ft. above sea level	GWL: Depth 36.2' Date/Time 6-20-91 / 15	DATE STARTED: 6/18/91
ENGINEER/GEOLOGIST: G.M. & K.M.	Depth 36.2' Date/Time 6-21-91 / 1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 4 OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
43	64020 6/19/91 1710 sequence 10		5.0	Dark Yellowish Brown (10YR, 4/4) Medium dense sand with a little to trace clay, saturated.	SC	NA	Top Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Top Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm
48	64023 6/21/91 1640 sequence 11	N/A SLANT BORINGS	1.7	Yellowish Brown (10YR, 5/4) Loose sand with a little gravel and trace fossils, saturated	SC	NA	Top Hnu: .1 ppm, βγ: 250 cpm, α: NA cpm; Bottom Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm. Note: sample nos. 64021, 64022 were assigned to water samples. Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm
53	64024 6/22/91 0915 sequence 12		3.8	Light olive Brown (2.5Y, 5/4) Medium dense sand with a little gravel, saturated.	SC	N/A	Top Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Top Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, βγ: 250 cpm, α: 0 cpm
58							

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Brian Mueller
Supervisor: Bob Schoolcraft, Brian Mueller

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS	
Hnu	1104	.1	ppm
BETA-GAMMA	73937	250	cpm
ALPHA	55361	0	cpm



001133

MB 11-20-91

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1616	COORDINATES: ~~N 1004[illegible] E 1378215.70~~ K.M. 8-9-91	DATE	6/22/91
ELEVATION: 571.8 ft above sea level	GWL: Depth 36.2' Date/Time 6-20-91/1500	DATE STARTED:	6/8/91
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth 36.2' Date/Time 6-21-91/1895	DATE COMPLETED:	7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¾ inch augers		PAGE 5	OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
58	64025 6/22/91 1130	N/A SLANT BORING	4 ft.	Brown (10YR, 5/3) medium dense SAND with a little fine gravel and CLAY, saturated	SC	N/A	Top Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm
61.7 62	sequence 13			~~olive gray (5Y, 5/2) stiff CLAY, wet, low plasticity~~ No Recovery	CL	1.25	Top Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm
63	64026 6/24/91 1000		5.0	Light olive brown (2.5Y, 5/4) loose SAND, Saturated	SC	N/A	Top Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm
65				Interbedded layers of gray (5Y, 5/1) stiff CLAY with trace gravel, moist, low plasticity and Light olive brown (2.5Y, 5/4) loose SAND	SC & CL	N/A 1.5	Top Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm
68	sequence 14						
	64027 6/24/91 1415		5.0	Gray (5Y, 5/1) dense gravel, Sand and clay mixture, wet	GC	N/A	Top Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .1 ppm, γ: 250 cpm, α: 0 cpm
73	sequence 15						

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Mark Rebold, Brian Mueller

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104	.1 ppm
BETA-GAMMA	73937	250 cpm
ALPHA	55361	0 cpm

Invest. Date
Rec'd by
2nd Rec'd by
Have Copy Verification
11-21-91

REVIEWED BY QA MB DATE 11-20-91

VISUAL CLASSIFICATION OF SOILS

* See Backside Jm 10.9.91

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES: ~~N430469.90 E1372576.30~~ K.M. 8-9-91	DATE 6/25/91
ELEVATION: 571.03 ft. above Sea level	GWL: Depth 36.2' Date/Time 6-20-91 / 1500	DATE STARTED: 6/8/91
ENGINEER/GEOLOGIST: G.M. + K.M.	Depth 36.2' Date/Time 6-21-91 / 1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 6 OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
73	64028 6/25/91 1425	N/A SLANT BORINGS	5.0	Gray (5Y 5/1) dense Gravel, Sand and clay mixture, wet	GC	N/A	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
74				Gray (5Y, 5/1) stiff Clay with trace Gravel and sand moist, low plasticity	CL	2.0	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
77	Sequence 16			Gray (5Y, 5/1) Stiff Sandy Clay with a little gravel, damp No plasticity	CL	2.0	
78	64029 6/25/91 1650		5.0	Same as above but moist + Low plasticity	CL	2.0	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
	Sequence 17			Gray (5Y, 5/1) Medium Stiff Clay with Sand and gravel, moist, Low plasticity	CL	.75	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
83	64030 64031 6/26/91 0835			Gray (5Y, 5/1) medium Stiff Clay with trace sand + gravel damp, med plasticity			Top Hnu: 0 ppm, βγ: 280 cpm, α: NA cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
85.2	Sequence 18			No Recovery			Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm

	Initials	Date
1st Key In		11-22-91
2nd Key In		12-4-91
Rev. Key In		

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Mark Rebold, Jim Capannari

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104	0 ppm
BETA-GAMMA	73937	280 cpm
ALPHA	55361	0 cpm

REVIEWED BY QA AB DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

* See Backside Jan 10.9.91

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES ~~N180161.10 E7318315.30~~ K.M. 8-9-91	DATE 6/26/91
ELEVATION: 5713.03 ft. above sea level	GWL: Depth 36.2' Date/Time 6-20-91 /1500	DATE STARTED: 6-8-91
ENGINEER/GEOLOGIST: K.M. and G.M.	Depth 36.2' Date/Time 6-21-91 /1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 7 OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
88	64032 64033 64034 64035 64036 6/26/91 1600 Sequence 19	N/A SLANT Borings	5.0	Gray (5Y, 5/1) medium stiff CLAY with a little SAND and gravel, moist, high plasticity	CL	1.0	Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm
93	64037 6/27/91 0920 Sequence 20		5.0	Gray (5Y, 5/1) medium stiff CLAY with a little SAND and gravel, moist, high plasticity	CL	1.0	Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm
98	64038 6/27/91 1700 Sequence 21		5.0	Gray (5Y, 5/1) stiff CLAY with a little SAND and trace gravel, moist, high plasticity	CL	1.25	Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm Top: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm; Bottom: Hnu: .1 ppm, βγ: 300 cpm, α: 0 cpm
103							

	Initial	Date
1st Key In		11-22-91
2nd Key In		12-4-91
Hard Copy Verification		

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Ben Johnson, Brian Mueller

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1104	.1 ppm
BETA-GAMMA	73937	300 cpm
ALPHA	SS361	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

001136

VISUAL CLASSIFICATION OF SOILS

* See Backside

Jun 10-9-91

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1616	COORDINATES: ~~N 40 464.96 E 1376315.30~~ K.M. 8-7-91	DATE 6/28/91
ELEVATION: 571.03 ft. above sea level	GWL: Depth 36.2' Date/Time 8-26-91/1500	DATE STARTED: 6/8/91
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth 36.2' Date/Time 8-21-91/1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¾ inch augers		PAGE 8 OF 9

DEPTH DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
103	64039 64040 64041 64042 64043 64044 64045 6/28/91 1000 Sequence 22	N/A SLANT BORINGS	5.0	Gray (5Y, 5/1) stiff CLAY with a little SAND and trace gravel, moist, high plasticity	CL	1.25	Top Hnu: .6 ppm, βγ: /000 cpm, α: 0 cpm; Bottom Hnu: .6 ppm, βγ: /000 cpm, α: 0 cpm Top Hnu: .6 ppm, βγ: /000 cpm, α: 0 cpm; Bottom Hnu: .6 ppm, βγ: /000 cpm, α: 0 cpm
108	64049 6/28/91 1100 Sequence 23		5.0	Gray (5Y, 5/1) stiff CLAY with SAND and Gravel, moist, high plasticity	CL	1.5	Top Hnu: .3 ppm, βγ: /000 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: /000 cpm, α: 0 cpm Top Hnu: .3 ppm, βγ: /000 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: /000 cpm, α: 0 cpm
112.5				Gray (5Y, 5/1) limestone	N/A	N/A	The bottom half tennite tube split down the middle
113				The augers were used to drill this five foot interval through the limestone sheet without the split barrel sampler			Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm
118							

	Initial	Date
1st Key In	KT	11-22-91
2nd Key In	JAB	12-4-91
Hard Copy Verification		

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Jim Capinad

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	111037	.3 ppm
Nan Shielded BETA-GAMMA Probe	77173	1000 cpm
ALPHA	60101	0 cpm

REVIEWED BY QA: [illegible] DATE 11-20-91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

* See Backside

Jw 10.9.91

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 16/6	COORDINATES ~~N486469.40 E1578315.30~~ K.M. 8-9-91	DATE 7/1/91
ELEVATION: 571.03 ft. above sea level	GWL: Depth 36.2' Date/Time 8-20-91 / 1500	DATE STARTED: 6/8/91
ENGINEER/GEOLOGIST: G.M and K.M	Depth 36.2' Date/Time 8-21-91 / 1845	DATE COMPLETED: 7/15/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 9 OF 9

DRILLED AT 7° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
to	64050 7/1/91 2000 sequence 24		1.6	Olive gray (5Y, 5/2) hard CLAY with SAND and Gravel, dry, nonplastic	CL	>4.0	Top Hnu: .3 ppm, γ: 800 cpm, α: N/A cpm; Bottom Hnu: .3 ppm, γ: 800 cpm, α: 0 cpm
19.6 = 20.1 =	64051 7/2/91 0155 sequence 25		.5	Olive gray (5Y, 5/2) hard CLAY with SAND and Gravel, dry, nonplastic	CL	>4.0	Note: Water entered the sample from a layer above. Top Hnu: .3 ppm, γ: 800 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 800 cpm, α: 0 cpm
		N/A SLANT Borings		Bottom of Bore Hole			Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm

	Initial	Date
1st Key In	KT	11-20-91
2nd Key In	KAB	12-4-91
Mark Copy Verification Key		

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Mark Rohr / Brian Meuller

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1185	.3 ppm
BETA-GAMMA	Non Shielded 50754 Probe	800 cpm
ALPHA	50747	0 cpm

REVIEWED BY: MB DATE 11-20-91

ERNALD
RI/FS

Slant Boring ~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 10-1-91
PROJECT NO. 602.3.19 CHECKED BY _____ DATE _____
BORING NO. 1616
PIEZOMETER NO. N/A DATE OF ~~INSTALLATION~~ CEMENTING 7-15-91

BOREHOLE DRILLING

DRILLING METHOD 8 1/4 in. Hollow Stem Auger	TYPE OF BIT Bull Dog
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM _____ TO _____	SIZE 6" I.D. FROM 0 TO 118 ft.
FLUID N/A FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE N/A	RISER PIPE MATERIAL N/A
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. _____ I.D. _____
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS _____	JOINING METHOD _____
TOTAL PERFORATED AREA _____	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A	OTHER PROTECTION N/A
PROTECTIVE PIPE O.D. _____	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		571.03	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0	BOTTOM 2	TOP 571.03	BOTTOM 569.03
~~BENTONITE~~ Grout (valley)	TOP 2	BOTTOM 120.1	TOP 569.03	BOTTOM 450.93
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	120.1		450.93	
SWL AFTER INSTALLATION	N/A		N/A	

PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
PERMEABILITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐
REMARKS [illegible]

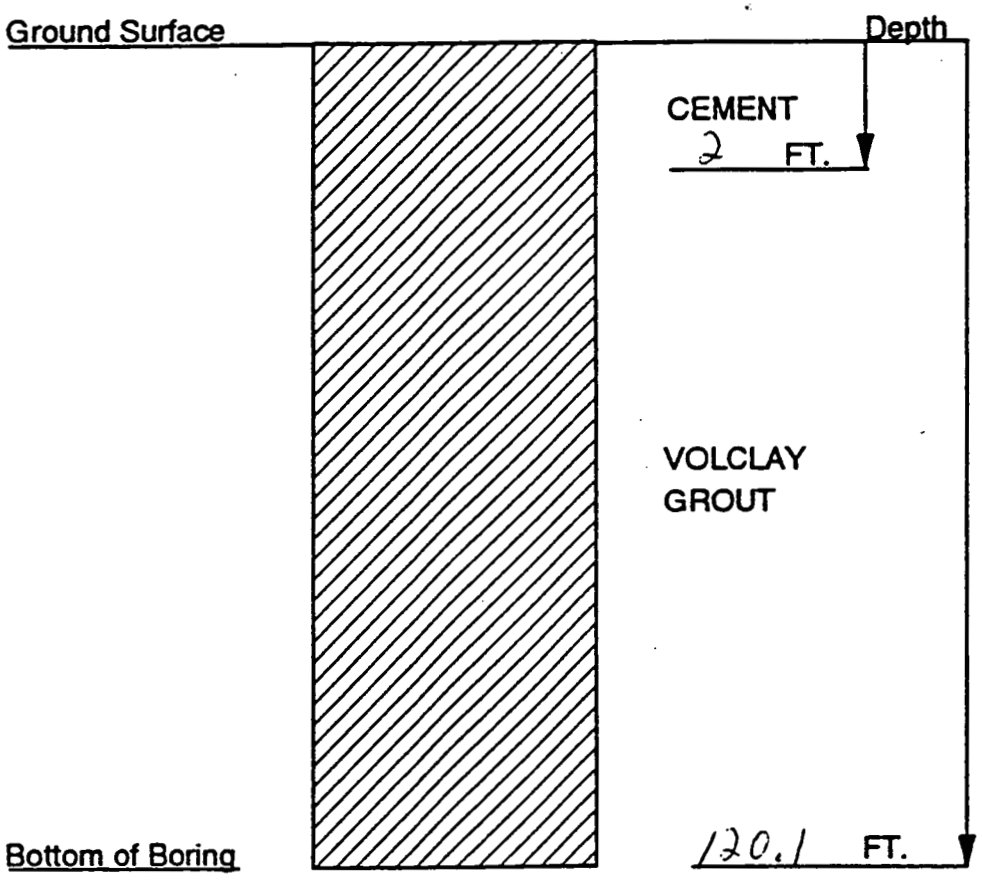
001130

REVIEWED BY QA [illegible] DATE 11-20-91

K-65 LOW ANGLE SLANT BORING

FERNALD RI/FS
Boring Diagram
Bore Hole No. 1616

Installation Date: 7-15-91
Geologist: Glen M., Ken M.
Project No. 602.3.19



Bore Hole Diameter: 10 3/4 Inches

MATERIALS USED:

Bags of Volclay Grout: 32
Amount of Water Used: 550 gallons
Amount of Cement: 2 bags

NOTES:

Average Drill Angle: 7 Degrees
Water Depth/Date: 36.2 ft. / 6-20-91
Water Depth/Date: 36.2 ft. / 6-21-91

*Not to Scale

REVIEWED BY QA NB DATE 11-20-91

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

*See backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1617	COORDINATES: ~~N 480200.27 E 1778393.47~~ K.M. 8-9-91	DATE 5/2/91	
ELEVATION: 576.19 ft. above sea level K.M. 8-9-91 *	GWL: Depth 50.4' Date/Time 6-5-91/1730	DATE STARTED: 4/30/91	
ENGINEER/GEOLOGIST: GM and K.M.	Depth Date/Time	DATE COMPLETED: 9/26/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 1 OF 5	

DEPTH DRILLED AT 6° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.5	66976 5/2/91 0920 Sequence No. 1	N/A SLANT BORINGS	1.5 *	Brown (10YR, 4/3) soft CLAY, with some root fragments, leaves, root stems, and wild onions, damp, medium plasticity	CL	.5	Top Hnu: 2.0 ppm β/γ: N/A cpm α: N/A cpm; Bottom Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm
4.9	66977 5/2/91 1025 Sequence No. 2		3.4	Light olive brown (2.5Y, 5/4) very stiff CLAY with a little sand, trace root fragments, and fine gravel, damp, low plasticity	CL	3.0	Top Hnu: 2.0 ppm β/γ: N/A cpm α: N/A cpm; Bottom Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm
				No Recovery			Top Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm; Bottom Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm
7.3	66978 5/2/91 1105 Sequence No. 3		3.1	Light olive brown (2.5Y, 5/4) very stiff CLAY with some sand and trace fine gravel, trace strong brown (7.5YR, 5/8) weathered staining, damp, low plasticity	CL	2.5	Top Hnu: 2.0 ppm β/γ: N/A cpm α: N/A cpm; Bottom Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm
9.6				olive brown (2.5Y, 4/3) stiff CLAY, low plasticity, moist	CL	1.5	
				No Recovery			Top Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm; Bottom Hnu: 2.0 ppm β/γ: 700 cpm α: 0 cpm
11.5				Continued on next page			

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson
* A total of 3.2 ft. of soil was collected. The additional 1.7 ft. of soil comes from where the sampler skidded across the ground surface in front of the start of the bore hole.

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	711083	2.0 ppm
BETA-GAMMA	77194	700 cpm
ALPHA	50740	0 cpm

REVIEWED BY QA [signature] DATE 11-20-91

402-11-46

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1617	COORDINATES: ~~N 480309.27 E 1378993.47~~ * K.M. 8-9-91	DATE 5/2/91	
ELEVATION: ~~576 ft. above sea level~~ K.M. 8-9-91	GWL: Depth 50.4' Date/Time 6-5-91/1730	DATE STARTED: 4/30/91	
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth Date/Time	DATE COMPLETED: 9/26/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 2 OF 5	

DEPTH DRILLED AT 6° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
11.5	66979 5/2/91 1439 sequence NO. 4	N/A SLANT BORINGS	3.2	Dark yellowish brown (10YR, 4/4) stiff CLAY, moist, medium plasticity	CL	2.0	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
14.7				No Recovery			Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm. Depth is stopped here and is equal to 16.5 ft.
16.5	66980 66981 66982 66983 66984 5/2/91 1535 sequence NO. 5		3.7	Yellowish brown (10YR, 5/4) stiff CLAY, damp, medium plasticity	CL	2.0	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
20.2				No Recovery			Top Hnu: 1.0 ppm, βγ: cpm, α: cpm; Bottom Hnu: 1.0 ppm, βγ: cpm, α: cpm
21.5	66985 66986 5/2/91 1715 sequence NO. 6		3.5	Yellowish brown (10YR, 5/4) stiff CLAY, damp, medium plasticity	CL	2.0	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
24.0				Yellowish brown (10YR, 5/4) very stiff CLAY, damp, medium plasticity	CL	3.25	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
25.0				No Recovery			
26.5							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	711083	1.0 ppm
BETA-GAMMA	77194	800 cpm
ALPHA	50740	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1617	COORDINATES: N480309.27 E1378393.47 K.M. 8-9-91	DATE 5/2/91
ELEVATION: ~~576 ft. above sea level~~ K.M. 8-9-91	GWL: Depth 50.4' Date/Time 6-5-91/1720	DATE STARTED: 4/30/91
ENGINEER/GEOLOGIST: G.M. and K.M	Depth Date/Time	DATE COMPLETED: 9/26/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 3 OF 5

DEPTH DRILLED AT 6° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
26.5	66987 5/2/91 1752	↑	4.9	Dark Yellowish brown (10YR, 4/4) very stiff CLAY, damp, low plasticity	CL	2.0	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
29.5	Sequence NO. 7			Light Yellowish brown (2.5Y, 6/4) ~~very stiff~~ medium dense CLAYEY FINE SAND with light gray (10YR, 7/2) mottling, damp, nonplastic	SC	N/A	Top Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm; Bottom Hnu: 1.0 ppm, βγ: 800 cpm, α: 0 cpm
31.4 31.5				~~No Recovery~~			
	66988 5/3/91 1600	N/A SLANT BORINGS	4.1	Light olive brown (2.5Y, 5/4) loose CLAYEY SAND with light gray (2.5Y, 7/2) mottling, moist	SC	N/A	Top Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm; Bottom Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm
1	Sequence NO. 8			Light olive brown (2.5Y, 5/4) soft sandy, silty, CLAY; moist, high plasticity	CL	.25	Top Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm; Bottom Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm
35.6				No Recovery			
36.5	66989 66990 66991 66992 66993 5/3/91 1702	↓	3.7	Light Yellowish brown (2.5Y, 6/4) loose CLAYEY SAND and CLAY with light gray (2.5Y, 7/1) mottling	SC	N/A	Top Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm; Bottom Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm
39.3				Yellowish brown (10YR, 5/8) to light olive brown (2.5Y, 5/6) medium stiff SANDY CLAY with weathered black organics, moist, medium plasticity	CL ↙ ~~CL~~	1.0 ↙ ~~1.0~~	Top Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm; Bottom Hnu: 1.2 ppm, βγ: 700 cpm, α: 0 cpm
40.2	Sequence NO. 9			No Recovery			
41.5							

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	711083	1.0 ppm
	5/3:	1.2
BETA-GAMMA	77194	800 cpm
	5/3: 73937	700
ALPHA	50740	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

*See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1617	COORDINATES ~~N 480304.27 E1378393.47~~ K.M. 8-9-91	DATE 5/4/91	
ELEVATION: ~~576 ft. above sea level~~ K.M. 8-9-91	GWL: Depth 50.4' Date/Time 6-5-91/1730	DATE STARTED 4/30/91	
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth Date/Time	DATE COMPLETED: 9/26/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 4 OF 5	

DEPTH DRILLED AT 6° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
41.5	66994 66995 5/4/91 0900 Sequence NO. 10	N/A SLANT BORING	4.7	Light olive brown (2.5Y, 5/4) loose CLAYEY SAND with trace weathered black organics, wet	SC	N/A	Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm
46.2				No Recovery			
46.5	66996 5/4/91 0952 Sequence No. 11		4.0	Light olive brown (2.5Y, 5/4) loose CLAYEY SAND, Saturated	SC	N/A	Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm
50.5				No Recovery			
51.5	66997 5/4/91 1030 Sequence No. 12		5.0	Light Yellowish brown (2.5Y, 6/4) very loose CLAYEY SAND, Saturated	SC	~~very loose~~ N/A	Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm Top: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm, pH=7 Bottom: Hnu: 2.0 ppm, βγ: 600 cpm, α: 0 cpm
56.5				Yellowish brown (10YR, 5/6) loose CLAYEY SAND with trace gravel, wet	SC	N/A	

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	711083	2.0 ppm
BETA-GAMMA	73937	600 cpm
ALPHA	50740	0 cpm

REVIEWED BY QA [signature] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1617	COORDINATES: ~~N 403309.37 E 1374347.47~~ K.M. 8-9-91	DATE 5/4/91	
ELEVATION: ~~576 ft. above sea level~~ K.M. 8-9-91	GWL: Depth 50.4' Date/Time 6-5-91/1730	DATE STARTED: 4/30/91	
ENGINEER/GEOLOGIST: G.M. and K.M.	Depth Date/Time	DATE COMPLETED: 9/26/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 5 OF 5	

DEPTH DRILLED AT ° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
58.5	66998 66999 ~~67000~~ ~~67001~~ ~~67002~~ ~~67003~~ K.M. 10/3/91 5/4/91 1423 Sequence No. 13	64001 64002 64003 64004	3.7	Light olive brown (2.5 Y, 5/6) loose CLAYEY SAND with some gravel and limestone cobbles, moist to damp	SC	~~loose~~ N/A	Top Hnu: ppm cpm α: cpm Bottom Hnu: ppm cpm α: cpm The hole was stopped at 63.5 ft. corrected starting depth from 56.5 to 58.5 ft. Top Hnu: ppm cpm α: cpm Bottom Hnu: ppm cpm α: cpm
62.2				No Recovery			
63.5	64005 ~~67004~~ K.M. 10/3/91 5/4/91 1620 Sequence No. 14	N/A SLANT BORING	4.9	Light olive brown (2.5Y, 5/4) CLAY, loose SAND, and GRAVEL mixture, trace limestone cobbles, Saturated	GC	~~loose~~ N/A	Top Hnu: 1.3 ppm cpm Bottom Hnu: 1.3 ppm cpm Top Hnu: 1.3 ppm cpm Bottom Hnu: 1.3 ppm cpm
65.8				Light brownish gray (2.5Y, 6/2) medium dense CLAYEY SAND with some gravel,	SC	~~loose~~ ~~medium dense~~ N/A	Top Hnu: 1.3 ppm cpm Bottom Hnu: 1.3 ppm cpm Top Hnu: 1.3 ppm cpm Bottom Hnu: 1.3 ppm cpm
68.4 68.5				~~No Recovery~~			
				Bottom of Bore Hole			Top Hnu: ppm cpm α: cpm Bottom Hnu: ppm cpm α: cpm Top Hnu: ppm cpm α: cpm Bottom Hnu: ppm cpm α: cpm

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	711083	1.3 ppm
BETA-GAMMA	73937	800 cpm
ALPHA	50740	0 cpm

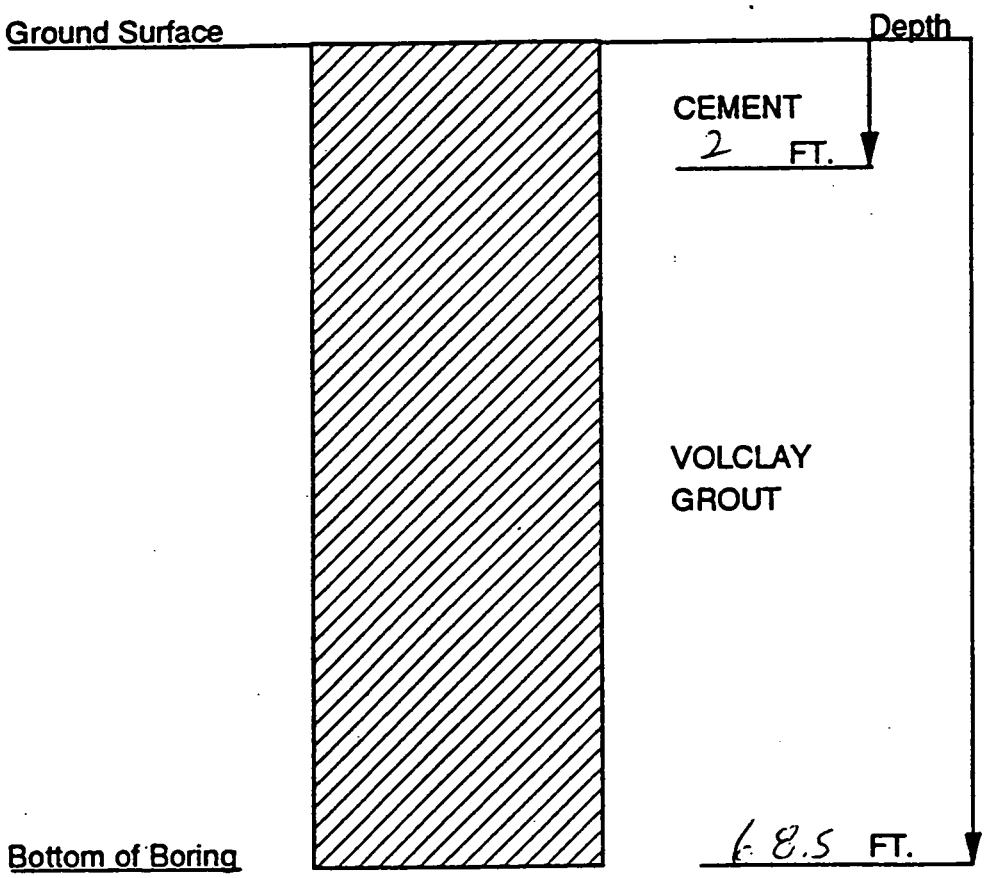
001145

REVIEWED BY QA [illegible] DATE 11-20-91

K-65 LOW ANGLE SLANT BORING

FERNALD RI/FS
Boring Diagram
Bore Hole No. 1617

Installation Date: 9-26-91
Geologist: Glen M., Ken M.
Project No. 602.3.19



Bore Hole Diameter: 8 3/4 Inches

MATERIALS USED:

Bags of Volclay Grout: 8
Amount of Water Used: 120 gallons
Amount of Cement: 1 bag

NOTES:

Average Drill Angle: 6 Degrees
Water Depth/Date: 50.94 ft./6-5-91
Water Depth/Date:

*Not to Scale

REVIEWED BY GA [illegible] DATE 11-20-91

ERNALD RI/FS

Slant Boring
~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 10-1-91
PROJECT NO. 602.3.19 CHECKED BY _____ DATE _____
BORING NO. 167
PIEZOMETER NO. N/A DATE OF ~~INSTALLATION~~ CEMENTING 9-26-91

BOREHOLE DRILLING

DRILLING METHOD 8 1/4 in Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM _____ TO _____
FLUID N/A FROM _____ TO _____

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE N/A FROM _____ TO _____
SIZE N/A FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		576.17	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0	BOTTOM 2	TOP 576.17	BOTTOM 574.17
~~BENTONITE~~ VOLCLAY	TOP 2	BOTTOM 68.5	TOP 574.17	BOTTOM 507.67
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	68.5		507.67	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐

REMARKS _____

REVIEWED BY GA [illegible] DATE 11-20-91

001147

FERNALD RI/FS

Initial			
	1st Key In	2nd Key In	Hand Copy Verification

Date: 6-5-91
Time: 17:30
Page: 1 of 1

5711

WATER QUALITY FIELD COLLECTION REPORT

FADL REF#

8-7-91 [illegible]

PROJECT NAME	RI/FS Fernald	SAMPLE LOCATION	616 / 617
PROJECT NUMBER	602 3-19	SAMPLE ID NUMBER	N/A
DATE COLLECTED	6-5-91	RFA NUMBER	N/A
TIME COLLECTED	17:30	C/C NUMBER	N/A
COLLECTED BY	L. Marshall / G. Marshall	SAMPLE TYPE	Ground Water.

SAMPLING INFORMATION

BAROMETRIC PRESSURE	UNKNOWN
AIR TEMPERATURE	46°C
DO SATURATION IN AIR	7.8 MG/L
WATER TEMPERATURE	17
DEPTH OF SAMPLE	68.5
WATER LEVEL	50.4

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	8.0	8.0	X
SPEC. COND. uMHOS/cm	2600	2550	X
D.O. MG/L	1.2	.9	X

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	.4	.4	.4

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
18.0°C	4	7	19.0°C	0	15	0	16	147	1413	Isobut.	1104	100ppm	5.25
OK	OK	OK	OK	✓	✓	0.4	OK	147	1214	✓	✓	✓	✓

WEATHER CONDITIONS	Sunny, Hot, Clear
ADDITIONAL REMARKS	None.

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
11534	YSI Model 51B Oxygen Meter
15942	YSI Model 335 SLT Meter
3032	Fisher Sci. PH meter
SN00260	Solist Water level Indicator.

EQUIP.	NUMBER
BAILER	None
HOSE/S	YES
PUMP	
FILTER KIT	None

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

(T.D. 68.5) - (W.L. 50.4) = 18.1 Ht. of Water Column

18.1 Ht. of Water Column x .73 = 39.63 (3 Volumes)

18.1 Ht. of Water Column x .73 = 66.06 (5 Volumes)

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

*See backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1618	COORDINATES: ~~N 180236, 57 E 370665.83~~ K.M. 8-9-91	DATE: 7/27/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 1 OF 9	

DEPTH DRILLED AT 5° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5	64092 7/27/91 1835	N/A SLANT BORINGS	.5	Organic matter such as grass and root stems with a little yellowish brown (10YR, 5/6) CLAY, dry, non plastic, a few gray insects			Top Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
			5.0	Yellowish brown (10YR, 5/6) stiff CLAY with trace organic matter, dry, non plastic	CL	2.5	
3.2	sequence 1			Yellowish brown (10YR, 5/6) hard CLAY with trace root stems and gravel, damp, non plastic	CL	>4.5	Top Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
5	64093 7/27/91 1900		4.0	Yellowish brown (10YR, 5/6) hard CLAY with trace root stems and gravel, damp, non plastic	CL	4.5	Top Hnu: .3 ppm, pγ: 250 cpm, α: N/A cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
9	sequence 2			No Recovery			Top Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
10	64094 7/27/91 1910		4.6	Yellowish brown (10YR, 5/6) very stiff CLAY with trace gray (10YR, 6/1) mottling, damp, low plasticity	CL	3.5	Top Hnu: .3 ppm, pγ: 250 cpm, α: N/A cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
11.7				A mottled dark brown (10YR, 3/3) and reddish brown (5YR, 4/4) medium stiff CLAY with a little silt and organic matter, damp, low plasticity	CL	1.0	
12.7				Yellowish brown (10YR, 5/6) very stiff CLAY with trace gray (10YR, 6/1) mottling, damp, low plasticity	CL	3.5	Top Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, pγ: 250 cpm, α: 0 cpm
13.5				A mottled dark brown (10YR, 3/3) and reddish brown (5YR, 4/4) very stiff CLAY with a little silt and trace organic matter, damp, low plasticity	CL	3.5	
14.6	sequence 3			No Recovery			
15							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Rob Johnson, Terry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.3 ppm
BETA-GAMMA	73937	250 cpm
ALPHA	73918	0 cpm

REVIEWED BY QA MR DATE 11/20/91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

* See Back side

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1618	COORDINATES: ~~N 40,935.57 E 378,845.83~~ K.M. 8-9-91	DATE 7/27/91
ELEVATION: 577.39 ft. above Sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91
DRILLING METHODS: Horizontal drill machine with 8¼ inch augers		PAGE 2 OF 9

DEPTH DRILLED AT 5° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	64095 7/27/91 1930	N/A SLANT BORINGS	3.0	Dark brown (10YR, 4/3) very stiff SILTY CLAY with a little reddish brown (5YR, 4/4) mottling and trace organic matter, damp, non plastic	CL	3.0	Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
16				Light olive brown (2.5Y, 5/4) very stiff SANDY CLAY with fine gravel and a little reddish brown (5YR, 4/4) mottling, dry, non plastic	CL	3.5	Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
18				No Recovery			Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
20	Sequence 4						
	64096 7/27/91 2320		3.1	Light olive brown (2.5Y, 5/4) hard SANDY CLAY with gravel, trace root stems, dry, non plastic	CL	>4.5	Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
23.1				No Recovery			Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
25	Sequence 5						
26	64097 7/27/91 2330		3.4	Light olive brown (2.5Y, 5/4) hard CLAY with sand and fine gravel, dry, non plastic	CL	>4.5	Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
28.4				A mottled light olive brown (2.5Y, 5/4) and grayish brown (2.5Y, 5/4) hard CLAY with trace very dark gray (2.5Y, 3/0) organic matter			Top Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, γ: 250 cpm, α: 0 cpm
				No Recovery			
28	Sequence 6						

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Rick Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.3 ppm
BETA-GAMMA	73937	250 cpm
ALPHA	73918	0 cpm

402-11-44

DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1618	COORDINATES: ~~N40236.57 E51860.83~~ K.M. 8-9-91	DATE 7/27/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: K.M, G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 3 OF 9	

DEPTH DRILLED ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	64098 7/27/91 2345 sequence 7	N/A SLANT BORINGS	5.0	A mottled light olive brown (2.5Y, 5/4) and light brownish gray (2.5Y, 6/2) hard CLAY, damp, non plastic	CL	>4.5	Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm
35	64099 7/28/91 0000 sequence 8		5.0	Light olive brown (2.5Y, 5/4) very stiff CLAY with grayish brown (2.5Y, 5/2) mottling, damp, low plasticity	CL	2.5	Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm
37.5				Light olive brown (2.5Y, 5/4) stiff CLAY with grayish brown (2.5Y, 5/2) mottling, damp, medium plasticity	CL	1.5	Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm
40	64100 7/29/91 1845 sequence 9		5.0	Grayish brown (2.5Y, 5/2) stiff CLAY with yellowish brown (10YR, 5/6) mottling, damp, low plasticity	CL	1.25	Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm
42.4			3.4	Light olive brown (2.5Y, 5/4) very stiff CLAY with some gray (5Y, 6/1) and a little very dark grayish brown (10YR, 3/2) mottling, damp, medium plasticity	CL	3.0	Top Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm; Bottom Hnu: .3 ppm, βγ: 250 cpm, α: 0 cpm
43.4				No Recovery			
45							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.3 ppm
BETA-GAMMA	73937	250 cpm
ALPHA	73918	0 cpm

DATE 11-20-91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1618	COORDINATES: ~~N40036.59 E613645.83~~ K.M. 8-9-91	DATE	7/30/91
ELEVATION: 577.39 ft. above Sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED	7/27/91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED:	9/8/91
DRILLING METHODS: Horizontal drill machine with 8 ¾ inch augers		PAGE 4	OF 9

DEPTH DRILLED ATS ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	64101 64102 64103 7/29/91 1915	N/A SLANT BORINGS	3.5	Light olive brown (2.5Y, 5/4) stiff CLAY with some gray (5Y, 6/1) and a little very dark grayish brown (10YR, 3/2) mottling, damp, medium plasticity	CL	2.0	Top: Hnu: .2 ppm, βγ: 280 cpm, α: N/A cpm; Bottom: Hnu: .6 ppm, βγ: 280 cpm, α: 0 cpm
47				Light olive brown (2.5Y, 5/4) very stiff CLAY with some gray (5Y, 6/1) and a little very dark grayish brown (10YR, 3/2) mottling, damp, medium plasticity	CL	3.5	Top: Hnu: .6 ppm, βγ: 280 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
48.5	Sequence 10			No Recovery			
50	64104 64105 64106 64107 64108 7/30/91 0030		3.75	Light olive brown (2.5Y, 5/4) stiff CLAY with some gray (5Y, 6/1) and a little very dark grayish brown (10YR, 3/2) mottling, damp, medium plasticity	CL	2.5	Top: Hnu: .2 ppm, βγ: 280 cpm, α: N/A cpm; Bottom: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
53.75	Sequence 11			No Recovery			Top: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
55	64109 7/30/91 0121			Light olive brown (2.5Y, 5/4) stiff CLAY, damp, medium plasticity	CL	2.5	Top: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
57			5.0	Light olive brown (2.5Y, 5/4) stiff CLAY with a little sand and gravel, and light gray (2.5Y, 7/2) mottling, damp, medium plasticity	CL	1.75	Top: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
60	Sequence 12						

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Larry Marshall, Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	280 cpm
ALPHA	73918	0 cpm

REVIEWED BY QA: [illegible] DATE: 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See BackSide

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	DATE 7/30/91	
BORING NUMBER: 7618	COORDINATES: ~~N 1402365.57 E 1318645.89~~ K.M. 8-9-91	DATE STARTED: 7/27/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE COMPLETED: 9/8/91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	PAGE 5 OF 9	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers			

DEPTH DRILLED AT 5° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60 / 60.25	64110 7/30/91 0140 Sequence 13	N/A SLANT BORINGS	60.25 / 5.0	Light olive brown (2.5Y, 5/4) stiff CLAY with a little sand and gravel, and light gray (2.5Y, 7/2) mottling, damp, medium plasticity	CL	1.75	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
				Light olive brown (2.5Y, 5/4) stiff CLAY, damp, medium plasticity	CL	1.75	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
65	64111 64112 64113 64114 7/30/91 2359 Sequence 14		5.0	Light olive brown (2.5Y, 5/4) stiff CLAY with a little light gray (2.5Y, 7/2) mottling, damp, medium plasticity	CL	1.75	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
70	64115 64116 64117 64118 64119 7/31/91 0040 Sequence 15		5.0	Light yellowish brown (2.5Y, 6/4) stiff silty clay with a little sand and light olive gray (5Y, 6/2) mottling, damp, low plasticity	CL	1.5	Top Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 280 cpm, α: 0 cpm
75							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Rob Johnson, Marsha

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	280 cpm
ALPHA	73[illegible]	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

571

VISUAL CLASSIFICATION OF SOILS

*See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1618	COORDINATES: ~~N 480236.57 E 1310845.83~~ KM 8-9-91	DATE: 7/31/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 6 OF 9	

DEPTH DRILLED AT 75° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	64120 7/31/91 ~~1100~~ 0200	N/A SLANT BORINGS	5.0	Light yellowish brown (2.5Y, 6/4) stiff clayey silt, damp, non plastic	ML	2.0	Top Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Top Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm
	Sequence 16						
80	64121 7/31/91 2355		5.0	Light yellowish brown (2.5Y, 6/4) stiff CLAYEY-SILT with a little light gray (2.5Y, 7/0) mottling, damp, non plastic	ML	1.5	Top Hnu: .4 ppm, βγ: 300 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Top Hnu: .2 ppm, βγ: , α: ; Bottom Hnu: .2 ppm, βγ: , α:
	Sequence 17						
85	64122 64123 64124 8/1/91 0010		5.0	Light yellowish brown (2.5Y, 6/4) stiff CLAYEY SILT with a little light gray (2.5Y, 7/0) mottling, damp low plasticity	ML	1.5	Top Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm
87.5			5.0	Light yellowish brown (2.5Y, 6/4) stiff SILTY CLAY with a little light gray (2.5Y, 7/0) mottling, damp, low plasticity	CL	1.5	Top Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 300 cpm, α: 0 cpm
	Sequence 18						
90							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bill Jenkins, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A013345	.2 ppm
BETA-GAMMA	73937	300 cpm
ALPHA	73915	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
RING NUMBER: 1618	COORDINATES: ~~N480236.57 E1784865.83~~ K.M. 8-9-91	DATE: 8/1/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 7 OF 9	

DEPTH DRILLED AT ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	64125 64126 64127 64128 8/1/91 0107 Sequence 19	N/A SLANT BORINGS	5.0	Light yellowish brown (2.5Y, 6/4) stiff CLAYEY SILT with a little light gray (2.5Y, 7/0) mottling, damp, low plasticity	ML	1.5	Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm
95	64132 8/1/91 1945 Sequence 20		5.0	Light yellowish brown (2.5Y, 6/4) stiff SILTY CLAY with fine sand and a little light gray (2.5Y, 7/0) and light gray (2.5Y, 7/2) mottling, damp, low plasticity	CL	1.5	Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, γ: 300 cpm, α: cpm Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .4 ppm, γ: 300 cpm, α: 0 cpm
100	64133 8/1/91 2340 Sequence 21		5.0	Light yellowish brown (2.5Y, 6/4) stiff CLAYEY SILT with a little light gray (2.5Y, 7/0) and light gray (2.5Y, 7/2) mottling, damp, low plasticity Light olive brown (2.5Y, 5/4) very stiff CLAY, damp, medium plasticity	ML CL	1.5 2.5	Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm Top: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm; Bottom: Hnu: .2 ppm, γ: 300 cpm, α: 0 cpm
103.5 105							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Glen Marsh

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	300 cpm
ALPHA	73918	0 cpm

REVIEWED BY QA: DATE 11/20/91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 5711

* See Backside

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1618	COORDINATES: ~~N480236.57~~ K.M. 8-9-91 E370645.83	DATE: 8/2/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 104.40 Date/Time 8-8-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 8 OF 9	

DEPTH DRILLED ATS ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	64134 64135 64136 64137 64138 K.M. ~~64139~~ 64139 105-44 ~~64140~~ 64140 64141 8/2/91 0015 Sequence 22	N/A SLANT BORINGS	5.0	Light olive brown (2.5Y 5/4) stiff CLAY, moist, medium plasticity	CL	2.0	Top: Hnu: 0 ppm, BY: 360 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm Note: The BY is 100 cpm above background at 105 ft
109				olive (5Y, 5/4) Very stiff clay, moist, high, plasticity	CL	2.5	Top: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm
110	8/3/91 64142 K.M. ~~1145~~ 8/3/91 0200 Sequence 23		5.0	Olive (5Y, 5/3) to olive gray (5Y, 5/2) stiff CLAY, damp, high plasticity	CL	1.0	Top: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm Top: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm
115	64143 8/3/91 1622 Sequence 24		5.0	Olive (5Y, 5/3) stiff CLAY with trace black weathering, damp, high plasticity	CL	1.25	Top: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm Top: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm; Bottom: Hnu: 0 ppm, BY: 260 cpm, α: 0 cpm
120							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: [illegible], Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	0 ppm
BETA-GAMMA	73937	260 cpm
ALPHA	739[illegible]	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

001156

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

* See Back Side

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
RING NUMBER: 16/18	COORDINATES: ~~N480236.57~~ 8-9-91 E318895.83	DATE: 8/3/91	
ELEVATION: 577.39 ft. above sea level	GWL: Depth 98.48 Date/Time 8-7-91/1045	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST: L.M., G.M.	Depth 104.40 Date/Time 8-9-91/1535	DATE COMPLETED: 9/8/91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 9 OF 9	

DEPTH DRILLED AT 5° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	64144 8/3/91 1700 Sequence 25	N/A SLANT BORINGS	5.0	olive (5Y, 5/3) Stiff silty clay with trace black weathering, damp, high plasticity	CL	1.0	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
125	64145 64146 64147 64148 64149 64150 64151 8/3/91 1820 Sequence 26		5.0	A mottled pale olive (5Y, 6/4) and olive gray (5Y, 5/2) medium stiff silty CLAY with a little fine sand, trace black weathering, damp, medium plasticity	CL	.5	Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
				A mottled pale olive (5Y, 6/4) and olive gray (5Y, 5/2) medium stiff SILTY CLAY with a little fine sand, moist, medium plasticity			Top Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm; Bottom Hnu: 0 ppm, βγ: 280 cpm, α: 0 cpm
130				Bottom of Bore Hole			Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm
							Top Hnu: ppm, βγ: cpm, α: cpm; Bottom Hnu: ppm, βγ: cpm, α: cpm

NOTES
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: [illegible] Marshall, Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	0 ppm
BETA-GAMMA	73937	280 cpm
ALPHA	739.E	0 cpm

001157

REVIEWED BY QA [illegible] DATE 11-20-91

ERNALD
RI/FS

571

Slant Boring
~~PIEZOMETER~~ INSTALLATION SHEET

ROJECT NAME FEMP RI/FS FIELD ENG./GEO. Ken Marion DATE 10-1-91
RCJECT NC. 602.3.19 CHECKED BY DATE
ORING NO. 1618
IEZOMETER NO. N/A DATE OF ~~INSTALLATION~~ CEMENTING 9-8-91

OREHOLE DRILLING

DRILLING METHOD 8 1/4 in. Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM TO
FLUID N/A FROM TO

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE N/A FROM TC
SIZE N/A FROM TC

IEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS
TOTAL PERFORATED AREA

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. I.D.
LENGTH OF PIPE SECTIONS
JOINING METHOD

R CTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D.

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		577.39	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0	BOTTOM 2	TOP 577.39	BOTTOM 575.39
~~BENTONITE~~ VOLCLAY	TOP 2	BOTTOM 130	TOP 575.39	BOTTOM 447.39
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
ERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
IEZOMETER TIP	N/A		N/A	
OTTOM OF BOREHOLE	130		447.39	
WL AFTER INSTALLATION	N/A		N/A	

T PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
A ENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐

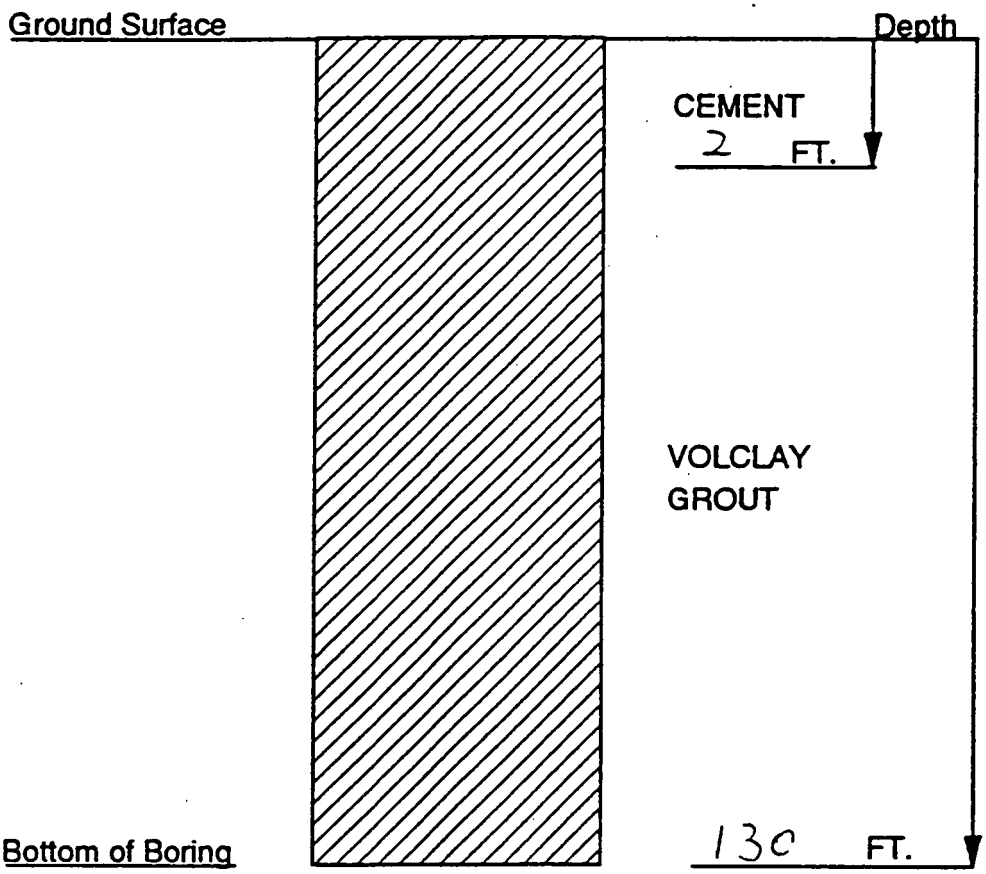
ARKS

001158 REVIEWED BY QA AAV DATE 11-20-91

K-65 LOW ANGLE SLANT BORING

FERNALD RI/FS
Boring Diagram
Bore Hole No. 1618

Installation Date: 9-8-91
Geologist: Glen M., Ken M
Project No. 6023.19



Bore Hole Diameter: 8 1/4 Inches

MATERIALS USED:

Bags of Volclay Grout: 20 bags
Amount of Water Used: 400 gallons
Amount of Cement: 1 bag

NOTES:

Average Drill Angle: 5 Degrees
Water Depth/Date: 98.48 ft./8-7-91
Water Depth/Date: 104.40 ft./8-8-91

*Not to Scale

001159

REVIEWED BY QA [illegible] DATE 11-20-91

-FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1619	COORDINATES: N48:412.98 E1378593.22	DATE 7-19-91
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91 /2000	DATE STARTED: 7-19-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 /2330	DATE COMPLETED: 9/8/91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 1 OF 8

DEPTH DRILLED AT 0° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	64055 7/19/91 1745	N/A SLANT BORINGS	3.0	Dark Yellowish brown (10YR, 4/4) very stiff SILT with some CLAY and a little organic matter, dry, non plastic	ML	4.0	Top Hnu: .4 ppm, βγ: N/A cpm, α: N/A cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
1				Light Yellowish brown (2.5Y, 6/4) hard CLAY with a little dark gray (10YR, 4/1) mottling, trace organic matter, dry, non plastic	CL	>4.5	
3				No Recovery			Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
	Sequence 1						
5	64056 7/19/91 [illegible]25		5.0	Light Yellowish brown (2.5Y, 6/4) hard CLAY with a little dark gray (10YR, 4/1) mottling, trace organic matter, dry, non plastic	CL	>4.5	Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
				Light Yellowish brown (2.5Y, 6/4) very stiff CLAY with a little dark grayish brown (10YR, 4/2) mottling and a little sand and gravel, trace organic matter, damp, non plastic	CL	4.0	Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .6 ppm, βγ: 1000 cpm, α: 0 cpm
7.5	Sequence 2			Olive gray (5Y, 5/2) very stiff CLAY, moist, non plastic	CL	3.0	
10	64057 7/19/91 1840		3.5	Olive gray (5Y, 5/2) very stiff CLAY with trace organic matter, moist, non plastic	CL	2.75	Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
13.5				No Recovery			Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
15	Sequence 3						

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

[illegible]ng Co: Pennsylvania Drilling
[illegible]er: Dave Newman
ssistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1185	.4 ppm
Nai Shielded BETA-GAMMA Probe	771198	1000 cpm
ALPHA	59146	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1619	COORDINATES: N480412.98 E1378593.22	DATE 7-19-91
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91 3000	DATE STARTED: 7-19-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 1835	DATE COMPLETED: 9-8-91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 2 OF 8

DRILLED AT ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	64058 7/19/91 2300	N/A SLANT BORINGS	3.9	Olive (5Y, 5/4) Very dense Gravel, Sand, and clay mixture, one large steel nail is in the sample, dry	GC	N/A	Top Hnu: .4 ppm, γ: 1000 cpm, α: N/A cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Top Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm
8.9	Sequence 4			No Recovery			
20	64059 7/19/91 2315		5.0	Olive (5Y, 5/4) very dense gravel, sand, and clay mixture, dry	GC	N/A	Top Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm
	Sequence 5			Light olive brown (2.5Y, 5/4) Very stiff CLAY with a little light brownish gray (2.5Y, 6/2) mottling, damp, low plasticity	CL	4.0	Top Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm
5	64060 7/19/91 2330		5.0	A mottled Light yellowish brown (2.5Y, 6/4), light brownish gray (2.5Y, 6/2), and dark grayish brown (2.5Y, 4/2) very stiff CLAY, moist, low plasticity	CL	2.5	Top Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm
25	Sequence 6			Light olive brown (2.5Y, 5/4) very stiff CLAY with a little dark grayish brown (2.5Y, 4/2) mottling, moist, medium plasticity	CL	2.5	Top Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, γ: 1000 cpm, α: 0 cpm

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1185	.4 ppm
BETA-GAMMA	77119	1000 cpm
ALPHA	59146	0 cpm

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 16/9	COORDINATES: N480412.98 E1378593.22	DATE 7-20-91
ELEVATION: 578.80 ft. above Sea level	GWL: Depth 86.3 Date/Time 7/26/91 1000	DATE STARTED: 7-19-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 1330	DATE COMPLETED: 9-8-91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 3 OF 8

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	64061 7/19/91 2350 Sequence 7	N/A SLANT BORING	5.0	Light olive brown (2.5Y, 5/4) stiff CLAY, moist, medium plasticity	CL	1.25	Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
35	64062 7/20/91 0005 Sequence 8		4.0	Light yellowish brown (2.5Y, 6/4) stiff CLAY with light brownish gray (2.5Y, 6/2) mottling, moist, low plasticity with silt; No Recovery	CL	1.5	Top Hnu: .4 ppm, βγ: 1000 cpm, α: N/A cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
39							
40	64063 7/20/91 0025 Sequence 9		5.0	Light yellowish brown (2.5Y, 6/4) stiff CLAY with light brownish gray (2.5Y, 6/4) mottling, trace sand and fine gravel, damp, no plasticity with silt	CL	1.5	Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Top Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm; Bottom Hnu: .4 ppm, βγ: 1000 cpm, α: 0 cpm
45							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	1185	.4 ppm
Non shielded BETA-GAMMA Probe	771195	1000 cpm
ALPHA	59146	0 cpm

11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

Jun 10, 1991

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1619	COORDINATES: N480412.98 E1378593.22	DATE 7-20-91
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91/0800	DATE STARTED: 7-19-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91/2330	DATE COMPLETED: 9-8-91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 4 OF 8

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	64064 7-20-91 1855	SLANT BORING	3.8	Yellowish brown (10YR, 5/4) hard Clay with silt and gray (10YR, 7/2) mottling, damp, low plasticity	CL	>4.5	Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
48.8	Sequence 10	N/A		NO Recovery			Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
50	64065 7-20-91 1915		5.0	Yellowish brown (10YR, 5/4) very Stiff Clay with Silt, light gray (10YR, 7/2) Mottling, Damp, non plastic.	CL	3.75	Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
	Sequence 11						
55		64066 64067 64068 64069 7/20/91 1940	5.0	A mottled Yellowish Brown (10YR, 5/6) Yellowish brown (10YR, 5/8), and light gray (10YR, 7/2) stiff Clay with Silt, moist, medium plasticity	CL	1.25	Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Top Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
60	Sequence 12						

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS	
Hnu	A01336	.2	ppm
BETA-GAMMA	50747	275	cpm
ALPHA	73937	0	cpm

REVIEWED BY QA [illegible] DATE 11.20.91

001163

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	DATE 7-20-91	
BORING NUMBER: 1619	COORDINATES: N48042.98 E137853.22	DATE STARTED: 7-19-91	
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91/2400	DATE COMPLETED: 9-8-91	5711
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91/2330	PAGE 5 OF 8	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers			

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	64071 64072 64073 64074 7/22/91 2325 Sequence 13	N/A SLANT BORINGS	5.0	A mottled light Yellowish brown (2.5Y, 6/4) to light gray (2.5Y, 7/2) stiff Clay with silt, moist, medium plasticity	CL	1.5	Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
65	64075 7/22/91 1030 Sequence 14		5.0	Light Yellowish Brown (2.5Y, 6/4) med. dense Clayey very fine Sand, wet medium plasticity.	SC	N/A	Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
70	64076 7/22/91 0150 Sequence 15		4.1	Light Yellowish Brown (2.5Y, 6/4) Med. dense Clayey very fine Sand and a little light gray (5Y, 7/1) mottling, wet, medium plasticity			Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Top: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm Bottom: Hnu: .2 ppm, γ: 275 cpm, α: 0 cpm
75							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01336	.2 ppm
BETA-GAMMA	50747	275 cpm
ALPHA	73937	0 cpm

001164

REVIEWED BY QA [illegible] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	
BORING NUMBER: 1619	COORDINATES: N480412.98 E1378593.22	DATE 7-23-91
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91 / 1900	DATE STARTED: 7-19-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 / 2330	DATE COMPLETED: 9-5-91
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 6 OF 8

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	64077 7/23/91 1930	N/A SLANT BORINGS	5.0	Light Yellowish Brown (2.5Y, 6/4) med. dense clayey very fine Sand, wet, low plasticity	SC	N/A	Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm
	Sequence 16						
80	64078 64079 64080 7/23/91 2315		5.0	Light Yellowish Brown (2.5Y, 6/4) medium dense Clayey Sand, Saturated	SC	N/A	Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm
	Sequence 17						
85	64081 7/23/91 2350		5.0	Olive (5Y, 5/4) dense Sand with a little Clay and gravel, Saturated	SC	NA	Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Top Hnu: .2 ppm βγ: 300 cpm α: 0 cpm; Bottom Hnu: .2 ppm βγ: 300 cpm α: 0 cpm
90	Sequence 18						

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	300 cpm
ALPHA	73918	0 cpm

11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)		
BORING NUMBER: 1619	COORDINATES: N486412.98 E1378593.22	DATE: 7-24-91	
ELEVATION: 578.80 ft. above sea level	GWL: Depth 86.3 Date/Time 7/26/91 2200	DATE STARTED: 7-19-91	
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 2332	DATE COMPLETED: 9-8-91	
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		PAGE 7 OF 8	

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	64082 7/24/91 0100		0				Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm
	Sequence 19						
95	64083 7/24/91 2350	N/A SLANT BORING	5.0	Olive (5Y, 5/4) dense Sand Saturated	SC	N/A	Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm
97.5				olive-(5Y, 5/4) dense gravel, Sand, and Clay mixture, Saturated	GC	N/A	Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm
99.5	Sequence 20			Olive gray (5Y, 5/2) dense gravel sand and Clay mixture, Saturated	GC	N/A	
100	64084 64085 64086 7/25/91 0130		5.0	Olive gray (5Y, 5/3) Very loose Clayey Sand with a little gravel, Saturated. Note: →	SC	N/A	Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; : loose Sand dripped out of the Sample tube when the spoon was Broke open. Top Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, βγ: 350 cpm, α: 0 cpm
103.75	Sequence 21			olive gray (5Y, 5/3) loose Clayey Sand with gravel, Saturated	SC	N/A	
105							

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	350 cpm
ALPHA	73918	0 cpm

402-11-44

001166 REVIEWED BY QA: [illegible] DATE 11-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.19	PROJECT NAME: FMPC RI/FS (K-65 Slant Borings)	DATE 7-25-91
BORING NUMBER: 1619	COORDINATES: N480412.98 E1378593.22	DATE STARTED: 7-19-91
ELEVATION: 578.80 ft. above Sea level	GWL: Depth 86.3 Date/Time 7/26/91 / 2000	DATE COMPLETED: 9-8-91
ENGINEER/GEOLOGIST: K.M., G.M.	Depth 67.0 Date/Time 7/29/91 / 1330	PAGE 8 OF 8
DRILLING METHODS: Horizontal drill machine with 8 ¼ inch augers		

DEPTH DRILLED AT 8° ANGLE	SAMPLE TYPE & NO	DEPTH FROM HORIZONTAL (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	64087 7-25-91 0200		5.0	olive gray (5Y, 5/2) very stiff gravely clay with sand, wet med. plasticity	CL	2.75	Top Hnu: .2 ppm, γ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 350 cpm, α: 0 cpm
							Top Hnu: .2 ppm, γ: 350 cpm, α: 0 cpm; Bottom Hnu: .2 ppm, γ: 350 cpm, α: 0 cpm
	Sequence 22						
110		N/A SLANT BORINGS		Bottom of Bore Hole			Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm
							Top Hnu: ppm, γ: cpm, α: cpm; Bottom Hnu: ppm, γ: cpm, α: cpm

NOTES:
- Borings sampled continuous using a 5.0 sampler
- Boring angle checked every 2 ft. using a slope indicator

Drilling Co: Pennsylvania Drilling
Driller: Dave Newman
Assistants: Bob Johnson, Larry Marshall

INSTRUMENT	SERIAL NO.	BACKGROUND READINGS
Hnu	A01345	.2 ppm
BETA-GAMMA	73937	350 cpm
ALPHA	73918	0 cpm

MR 11-20-91

ERNALD
RI/FS

Slant Borings ~~PIEZOMETER~~ INSTALLATION SHEET

3711

ROJECT NAME FEMP RI/FS
RCJECT NC. 602.3.19
ORING NO. 1619
IEZOMETER NO. N/A

FIELD ENG./GEO. Ken Marion DATE 10-1-91
CHECKED BY _____ DATE _____
DATE OF ~~INSTALLATION~~ CEMENTING 9-8-91

OREHOLE DRILLING

DRILLING METHOD 8 1/4 in. Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM _____ TO _____
FLUID N/A FROM _____ TO _____

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE N/A FROM _____ TO _____
SIZE N/A FROM _____ TO _____

EZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD _____

CTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION N/A

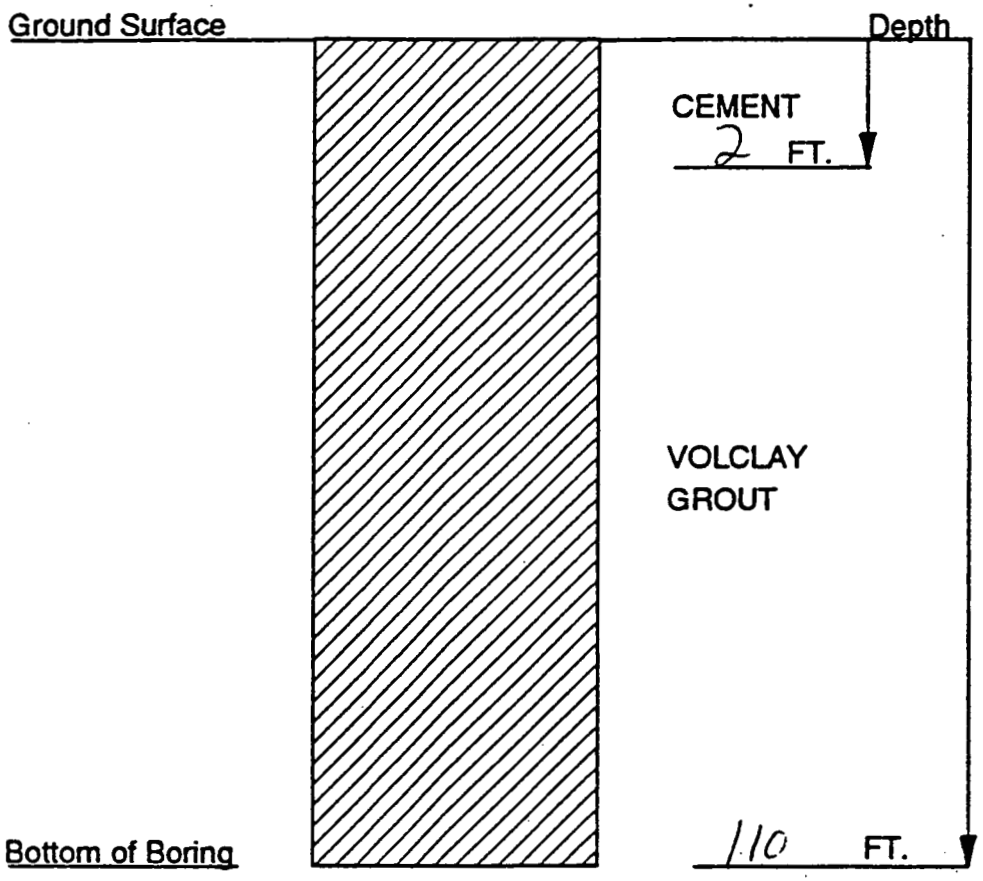
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
OP OF RISER PIPE	N/A		N/A	
ROUND SURFACE	0.0		578.80	
OTTOM OF PROTECTIVE PIPE	N/A		N/A	
OREHOLE FILL MATERIALS: ~~GROUT/SLURRY~~ CEMENT	TOP 0	BOTTOM 2	TOP 578.80	BOTTOM 576.80
~~BENTONITE~~ VOLCLAY	TOP 2	BOTTOM 110	TOP 576.80	BOTTOM 468.80
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
ERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
EZOMETER TIP	N/A		N/A	
OTTOM OF BOREHOLE	110		468.80	
WL AFTER INSTALLATION	N/A		N/A	

HEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐
RKS _____

K-65 LOW ANGLE SLANT BORING

FERNALD RI/FS
Boring Diagram
Bore Hole No. 1619

Installation Date: 9-8-91
Geologist: Glen M., Ken M
Project No. 602.3.19



Bore Hole Diameter: 8 1/4 Inches

MATERIALS USED:

Bags of Volclay Grout: 20
Amount of Water Used: 500 gallons
Amount of Cement: 1 bag

NOTES:

Average Drill Angle: 8 Degrees
Water Depth/Date: 86.3 ft./7-26-91
Water Depth/Date: 67.0 ft./7-29-91

*Not to Scale 001169

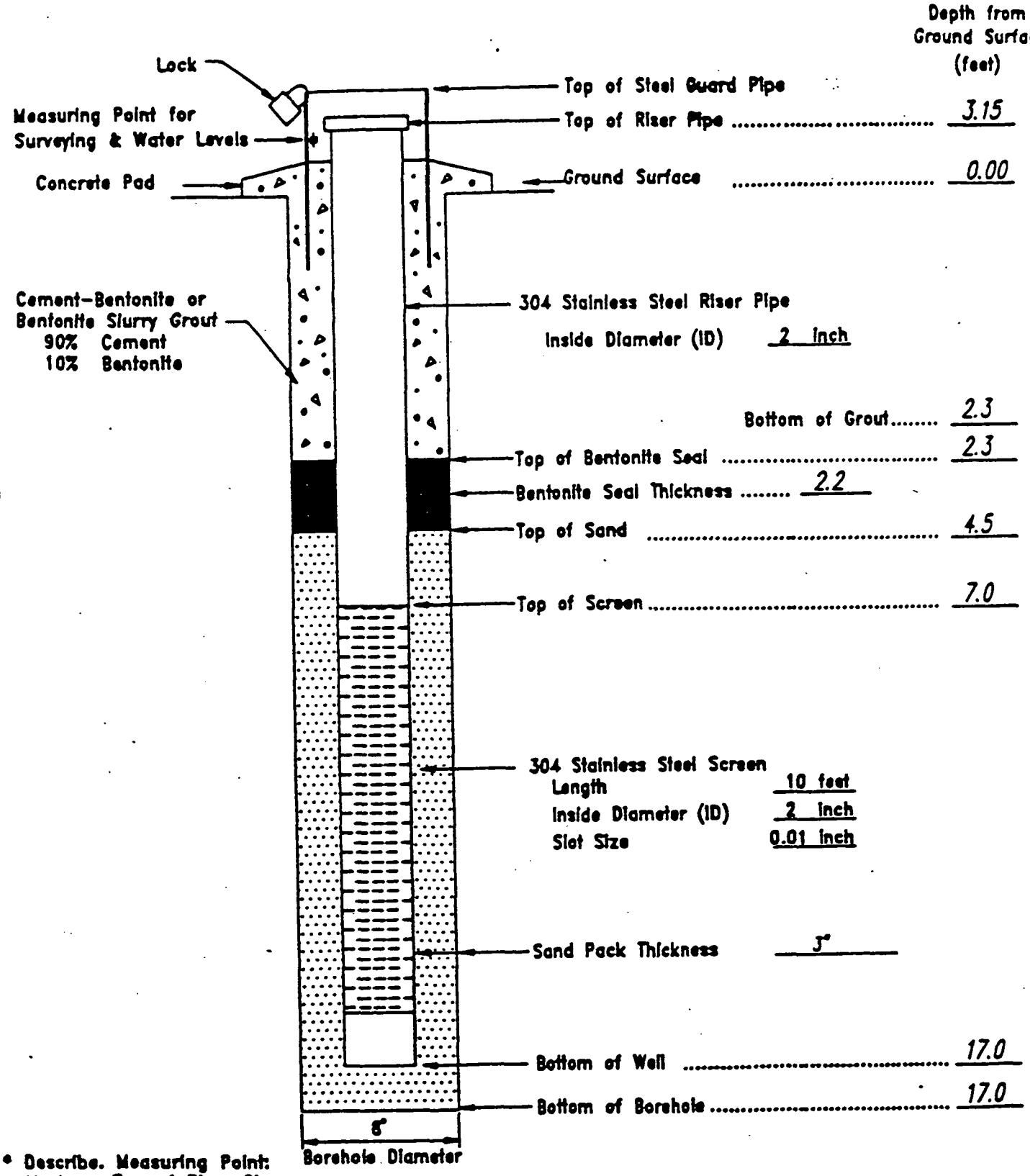
REVIEWED BY QA [signature] DATE 11-20-91

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-01S 2624
Well Location: Off Site
Date Of Installation: 3/19/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 533.39
Geologist/Engineer: M.A.F.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-32 Sh 1 of
Date Started 3/14/90 Completed 3/14/90 Ground Elev. 528.2
Total Depth 15.0 Ft Location A & W/Mobil Logged by M.Cousino
Remarks SB-32 completed as monitoring well MW-02S

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	1 4 2 4	0-2	1.7	Soft, brown, silt and clay, damp	0 Units no odor
4	02	3 3 3 3	2-4	1.7	Soft, brown to gray, clay, with some silt trace of sand, damp	0 Units no odor
	03	1,4 34	4-5.5	1.0		0 Units no odor no visual
6	04	2,4 3	5.5-7.0	1.2		0 Units no odors no visual
8	05	8 2 4	7.0-8.5	0.9	Loose, gray, coarse sand with some clay, and trace of gravels, wet	0.2 unit no odors no visual
10	06	2 1 1	8.5 - 10	1.0		0 Units no odors no visual
	07	4 6 4	10 - 11.5	1.1		0.2 Units no odors no visual
12	08	2 1 1	11.5-13.0	1.0		0 Units no odors no visual
14					Ground Water encountered at approximately 7 feet.	
16						
18						
20						

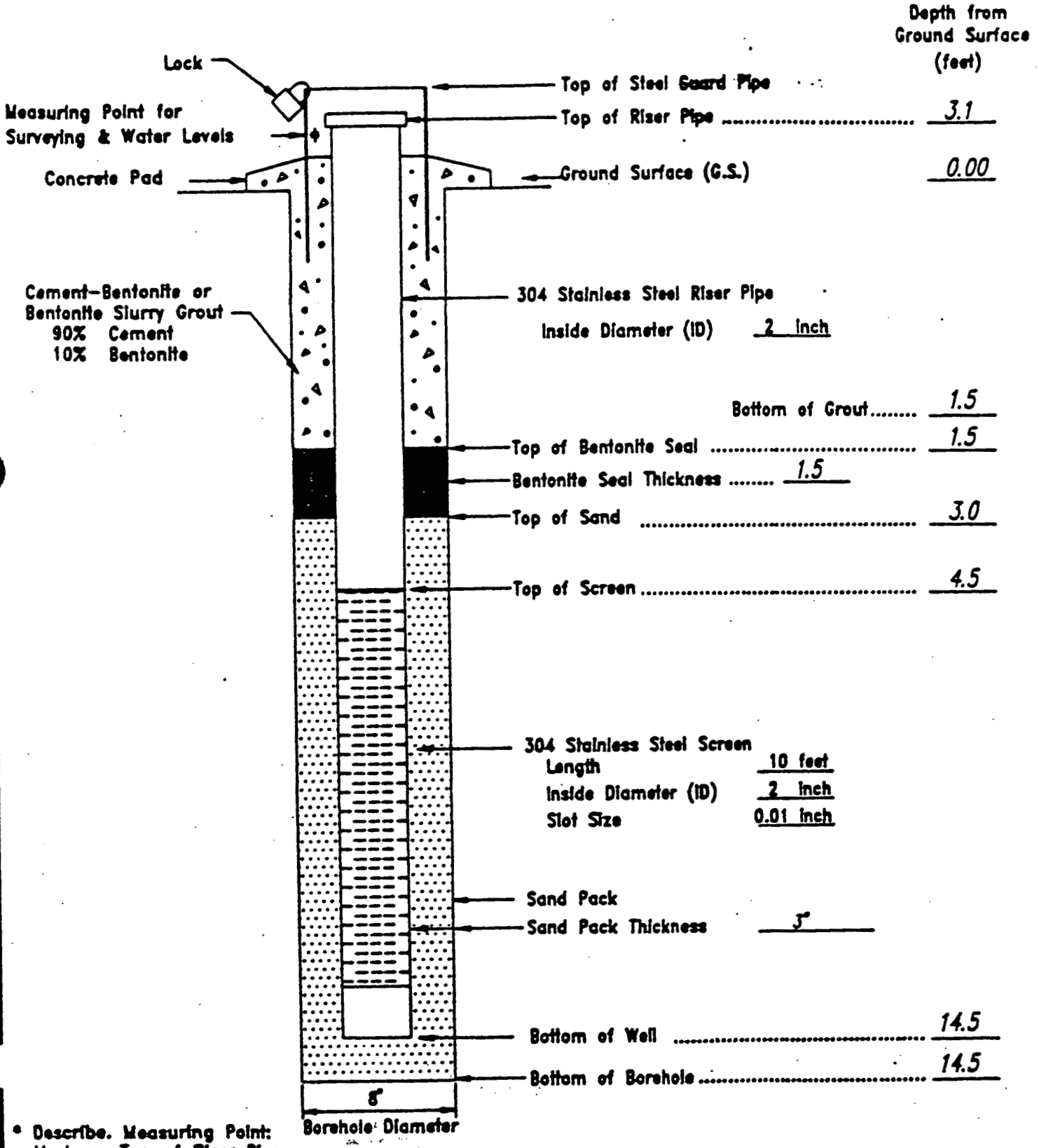
ENSR

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-02S 2625
Well Location: A & W
Date Of Installation: 3/20/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 531.29
Geologist/Engineer: M.A.C.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

2626

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-12 Sh 1 of 1
Date Started 3/01/90 Completed 3/01/90 Ground Elev. 528.0
Total Depth 16.0 Ft Location Logged by B. Berg
Remarks SB-12 completed as monitoring well MW-05S

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	4 4 3 2	0-2	2	Fine, gray, gravel (fill)	0 Units no odor no visual
2	02	3 2 1 2	2-4	2	Soft, brown, clay	0 Units no odor gray staining
4	03	7 14 12 11	4-6	2		0 Units no odor no visual
6	04	18 21 15 20	6-8	2	Medium dense to dense, tan, fine to medium sand, with some clay and trace gravels, moist to wet	30 Units gas odors gray staining
8	05	24 27 36 18	8-10	2		50 Units gas odors gray staining
10	06	42 140/ 4"	10-12	.5	Very dense, brown, medium to coarse gravels, wet	7 Units slight odor gray staining
12	07	36 43 84/ 4"	12-14	.5		0 Units slight odor gray staining
14	08	98 114/ 4"	14-16	.5		0 Units slight odor gray staining
16					Ground Water encountered at approximately 10.5 feet.	
18						
20						

ENSR

001173

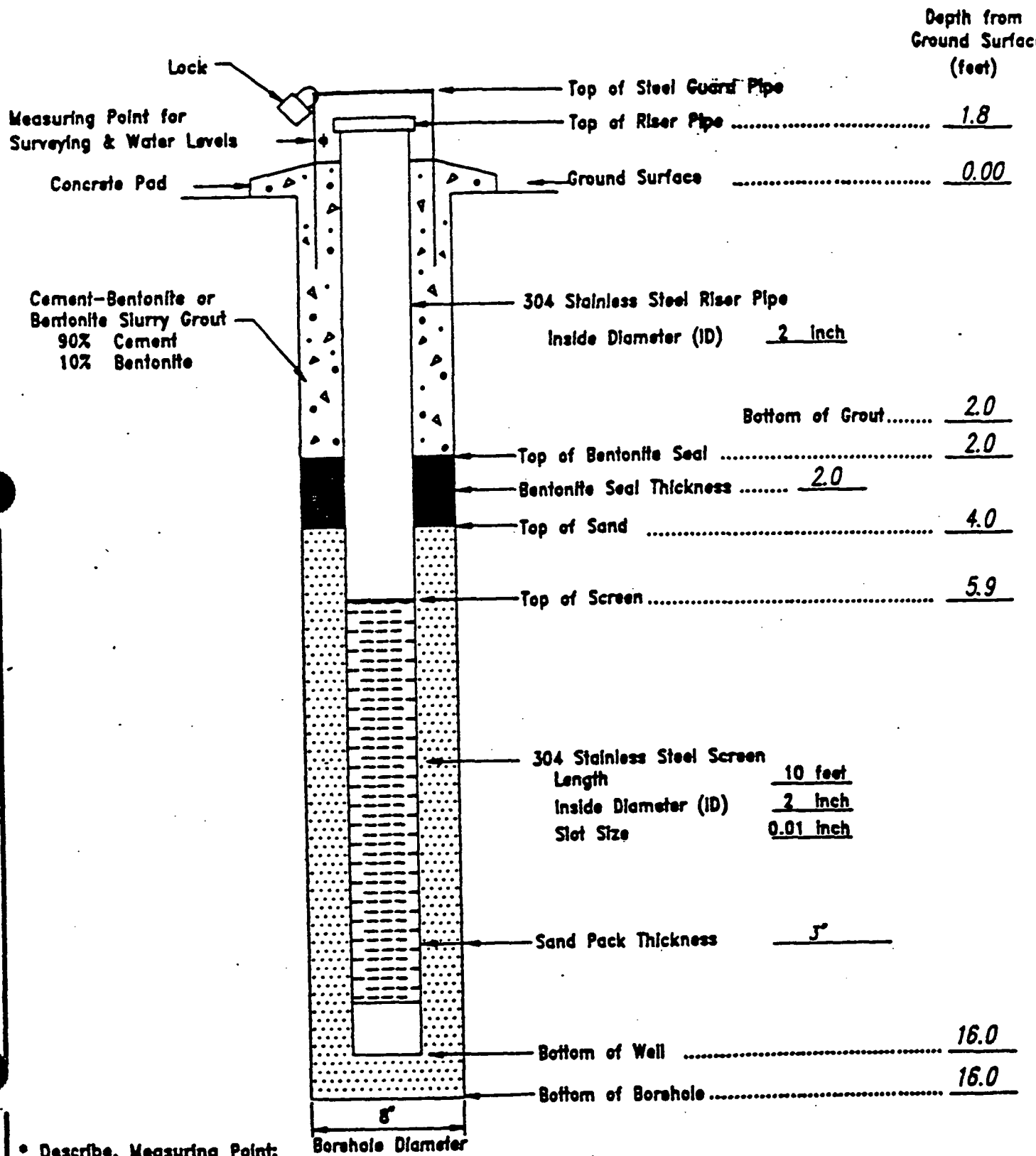
DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-05S 2626
Well Location: A & W
Date Of Installation: 3/1/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 530.04
Geologist/Engineer: W.R.B.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-06S Sh 1 of
Date Started 3/01/90 Completed 3/01/90 Ground Elev. 528.3
Total Depth 18.0 Ft Location A & W/Mobil Logged by B. Berg
Remarks

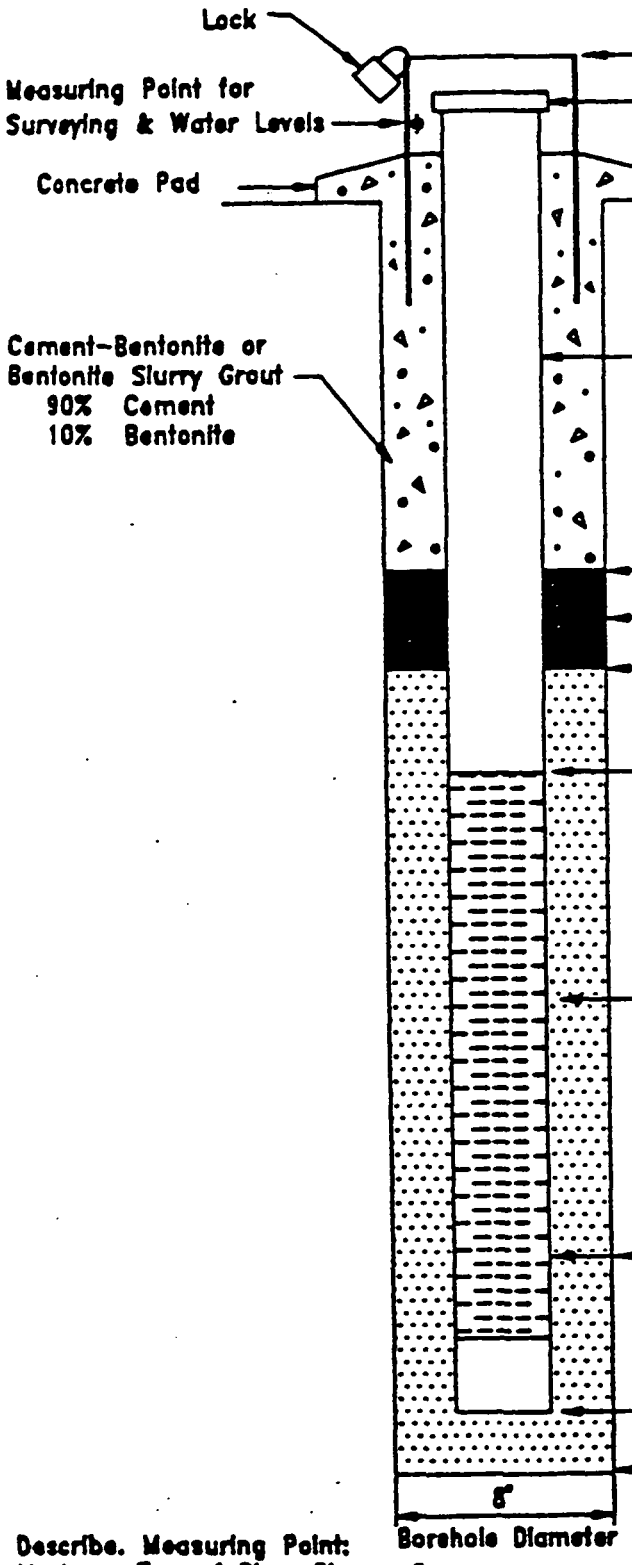
Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	10 20 13 9	0-2	1.5	Sand and Gravel, Gray Asphalt Sand, hard	0 Units No odor
2	02	6 9 7 7	2-4	1.5	Medium stiff, dark green to brown, clay, moist to wet	45 Units Sour Odor green stain
4	03	2 4 5 5	4-6	2		500 Units Sour Odor green stain
6	04	2 3 5 7	6-8	2		>1000 Units Sour Odor grn-bl.stain
8	05	3 5 5 7	8-10	2		500 Units Sour Odor green stain
10	06	15 37 36 51	10-12	2	Dense to very dense brown, fine to medium gravel and coarse sand with trace of clay, Moist to wet	300 Units Sour Odor green stain
12	07	17 48 59 49	12-14	2		50 Units Sour Odor green stain
14	08	17 27 23 13	14-16	2		100 Units No Odor green stain
16	09	6 5 6 11	16-18	1		0 Units No Odor no visual
18					Ground Water encounterd at approximately 11 feet.	

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-06S 2627
Well Location: A & W
Date Of Installation: 3/1/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 530.53
Geologist/Engineer: W.R.B.
Project Number: 4700-016



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.1
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	4.0
Top of Bentonite Seal	4.0
Bentonite Seal Thickness 2.0	
Top of Sand	6.0
Top of Screen	8.0
304 Stainless Steel Screen — Length 10 feet; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Sand Pack Thickness 3"	
Bottom of Well	18.0
Bottom of Borehole	18.0

* Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-08S Sh 1 of
Date Started 3/02/90 Completed 3/20/90 Ground Elev. 527.6
Total Depth 18.0 Ft Location A & W/Mobil Logged by B.Miller
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	6 5 5 9	0-2	2	Gravel Fill Silt, and some clay, damp	0 Units no odor no visual
2	02	3 5 5 7	2-4	2	Medium stiff, yellow, clay, damp	0 Units no odor no visual
4	03	3 4 5 5	4-6	2	Medium stiff, yellow-brown sandy silt, trace of sand, damp.	.5 Units no odor no visual
6	04	3 3 5 7	6-8	2		.5 Units no odor no visual
8	05	4 5 16 15	8-10	2		4 Units no odor no visual
10	06	8 12 9 8	10-12	2	Medium dense to dense, yellow to brown, gravel, with some coarse sand, trace of cobbles (~17 feet), damp to wet	4 Units no odor no visual
12	07	7 14 9 8	12-14	2		4 Units no odor no visual
14	08	11 19 24 19	14-16	2		4 Units no odor no visual
16	09	18 24 19 22	16-18	2		4 Units no odor no visual
18					Ground Water encountered at approximately 11.0 feet	

ENSR

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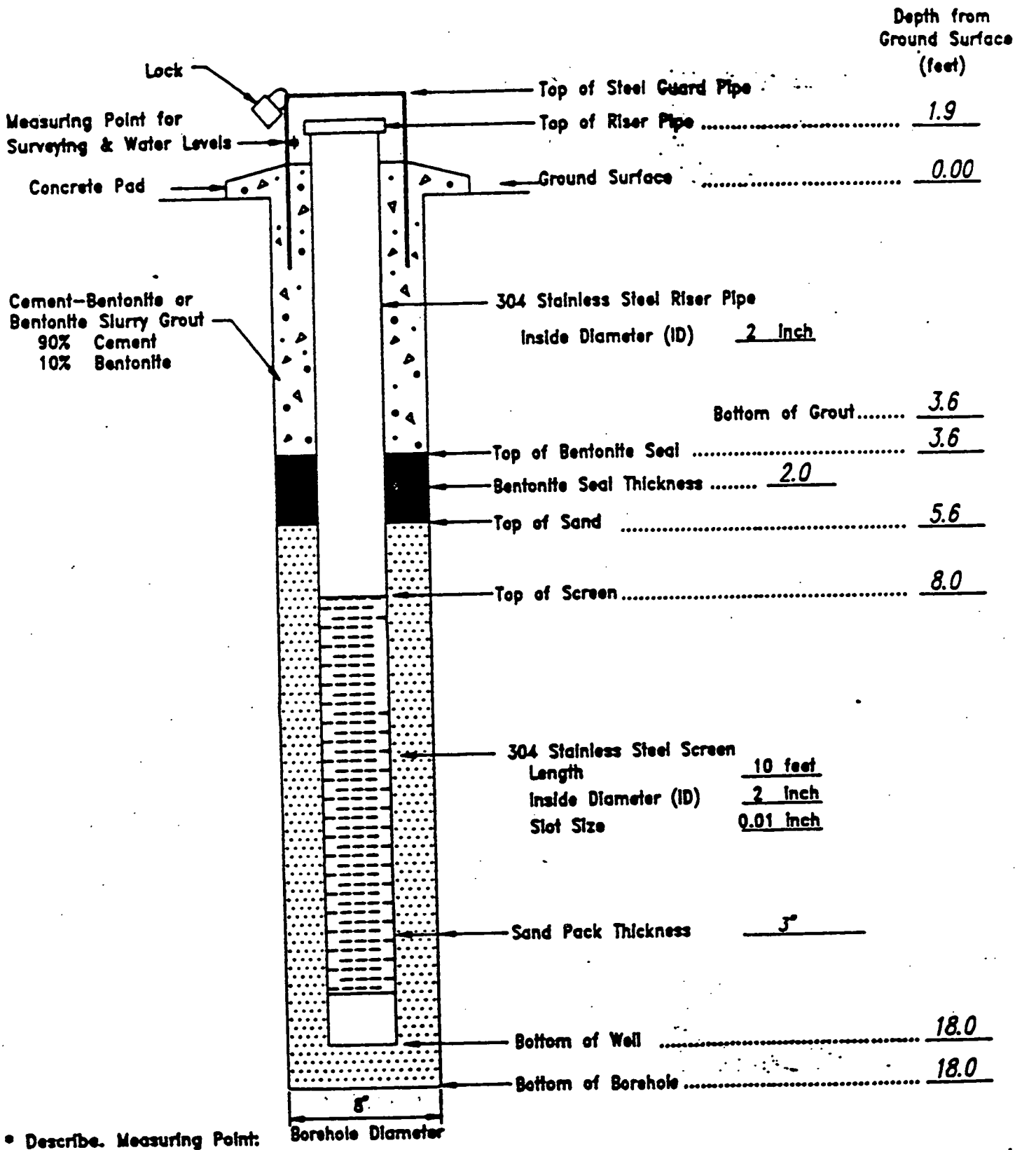
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-08S 2628
Well Location: A & W
Date Of Installation: 3/2/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 529.60
Geologist/Engineer: B.E.M.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-10S Sh 1 of 2
Date Started 3/13/90 Completed 3/13/90 Ground Elev. 529.8
Total Depth 22.0 Ft Location Logged by M.Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	2 7 10 4	0-2	0.7"	Medium stiff, brown, clay, and silt, with a trace of gravels damp	0 Units no odor no visual
2	02	3 4 4 4	2-4	1.7"		> 10 Units slight odor no visual
4	03	2 3 5 3	4-6	1.1"		21 Units slight odor no visual
6	04	3 4 4 7	6-8	0.7"		77 Units slight odor no visual
8	05	4 4 11 13	8-10	1.1"		270 Units slight odor no visual
10	06	11 13 9 9	10-12	1.0"		92 Units slight odor no visual
12	07	13 44 37 42	12-14	1.5"		>1000 Units strong odor black stain
14	08	9 23 31 33	14-16	1.3"		>1000 Units strong odor black stain
16	09	16 18	16-18	0.7"	Dense, brown, coarse gravels and cobbles with trace of fine sand and trace to some silt and clay moist to wet	>1000 Units strong odor black stain
18						

ENSR

5711
2629

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-10S Sh 2 of 2
Date Started 3/13/90 Completed 3/13/90 Ground Elev. 529.8
Total Depth 22.0 Ft Location Logged by M.Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	09	16 17 19 19	16-18	0.7		>1000 Units strong odor black stains
18	010	44 31 33 27	18-20	1.1"		400 Units strong odor black stains
20	011	44 22 18 19	20-32	1.2"		450 Units strong odor black stains
22						

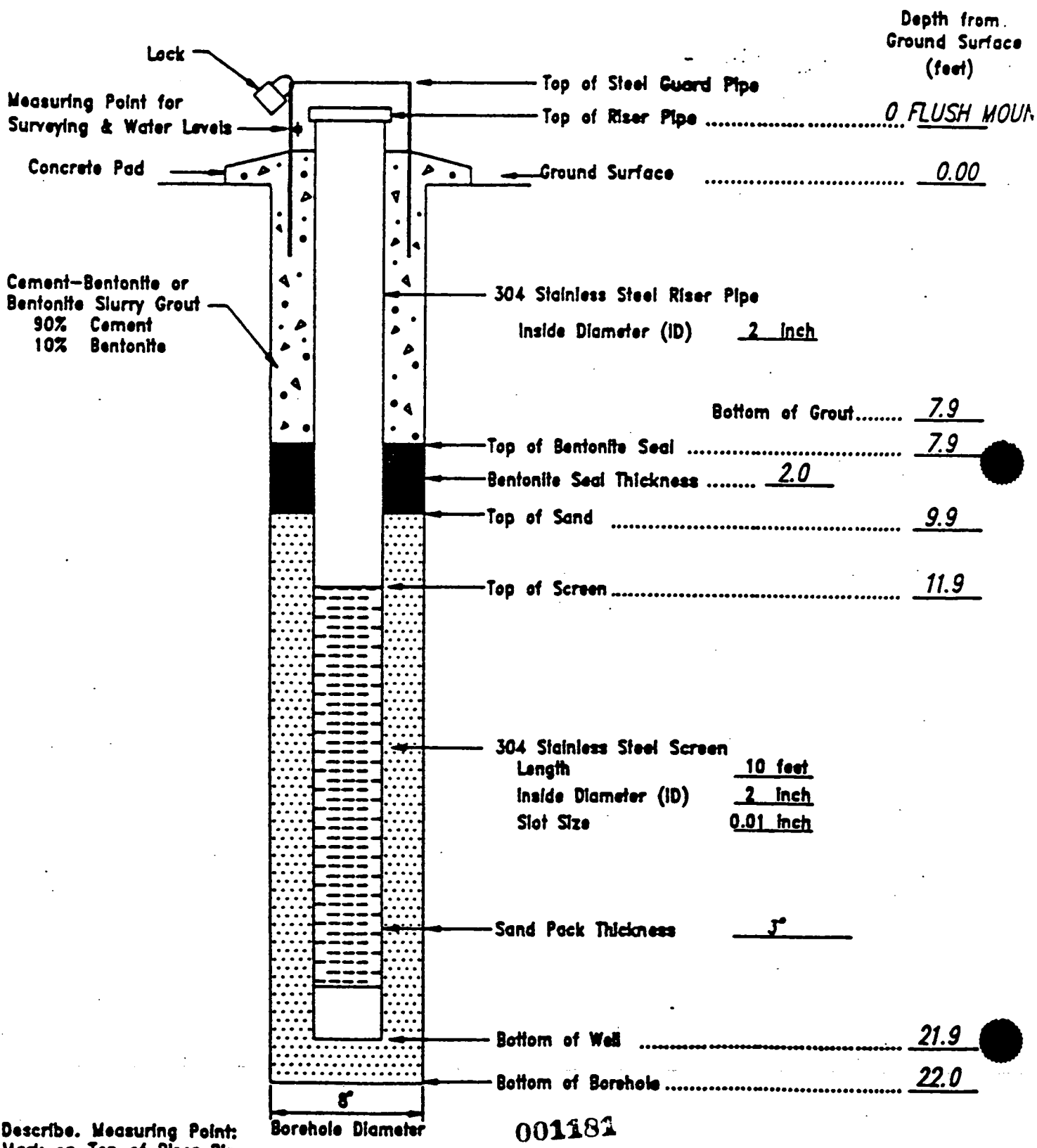
ENSR

DRAFT

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-10S 2629
Well Location: RNCC
Date Of Installation: 3/13/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 529.45
Geologist/Engineer: M.A.C.
Project Number: 4700-016



* Describe. Measuring Point: Mark on Top of Riser Pipe

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2630 5711

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-11S Sh 1 of 2
Date Started 3/13/90 Completed 3/13/90 Ground Elev. 530.1
Total Depth 22.0 Ft Location Logged by M.Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	5 4 5 5	0-2	0.5"	Asphalt and Gravel Fill Loose, gravel fill and clay, wet	No reading no odor no visual
2	02	2 3 3 4	2-4	0.3"		12 Units Slight Odor no visual
4	03	1 0 1 0	4-6	0.3	Soft, silt and clay, moist to wet with trace of sand.	>1000 Units Slight Odor no visual
6	04	1 0 0 0	6-8	10"		>1000 Units Slight Odor
8	05	1 0 0 5	8-10	0-8"		>1000 Units Strong Odor black stain
10	06	4 3 5 6	10-12	1.0"	Sand, stained black	>1000 Units Strong Odor Stains
12	07	7 16 12 27	12-14	1.3"	Dense coarse gravel and cobbles with some coarse sand and trace of clay, moist to wet	>1000 Units Strong Odor Black stain
14	08	3 7 17 12	14-16	1.5"		>1000 Units Strong Odor
16	09	7 18 21 18	16-18	1.5"		>1000 Units Strong Odor
18						

ENSR

2630

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-11S Sh 1 of 2
Date Started 3/13/90 Completed 3/13/90 Ground Elev. 530.1
Total Depth 22.0 Ft Location Logged by M.Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	10	4 12 18	18-19.5	1.0		>1000 Units Strong Odor Black Stains
20	11	5 4 22	19.5-21	1.1		>1000 Units Strong Odor Black Stains
22					Ground Water encountered at approximately 15 feet.	

ENSR

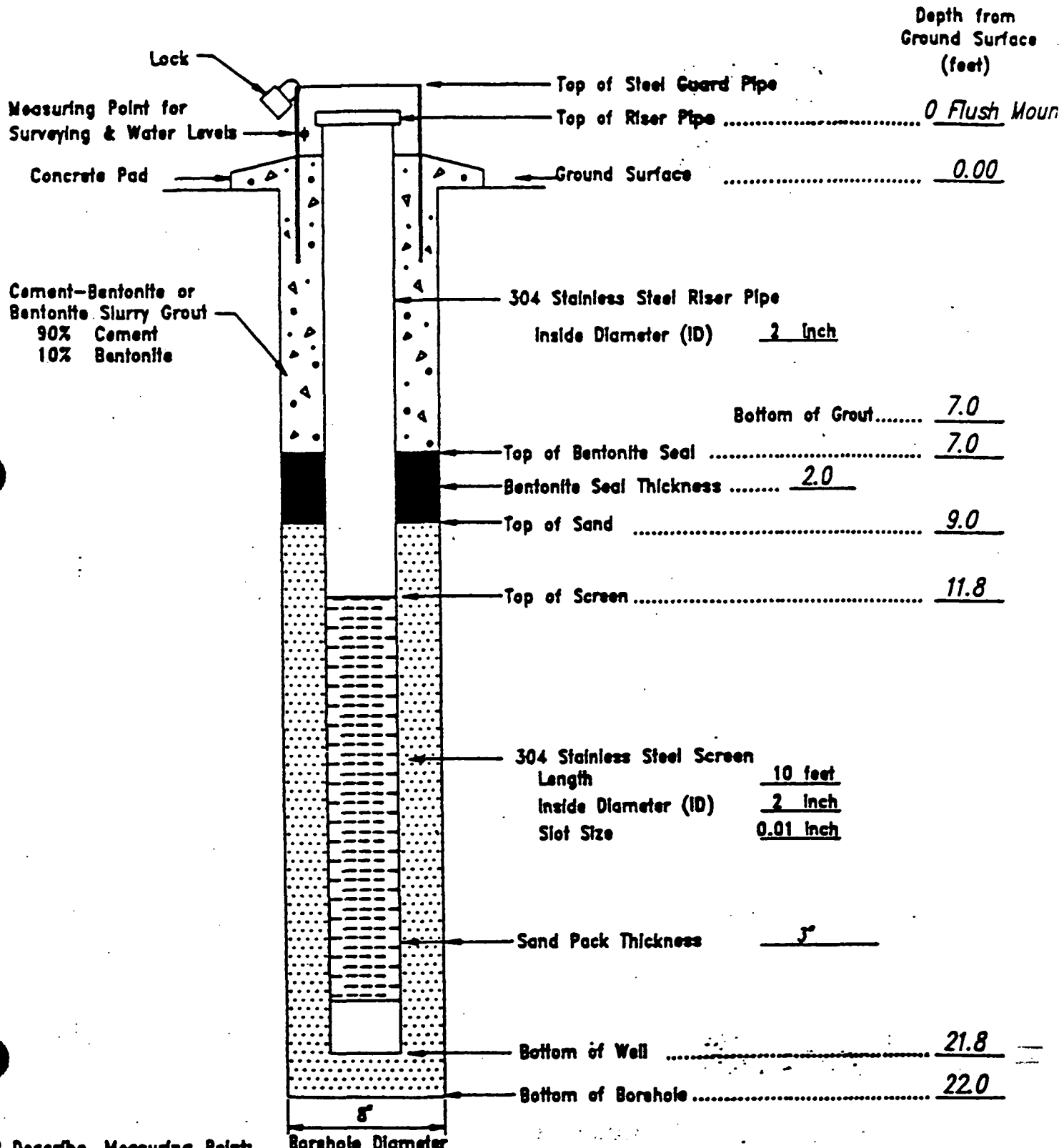
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-11S 2630
Well Location: RNCC
Date Of Installation: 3/13/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 529.71
Geologist/Engineer: M.A.C.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-12S Sh 1 of 2
Date Started 3/12/90 Completed 3/12/90 Ground Elev. 530.2
Total Depth 21.5 Ft Location Logged by M. Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	1 2 3 3	0-2	0.8	Sand and silt, brown, damp (Fill Material)	0 Units no odor
4	02	2 3 3 4	2-4	0.6	Soft, brown, clay and silt, moist	700 Units Slight Odor no visual
6	03	3 4 3 3	4-6	0.6		>1000 Units Solvent Odor black stain white crystals
8	04	1 3 4 8	6-8	1.3	Sand, gray, damp, black Staining Medium stiff, brown, clay, wet	>1000 Units Solvent Odor
10	05	4 11 10 9	8-10	1.2		>1000 Units Strong Odor
12	06	6 4 2 2	10-12	0.6	Dense, to very dense, gray to black gravels and cobbles with some coarse sand and trace of clay, moist to wet	800 Units Solvent Odor
14	07	7 8 11 14	12-14	1.2	Clay, some gravel, brown wet, stained black	>1000 Units Solvent Odor black stain
16	08	5 15 30 20	14-16	1.1	Gravel and cobbles, some silt, black stained and water at 15.5'	>1000 Units Solvent Odor black stain
18	09	58 69 30 21	16-18	1.3		>1000 Units Solvent Odor

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-12S Sh 2 of 2
Date Started 3/12/90 Completed 3/12/90 Ground Elev. 530.2
Total Depth 21.5 Ft Location Logged by M. Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
18						
	010	16 32 37 58	18-20	1.8"		>1000 units solvent odor black stain
20	011	17 21 27	20-21.5	1.3"		>1000 units solvent odor black stain
22						

ENSR

 DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-12S 2631
Well Location: RNCC
Date Of Installation: 3/12/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 533.06
Geologist/Engineer: M.A.C.
Project Number: 4700-016

	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.6
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	7.5
Top of Bentonite Seal	7.5
Bentonite Seal Thickness 2.0	
Top of Sand	9.5
Top of Screen	12.0
304 Stainless Steel Screen — Length 10 feet; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Sand Pack Thickness 3"	
Bottom of Well	22.0
Bottom of Borehole	22.0

* Describe. Measuring Point: Mark on Top of Riser Pipe

001187

5711 2632

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-13S Sh 1 of 2
Date Started 3/10/90 Completed 3/10/900 Ground Elev. 528.9
Total Depth 20.0 Ft Location RNCC Logged by M.Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	2 3 3 5	0-2	0.5	Soft, brown, clay and gravel	0 Units no odor no visual
4	02	2 3 3 4	2-4	0.5		0 Units no odor
6	03	4 6 7 10	4-6	1.2		0 Units no odor
8	04	4 14 15 10	6-8	1.3	Dense, brown, medium to coarse sand and gravels, moist to wet	0 Units no odor
10	05	5 17 27 20	8-10	1.3		7 Units no odor
12	06	11 29 28 20	10-12	1.5		7.4 Units slight odor
14	07	32 32 19 21	12-14	1.1		>1000 Units strong solvent odor product observed
16	08	11 54 56 40	14-16	1.5		>1000 Units strong solvent odor
18	09	6 12 15 20	16-18	1.2	Cobbles	>1000 Units strong solvent odor

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-13S Sh 2 of 2
Date Started 3/10/90 Completed 3/10/90 Ground Elev. 528.9
Total Depth 20.0 Ft Location RNCC Logged by M. Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
18						
	010	7 35 17 21	18-21	1.7"	Cobbles	>1000 units strong solvent odor black stain and material
20					Ground Water encountered at approximatey 14 feet.	

DRAFT

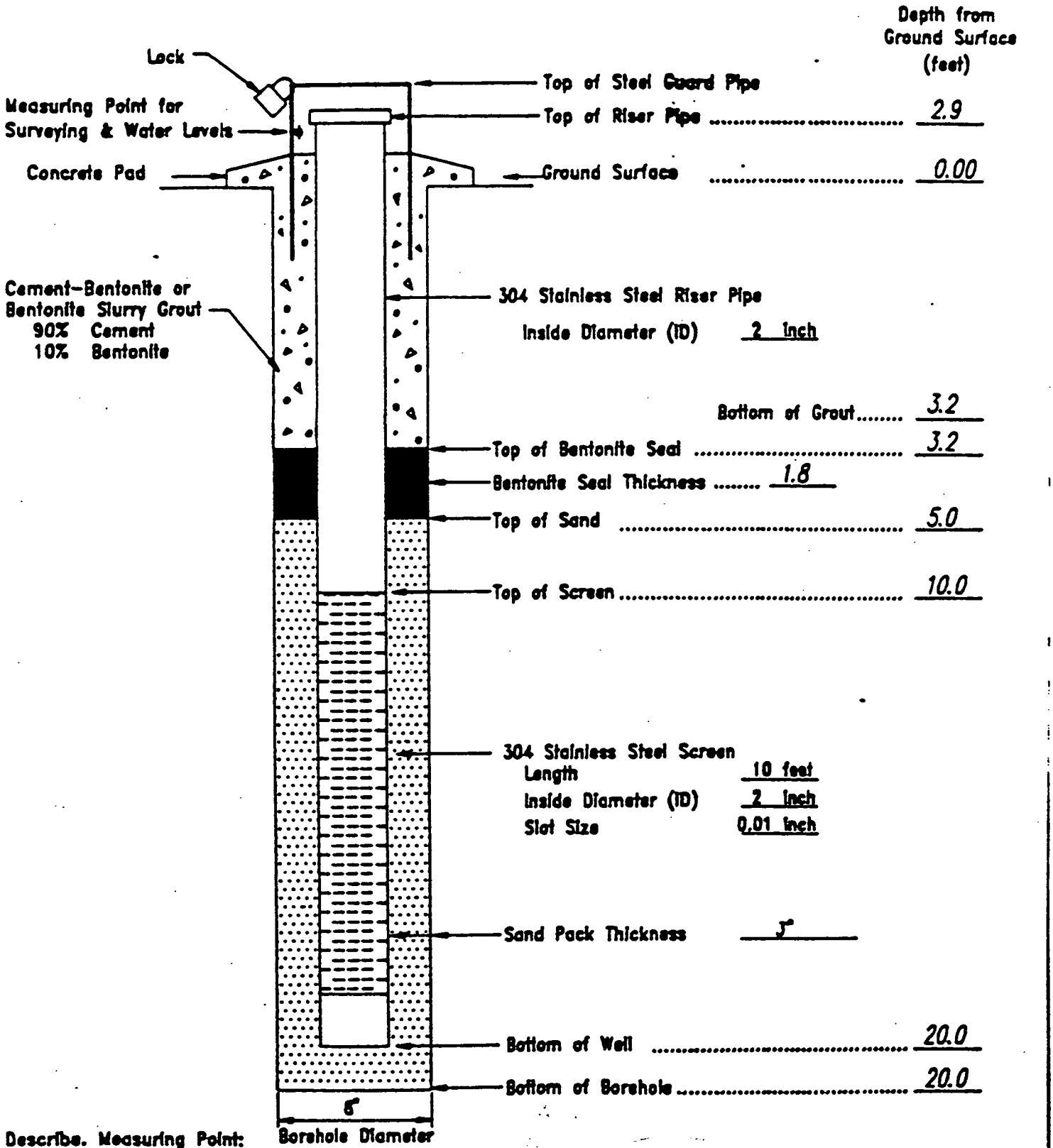
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-13S 2632
Well Location: RNCC
Date Of Installation: 3/12/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 531.89
Geologist/Engineer: B.E.M.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-14S Sh 1 of 2
Date Started 3/20/90 Completed 3/20/90 Ground Elev. 529.7
Total Depth 22.0 Ft Location Logged by J.Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	2 1 2 1	0-2	1.3	Topsoil, silty,-sand, brown Damp	0 Units no odor
4	02	4 4 6 7	2-4	0	Large cobble in spoon tip	0 Units no odor
6	03	4 8 8 8	4-6	1.8	Medium dense, brown, medium sand with some gravel and silt, moist	0.6 Units slight odor
8	04	4 5 6 8	6-8	1.5		3 Units slight odor
10	05	5 6 6 10	8-10	1.3		22 Units slight odor no visual
12	06	12 12 12 8	10-12	1.5	Dense to very dense, coarse gravels and fine sand with some silt, moist	10 Units slight odor
14	07	21 23 28 32	12-14	0.8	Very dense, brown, fine to coarse sand and coarse gravels with some silt, moist	2 Units slight odor
16	08	16 31 35 43	14-16	1.8		>1000 Units strong odor black staining
18	09	5 11 12 15	16-18	1.5		>1000 Units strong odor black staining

ENSR

DRAFT

2633

5711

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-14S Sh 2 of 2
Date Started 3/20/90 Completed 3/20/90 Ground Elev. 529.7
Total Depth 22.0 Ft Location Logged by J. Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
18						
	010	8 13 107	18-20	2.0	Sand	>1000 Units Strong odor
20						
	011	20 22 22 24	20-22	2.0	Gravel, fine, some fine to coarse sand, black staining saturated	>1000 Units Strong odor
22						
					Ground Water encountered at approximatley 15 feet	

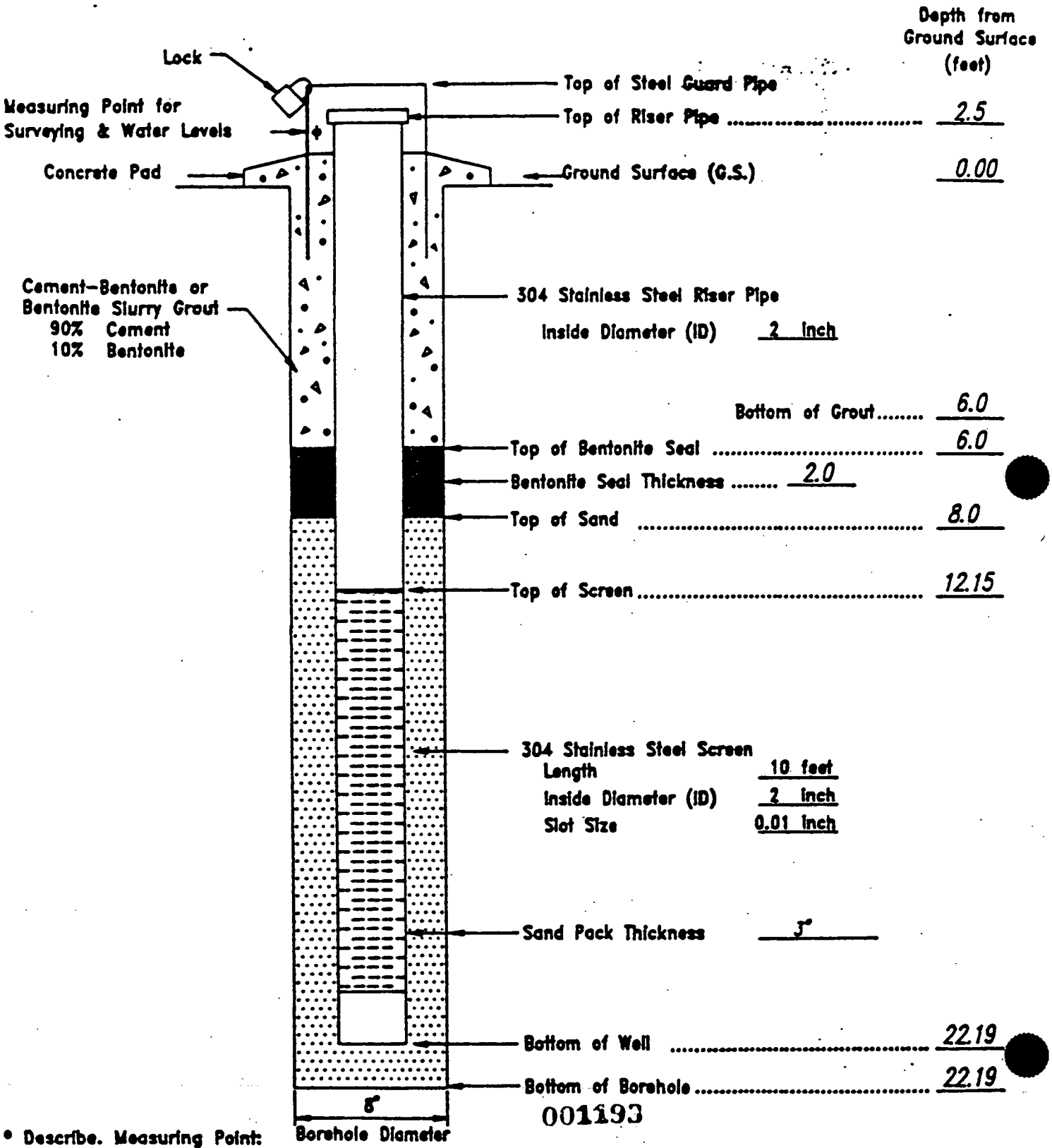
ENSR

DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-14S 2633
Well Location: Off Site
Date Of Installation: 3/20/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 532.12
Geologist/Engineer: J.S.
Project Number: 4700-016



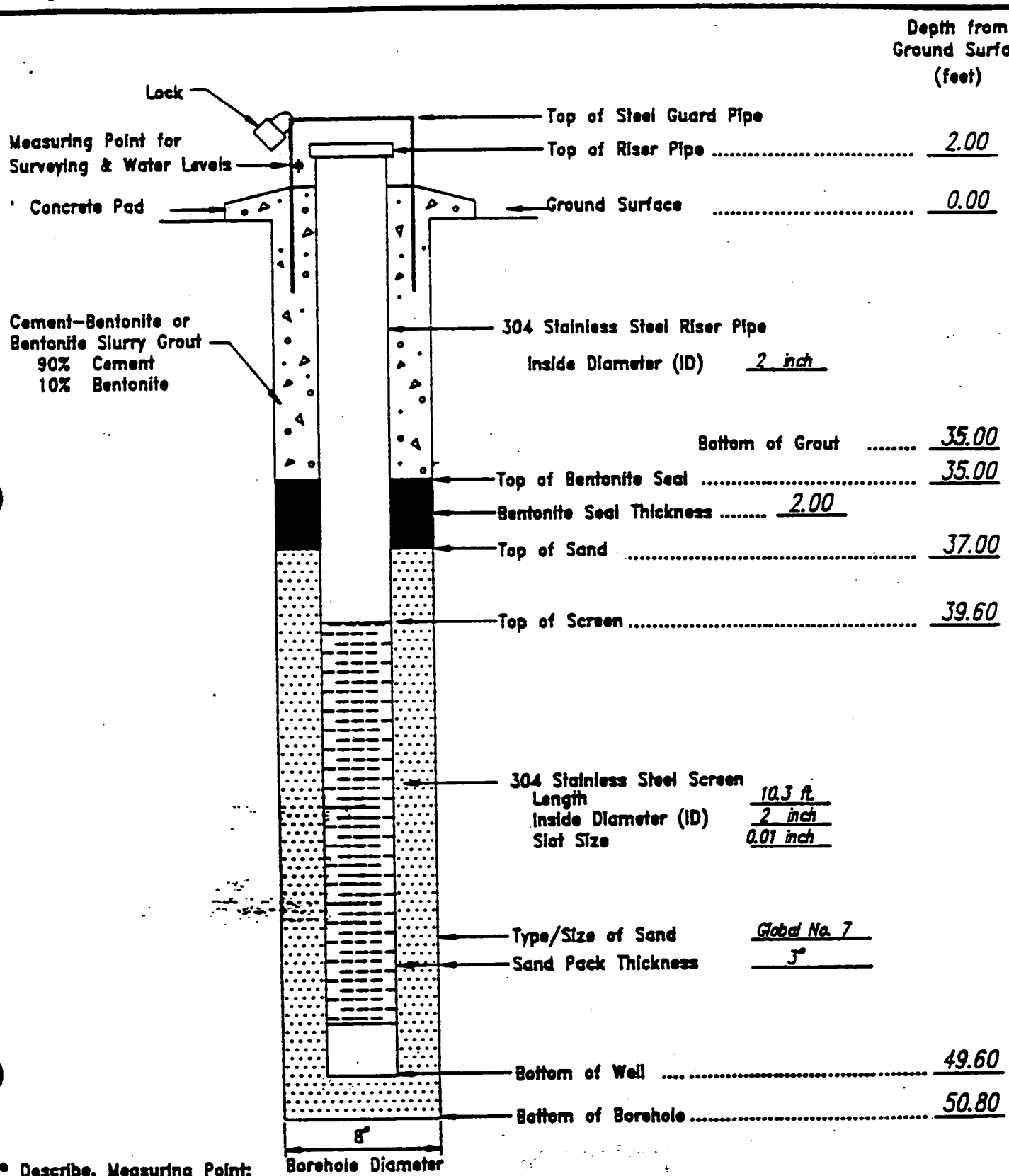
001193

• Describe. Measuring Point: Mark on Top of Riser Pipe

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-14t
Well Location: Off-Site
Date Of Installation: 12/10/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 531.84
Geologist/Engineer: B.E.M.
Project Number: 4700-062



• Describe. Measuring Point: Mark at Top of Riser

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-14I Sh 1 of 2
Date Started 12/10/90 Completed 12/10/90 Ground Elev. 529.89
Total Depth 50.0 Feet Location Off-Site Logged by BEM
Remarks See Soil Boring Log MW-14S for 0-22 Foot Interval

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	1	40	22-24	1.3	Brown-gray, dense, fine to coarse sand and fine gravel, wet	25 Units strong organic odor
24	2	60	24-26	1.7		30 Units slight organic odor
26	3	31	26-28	1.7		30 Units slight organic odor
28	4	38	30-32	1.7	Brown, dense, fine to coarse sand, silty, wet	20 Units slight organic odor
30	5	23	32-34	1.3		25 Units slight organic odor
32	6	81	32-34	1.3		20 Units slight organic odor
34	7	15	34-36	1.3	Brown, dense fine to coarse sand, trace of fine gravels, wet	15 Units slight organic odor
36	8	15	36-38	1.5		10 Units slight organic odor
38	9	15	38-40	1.7	Brown, medium dense, fine sand, wet	8 Units slight organic odor
40	10	51	40-42	1.5		0.8 Units
42						

ENSR

DRAFT

2634
5711

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-30 Sh 1 of 2
Date Started 3/09/90 Completed 3/09/90 Ground Elev. 528.9
Total Depth 22.0 Ft Location RNCC Logged by B. Miller
Remarks SB-30 completed as monitoring well MW-15S

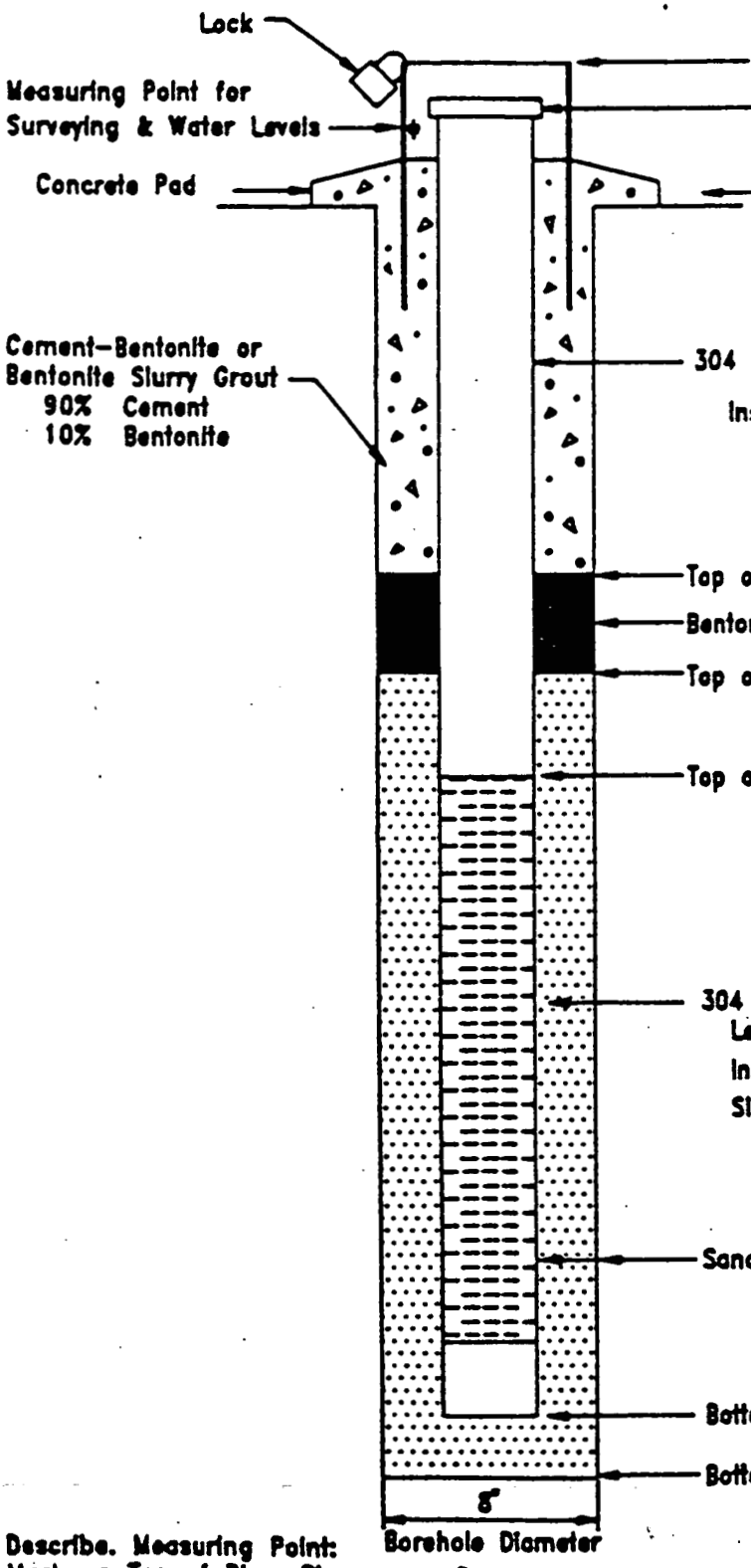
Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2		2 2 4 4	0-2	2	Soft, brown, silt with some clay, damp	0 Units no odor no visual
4		2 4 3 4	2-4	2	Soft to medium stiff, yellow-brown clay with some silt and sand, damp	0 Units no odor no visual
6		3 6 6 5	4-6	2		0 Units no odor no visual
8		3 5 5 9	6-8	2	Medium dense, yellow-brown, fine sand, trace of clay, damp	0 Units no odor no visual
10		8 10 19 19	8-10	2	Dense to very dense, brown to black, gravel with some sand, damp to wet	3 Units slight odor no visual
12		12 16 14 15	10-12	2		3 Units slight odor no visual
14		12 14 16 27	12-14	2		1 Unit slight odor no visual
16		12 14 18 30	14-16	2		5 Units slight odor no visual
18		34 54 56 39	16-18	0.5"		10 Units strong odor no visual

ENSR

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-15S 2634
Well Location: RNCC
Date Of Installation: 3/9/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 531.73
Geologist/Engineer: B.E.M.
Project Number: 4700-016



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.7
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	8.0
Top of Bentonite Seal	8.0
Bentonite Seal Thickness 2.0	
Top of Sand	10.0
Top of Screen	12.0
304 Stainless Steel Screen — Length 10 feet; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Sand Pack Thickness 3"	
Bottom of Well	22.0
Bottom of Borehole	22.0

* Describe. Measuring Point: Mark on Top of Riser Pipe

001197

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-15D Sh 1 of 4
Date Started 3/22/90 Completed 3/22/90 Ground Elev. 528.4
Total Depth 81.0 Ft Location RNCC Logged by
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
23					Running sands No sample taken	
25						
27						
29						
31						
33						
35						
37						
39						

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-15D Sh 2 of 4
Date Started 3/22/90 Completed 3/22/90 Ground Elev. 528.4
Total Depth 81.0 Ft Location RNCC Logged by M. Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
41						
		20	41-43	1.5	Gray, fine to coarse sand, some silt, trace fine to coarse gravel, wet	40 Units
43						
		140	43-45	1.8		18 Units
45						
		70	45-47	2	Greenish-brown, fine gravel trace medium to coarse gravel, some silty clay	10 Units
47						
		70	47-49	2	Gray, fine silty sand, some clay, trace fine gravel, wet	20 Units
49						
		55	49-51	2	Gray, fine to coarse sand, trace fine gravel, wet	10 Units slight odor no visual
51						
		36	51-53	2		10 Units slight odor no visual
53						
		75	53-55	2		.6 Units solvent odor no visual
55						
		53	55-57	2		1.2 Units solvent odor no visual
57						

ENSR

001199 DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-15D Sh 3 of 4
Date Started 3/22/90 Completed 3/22/90 Ground Elev. 528.4
Total Depth 81.0 Ft Location RNCC Logged by M.Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
59		52	57-59	2	Gray, fine sand, trace of clay wet	1.4 Units Slight Odor
61		52	59-61	1.8		1.8 Units Slight Odor
63		41	61-63	1.4	Gray, fine to medium sand, some fine gravel, wet	0 Units Slight Odor
65		22	63-65	.9	Gray, medium to coarse sand and fine gravel, wet	1.2 Units Slight Odor
67		32	65-67	2		2.4 Units Slight Odor
69		4	67-69	1		0 Units Slight Odor
71		115	69-71	2		10 Units Slight Odor
73		38	71-78	2		20 Units Slight Odor
75		26	73-75	1.2	Gray, medium to coarse sand soem fine gravel, wet	11 Units Slight Odor

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-15D Sh 4 of 4
Date Started 3/22/90 Completed 3/22/90 Ground Elev. 529.7
Total Depth 81.0 Ft Location RNCC Logged by M.Cousino
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
		87	75-77	2	Gray, meidum to coarse sand, wet	6.2 Units Slight Odor
77						
		91	77-79	2		1.8 Units Slight Odor
79						
		33	79-81	1.3		3.2 Units Slight Odor
81						

ENSR

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SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-18S Sh 1 of 1
Date Started 3/06/90 Completed 3/06/90 Ground Elev. 528.4
Total Depth 16.0 Ft Location Off Site Logged by J.Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	SS-1	16	0-2	1.7	Silt-sandy, fine grained, some clay, hard brown, moist	0 Units No odor
2	SS-2	9	2-4	1.5	Brown, fine sand and silt, moist	0 Units no odor
4	SS-3	36	4-6	1		4 Units no odor
6	SS-4	50	6-8	1.8		2 Units no odor
8	SS-5	70	8-10	2	Brown, fine to coarse sand with some medium gravels, trace of silt and clay	10 Units Petroleum Odor
10	SS-6	65	10-12	1.6	Gravels	10 Units Petroleum Odor
12	SS-7	80	12-14	2	Brown, fine to coarse sand, and fine gravels with trace ofsome silt and clay, wet	10 Units Petroleum Odor
14	SS-8	102	14-16	1.7		10 Units Petroleum Odor
16					Ground Water encountered at approimately 8.4 feet.	
18						

ENSR

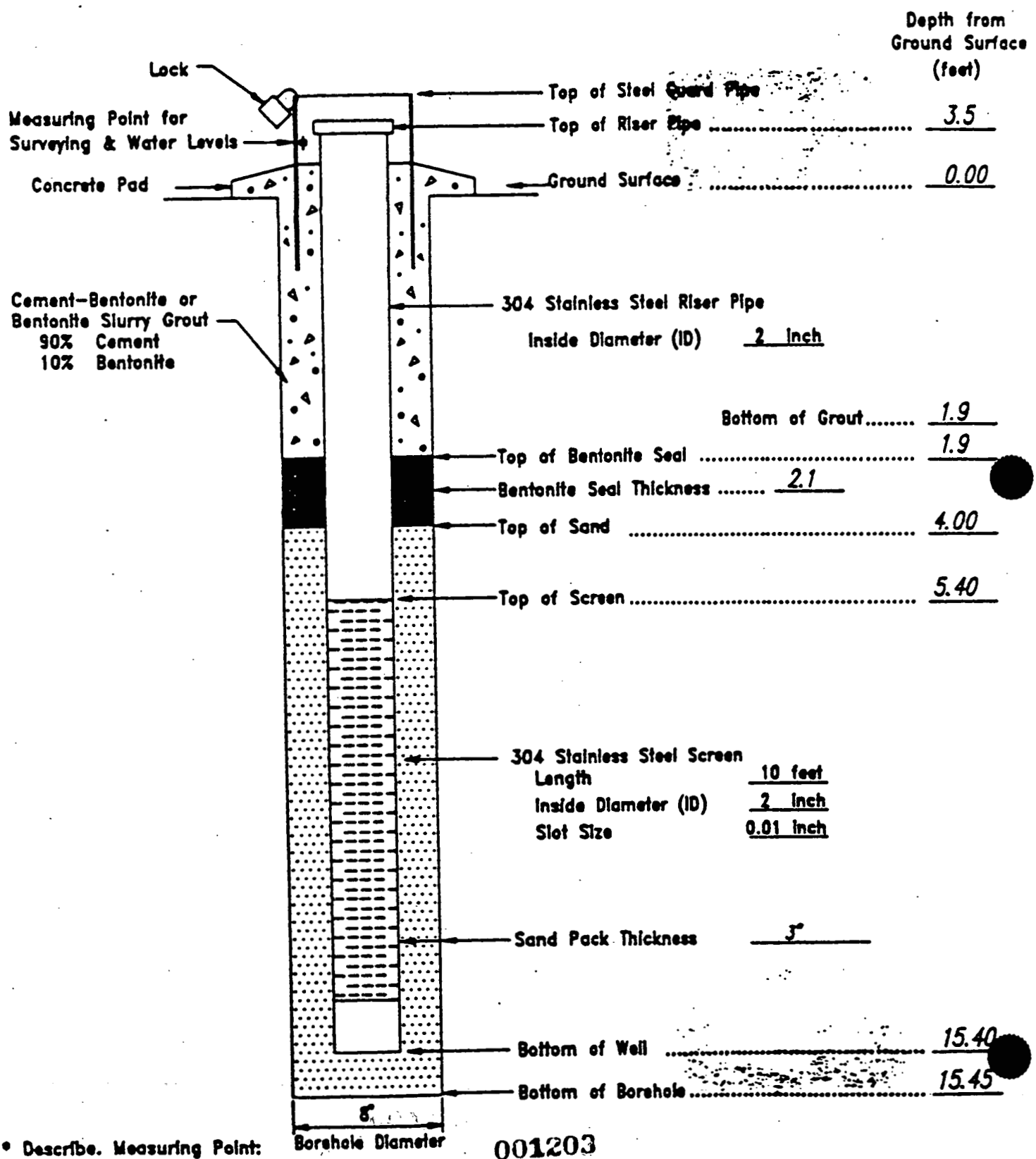
DRAFT

MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-18S 2636
Well Location: Off Site
Date Of Installation: 3/7/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 531.75
Geologist/Engineer: J.S.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

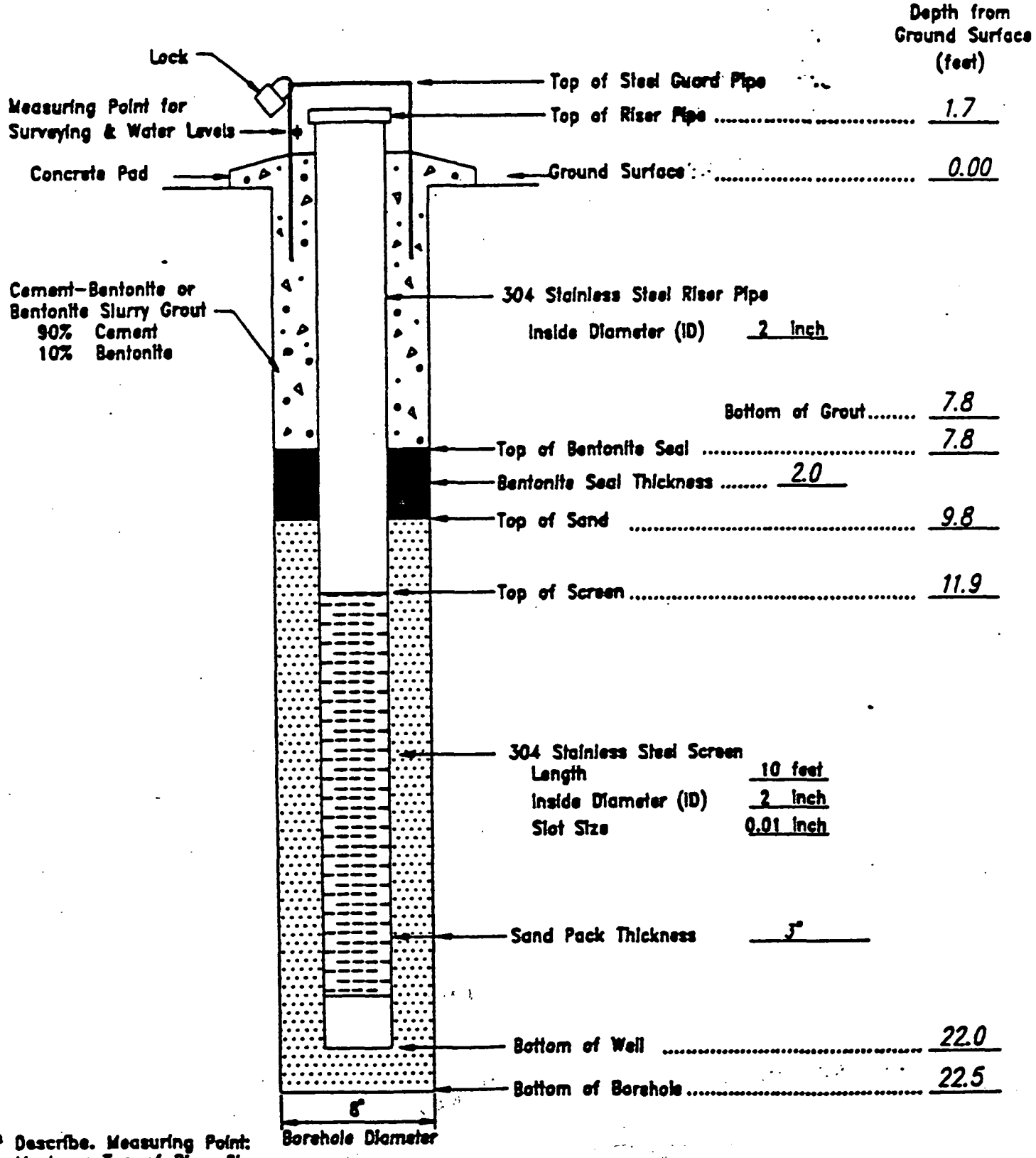
001203

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-16S 2635
Well Location: RNCC
Date Of Installation: 3/5/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 532.89
Geologist/Engineer: W.R.B.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-17 Sh 1 of 2
Date Started 3/05/90 Completed 3/05/90 Ground Elev. _____
Total Depth 22.0 Ft Location RNCC Logged by B. Berg
Remarks Soil boring SB-17 is completed as monitoring well MW-16S

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	3 4 2 4	0-2	0.5	Medium stiff, lite brown to brown clay with trace of silt and fine sand	0 Units no visual
4	02	2 2 4 5	2-4	1.5		0 Units no visual
6	03	2 4 2 4	4-6	2.0		18 Units gray stain
8	04	2 3 2 3	6-8	1.8		40 Units gray stain
10	05	2 1 1 1	8-10	2.0		480 Units gray-black stain
12	06	1 1 3 8	10-12	1.8		650 Units black stain
14	07	8 8 16 12	12-14	2.0	Dense to very dense, gray to medium gravels, and cobbles, with some clay	10 Units black stain
16	08	12 17 19 16	14-16	2.0		5 Units black tarry stain
18	09	27 46 91/5"	16-18			no recovery
20	10		18-20	0	Clay content decreasing	4 units black stain

ENSR

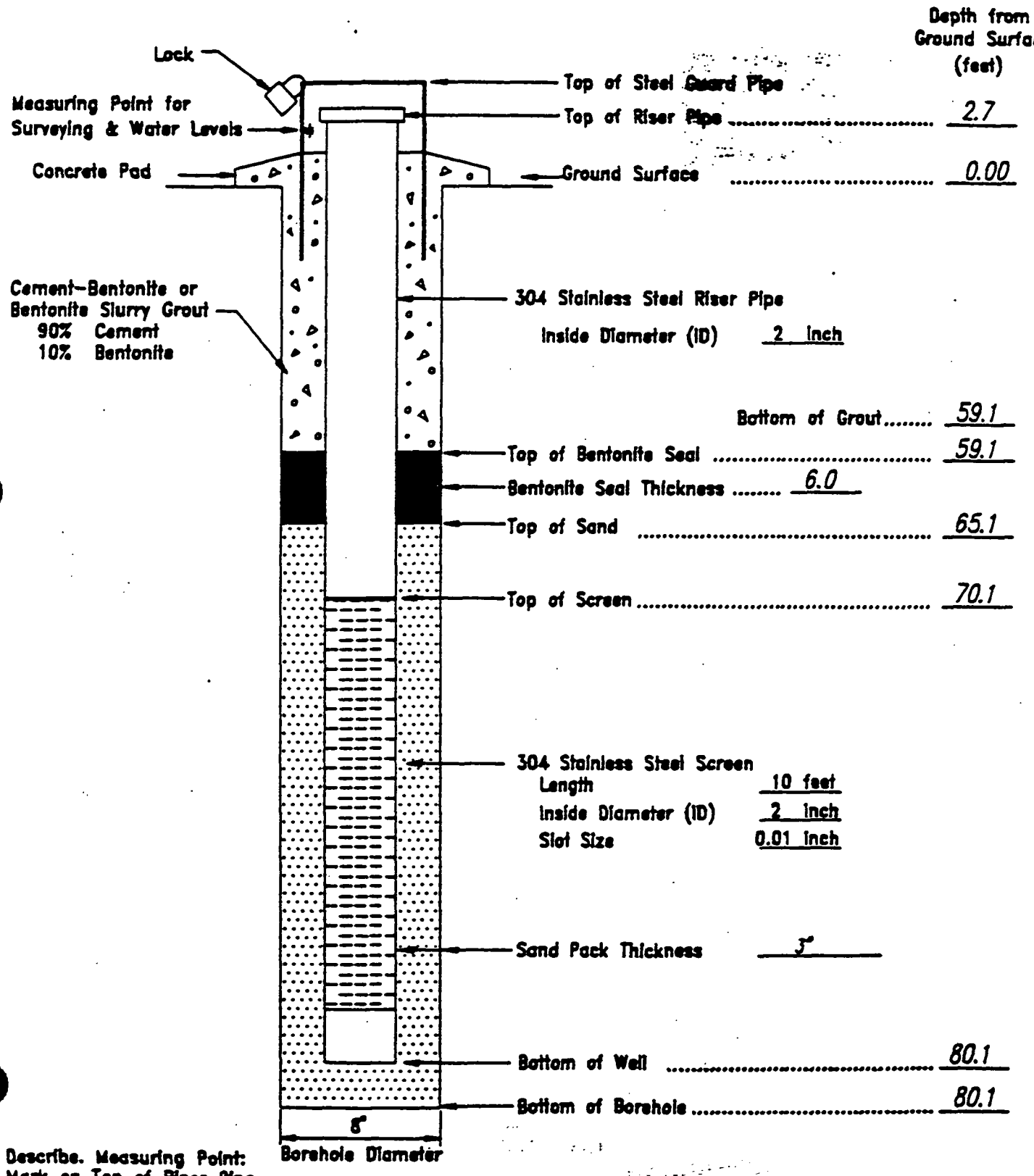
DRAFT

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

3635711

Well Identification: MW-15D
Well Location: RNCC
Date Of Installation: 3/24/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 530.96
Geologist/Engineer: J.S.
Project Number: 4700-016



* Describe. Measuring Point: Mark on Top of Riser Pipe

3636

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-18D Sh 1 of
Date Started 3/08/90 Completed Ground Elev. 528.3
Total Depth 79.0 Ft Location Off Site Logged by J.Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
					Logged previously at MW-18S	
16						
18	SS-1	67	16-18	1.8	Brown, medium to coarse gravel and fine to coarse sand, some silt and clay, wet	3 Units Petroleum Odor
20	SS-2	65	18-20	1.6	Brown to gray, fine to coarse sand some medium gravl , silt trace of clay	30 Units no odor
21	SS-3	44	20-22	1.6		.6 Units no odor
23	SS-4	12	21-23	0		.8 Units no odor
25	SS-5	42	23-25	1.8		.4 Units no odor
27	SS-6	40	27-28	2	Brown, fine to coarse sand, some silt and clay, trace of fine gravel, moist to wet	1.2 Units no odor
29	SS-7	43	28-29	2		2.2 Units no odor

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-18D Sh 2 of 4
Date Started 3/08/90 Completed _____ Ground Elev. 528.3
Total Depth 79.0 Ft Location _____ Logged by J.Starkes
Remarks _____

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
31	SS-8	60	29-31	2	Brown, fine to medium sand, some fine gravel, some silt wet	2.2 Units
	SS-9	75	31-33	1.8		3.8 Units
33					Reddish-Brown, sand, fine to coarse, some silt, trace of clay, wet	
	SS-10	-	33-35	2		2 Units
35						
	SS-11	50	35-37	1.8		0 Units
37						
	SS-12	50	37-39	2	Brown, fine to medium sand, trace medium gravel, wet	0 Units
39						
	SS-13	50	39-41	1.3	Brown, medium to coarse sand trace of fine gravel, trace of silt wet	0 Units
41						
	SS-14	65	41-43	1.9		0 Units
43						
	SS-15	35	43-45	1		0 Units
45						
	SS-16	50	45-47	1.7		0 Units
47						

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-18D Sh 3 of
Date Started 3/08/90 Completed Ground Elev. 528.3
Total Depth 79.0 Ft Location Logged by J.Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
49	SS-17	24	47-49	1.7	Brown, fine to coarse sand, trace of fine gravel and silt, wet	0 Units
51	SS-18	62	49-51	1.7		0 Units
	SS-19	45	51-53	1.7	Brown, fine to coarse gravel, moist	0 Units
53					Brown, fine to coarse sand some silt, trace of clay, wet	
55	SS-20	50	53-55	1.7		0 Units
	SS-21	46	55-57	1.6		0 Units
57					Brown, fine to medium gravel, some medium sand, wet	
	SS-22	50	57-59	1.8		0 Units
59					Brown, fine to coarse sand, some gravel, trace of silt and clay, wet	
	SS-23	74	59-61	1.6		0 Units
61						
	SS-24	85	61-63	1.7		3 Units Slight odor
63						
	SS-25	85	63-65	1.7		3 Units
65						

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-18D Sh 4 of 4
Date Started 3/08/90 Completed _____ Ground Elev. 528.3
Total Depth 79.0 Ft Location Off Site Logged by J.Starkes
Remarks _____

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
67	SS-26	70	65-67	2		3.2 Units
69	SS-27	50	67-69	1.8		0 Units
71	SS-28	60	69-71	1.7		0 Units
73	SS-29	80	71-73	1.8		3.6 Units
75	SS-30	60	73-75	1.6	Brown and gray, fine to coarse sand, some fine to medium gravel, some silt & clay, wet	0 Units
77	SS-31	0	75-77	0	Brown to gray, very fine sand and silt, some clay	0 Units
79	SS-32	50	77-79	1.4	Sand, medium to coarse trace fine gravel, trace silt	1 Units

ENSR

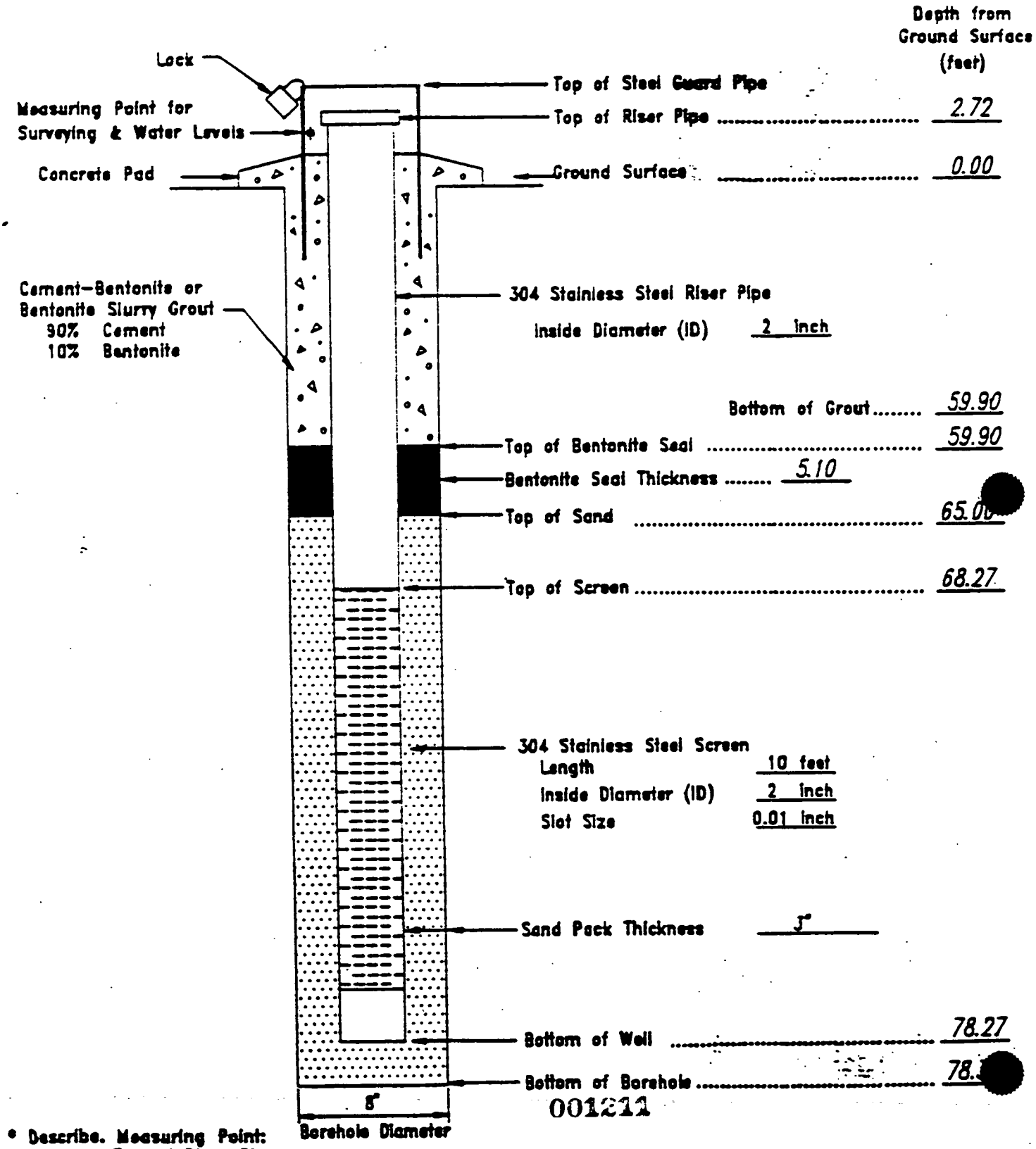
DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

3636

Well Identification: MW-18D
Well Location: Off Site
Date Of Installation: 3/10/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 531.08
Geologist/Engineer: J.S.
Project Number: 4700-016



001211

• Describe. Measuring Point: Mark on Top of Riser Pipe

2638

571

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-20S Sh 1 of 1
Date Started 2/21/90 Completed 2/21/90 Ground Elev. 518.8
Total Depth 16.0 Ft Location Logged by B.BERG
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
		2 5 8 2	0-2	1	Top soil, soft, brown	0 Units No odor no visual
2		8 13 23 20	2-4	2	Stiff, brown, clay	0 Units No odor no visual
4		2 3 5 8	4-6	2		0 Units No odor no visual
6		4 9 24 25	6-8	2	Sandy	0 Units No odor no visual
8		10 24 35 60	8-10	1		0 Units No odor no visual
10			10-12	-	Dense to very dense, medium to coarse sand and fine to mediuum gravel, wet	No recovery
12			12-14	1		0 Units No odor no visual
14		5 10 23 18	14-16	2		0 Units No odor no visual
16					Ground Water encountered at approximately 7.5 feet.	

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-20S 2638
Well Location: Off Site
Date Of Installation: 2/21/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 521.65
Geologist/Engineer: W.R.B.
Project Number: 4700-016

	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	3.0
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	2.0
Top of Bentonite Seal	2.0
Bentonite Seal Thickness 1.9	
Top of Sand	3.90
Top of Screen	4.90
304 Stainless Steel Screen — Length 10 feet; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Sand Pack Thickness 3"	
Bottom of Well	15.15
Bottom of Borehole	15.15

* Describe. Measuring Point: Mark on Top of Riser Pipe

001213

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-19S Sh 1 of 1
Date Started 2/26/90 Completed 2/26/90 Ground Elev. 519.0
Total Depth 16.0 Ft Location OFF SITE Logged by B. Berg
Remarks

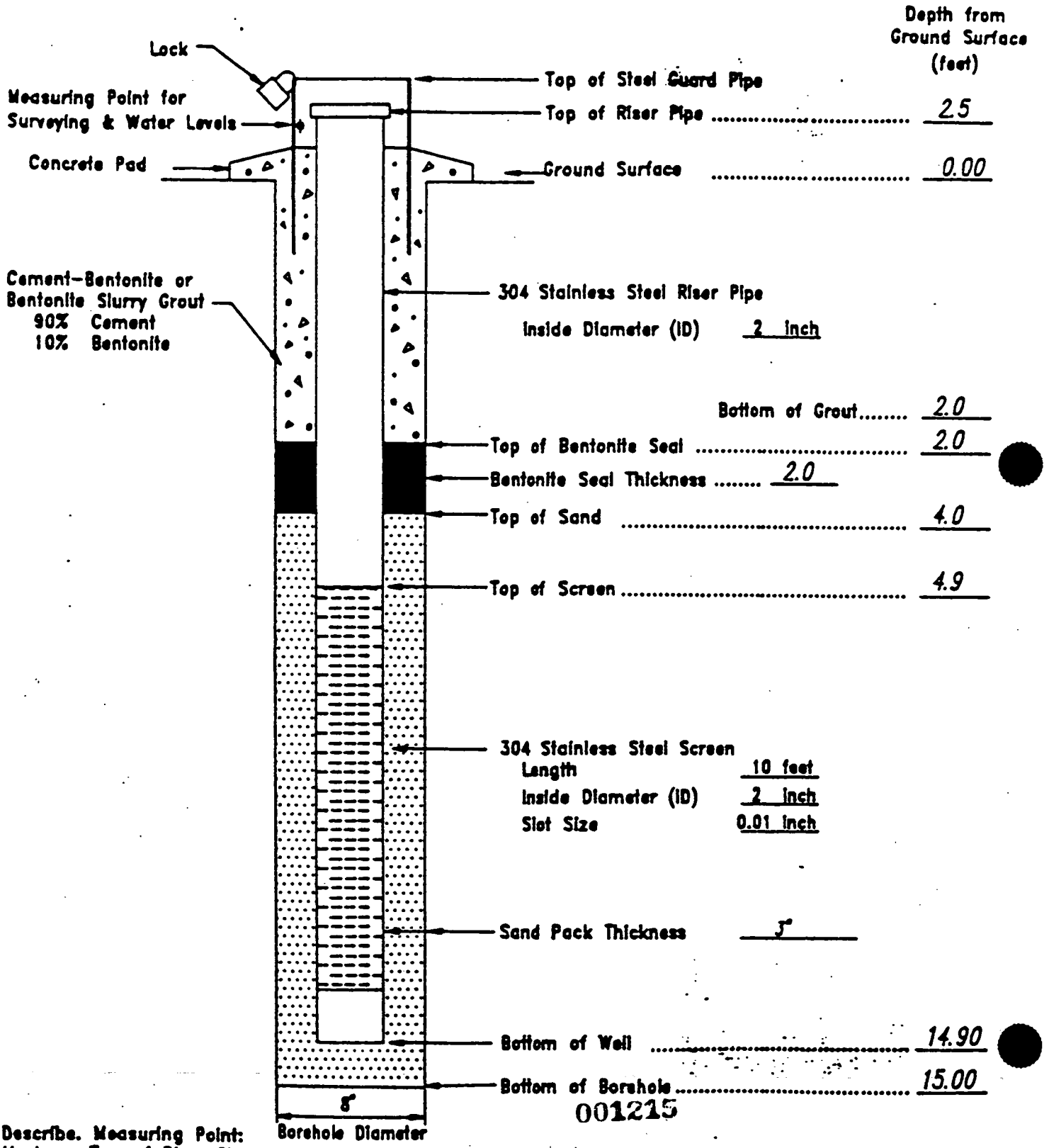
Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2		2 6 6 5	0-2	.5	Topsoil, soft, dark brown moist	0 Units no odor no visual
4		6 10 21 23	2-4	.7	Medium stiff to stiff, brown clay	0 Units no odor no visual
6		4 6 9 9	4-6	.7		0 Units no odor no visual
8		5 5 9 10	6-8	1		0 Units no odor no visual
10		1 1 2 4	8-10	1	Loose to dense, brown, fine to medium sand and fine gravels, wet	0 Units no odor no visual
12		3 6 13 15	10-12	2		0 Units no odor no visual
14		13 18 15 22	12-14	2		0 Units no odor no visual
16		12 16 16 22	14-16	2		0 Units no odor no visual
					Ground Water encountered at approximately 7.5 feet	

ENSR

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-19S 2637
Well Location: Off Site
Date Of Installation: 2/26/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 522.20
Geologist/Engineer: W.R.B.
Project Number: 4700-016



001215

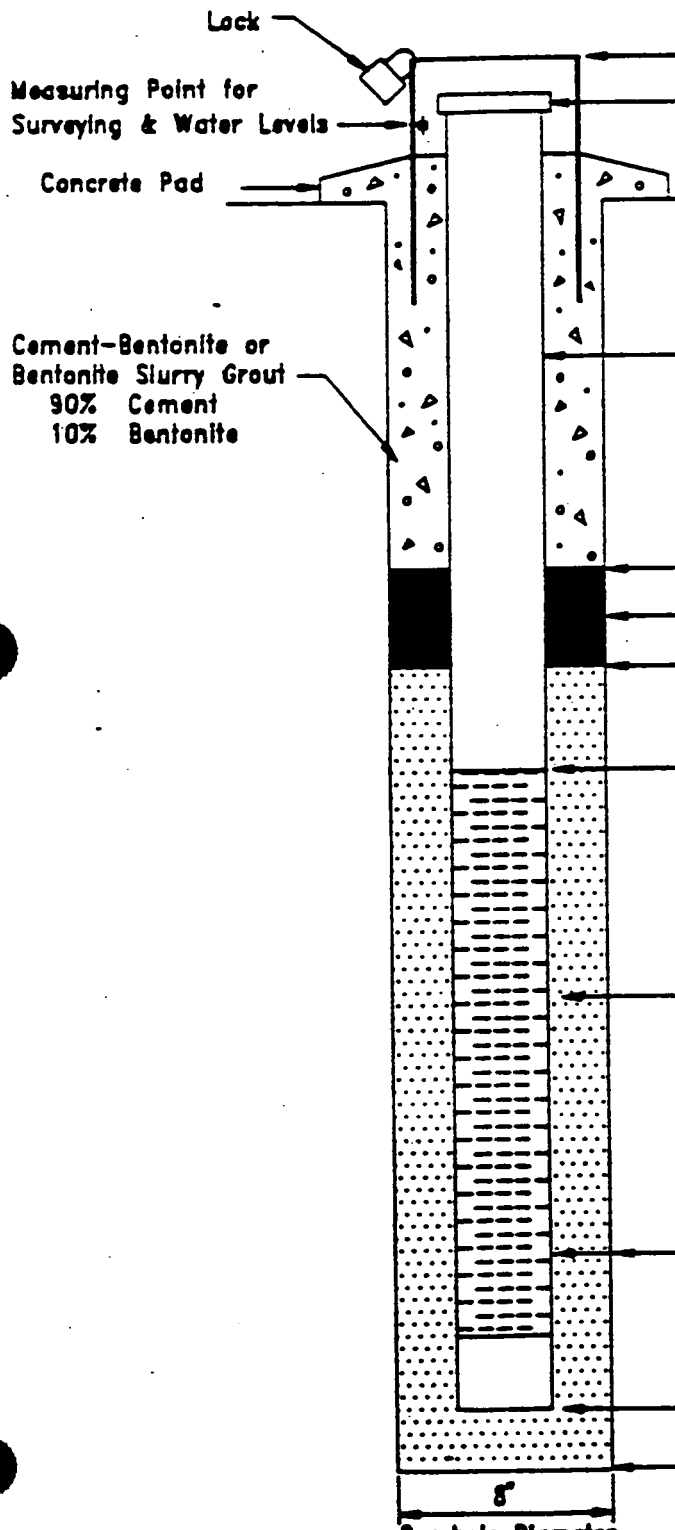
* Describe. Measuring Point: Mark on Top of Riser Pipe

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

3638

Well Identification: MW-20D
Well Location: Off Site
Date Of Installation: 2/26/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 521.31
Geologist/Engineer: J.S.
Project Number: 4700-016



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.35
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	64.25
Top of Bentonite Seal	64.25
Bentonite Seal Thickness 4.75	
Top of Sand	69.00
Top of Screen	72.22
304 Stainless Steel Screen — Length 10 feet; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Sand Pack Thickness 3"	
Bottom of Well	82.22
Bottom of Borehole	82.47

• Describe. Measuring Point: Mark on Top of Riser Pipe

001216

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-015 Site PRRS BORING MW-20D Sh 1 of 4
Date Started 2/23/90 Completed 2/24/90 Ground Elev. 518.9
Total Depth 80.5 Ft Location Logged by M.Ferlin
Remarks See MW-20S Log for lithology above 16 ft.

Depth Feet	Sample: Split Spoon #	Blows Per 24"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
16	1	50	16-18		Sand, fine to medium, some silt trace gravel, brown wet	0 Units No odor
18	2	45	18-20		Gravel, medium some sand and silt, brown saturated	0 Units No Odor
20	3	47	20-22	1	- some clay	0 Units No odor
22	4	49	22-24	1.3		0 Units No odor
24	5	51	24-26	1.2	Sand, coarse, and gravel trace clay	0 Units No odor
26	6		26-28	0		No recovery
28	7		30-31.5	0.3	Gravel and sand, brown and gray	0 Units No odor
30	8				Some clay	0 Units No odor
32						

001217

ENSR

DRAFT

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-20D Sh 2 of 4
Date Started 2/23/90 Completed 2/24/90 Ground Elev. 518.9
Total Depth 80.5 Ft Location Logged by M.Ferlin
Remarks See MW-20S Log for lithology above 16 ft.

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
32	9	56	31.5-33.5	.7		0 Units No odor
33	10	76	33.5-35.5	1.3	Sand, medium to coarse, and gravel some clay, trace cobbles, gray	0 Units No odor
35	11		35.5 - 37.5	.7		0 Units No odor
37			37.5-40	0	No recovery, drilled through sample	No Recovery
39	12		40-42	1.3	Sand, fine, some gravel, gray saturated	0 Units No odor
41	13	75	42-44	1.6		0 Units No odor
43	14	45	44-46	1	Sand, medium to coarse, and gravel, some silt, trace cobbles, brown	0 Units No odor
45	15	85	46-48	1.6		
46						
49						

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-20D Sh 3 of 4
Date Started 2/23/90 Completed 2/24/90 Ground Elev. 518.9
Total Depth 80.5 Ft Location Logged by M.Ferlin
Remarks See MW-20S Log for lithology above 16 ft.

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
48	16		48-50	1.5		0 Units No odor
50	17	20	50-52	.5	Sand, medium to coarse, some fine gravel, gray	0 Units No odor
52	18	80	52-54	1.5	Trace clay	0 Units No odor
54	19	67	54-56	1.5		No Recovery
56	20	55	56-58	1.5	Sand, fine to medium, trace clay, gray	0 Units No odor
58			58-60		No recovery, drilled through sample	
60	21	50	60-62	1.5	Sand, fine to medium some gravel, gray	0.8 Units No odor
62	22	120	62-64	1.5	Sand, medium to coarse, some gravel, fine, gray	0.6 Units No odor
64						

ENSR

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SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-20D Sh 4 of 4
Date Started 2/23/90 Completed 2/24/90 Ground Elev. 518.9
Total Depth 80.5 Ft Location Logged by M.Ferlin
Remarks See MW-20S Log for lithology above 16 ft.

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
64	23	75	64-65	1.4		0.2 Units No odor
66	24	70	66-68	1		0 Units No odor
68	25	45	68-70	1.3		2.5 Units No odor
70	6	25	70-72	1.3		1.0 Units No odor
72	27	100	72-74	1.5		0 Units No odor
74	28	75	74-76	1.3	Sand, coarse, and gravel, fine gray	0 Units Natural Gas odor
76	29	100	76-78	1.3		0 Units No odor
78	30	80	78-80	1.5		Equipment Malfunction
79						
80						

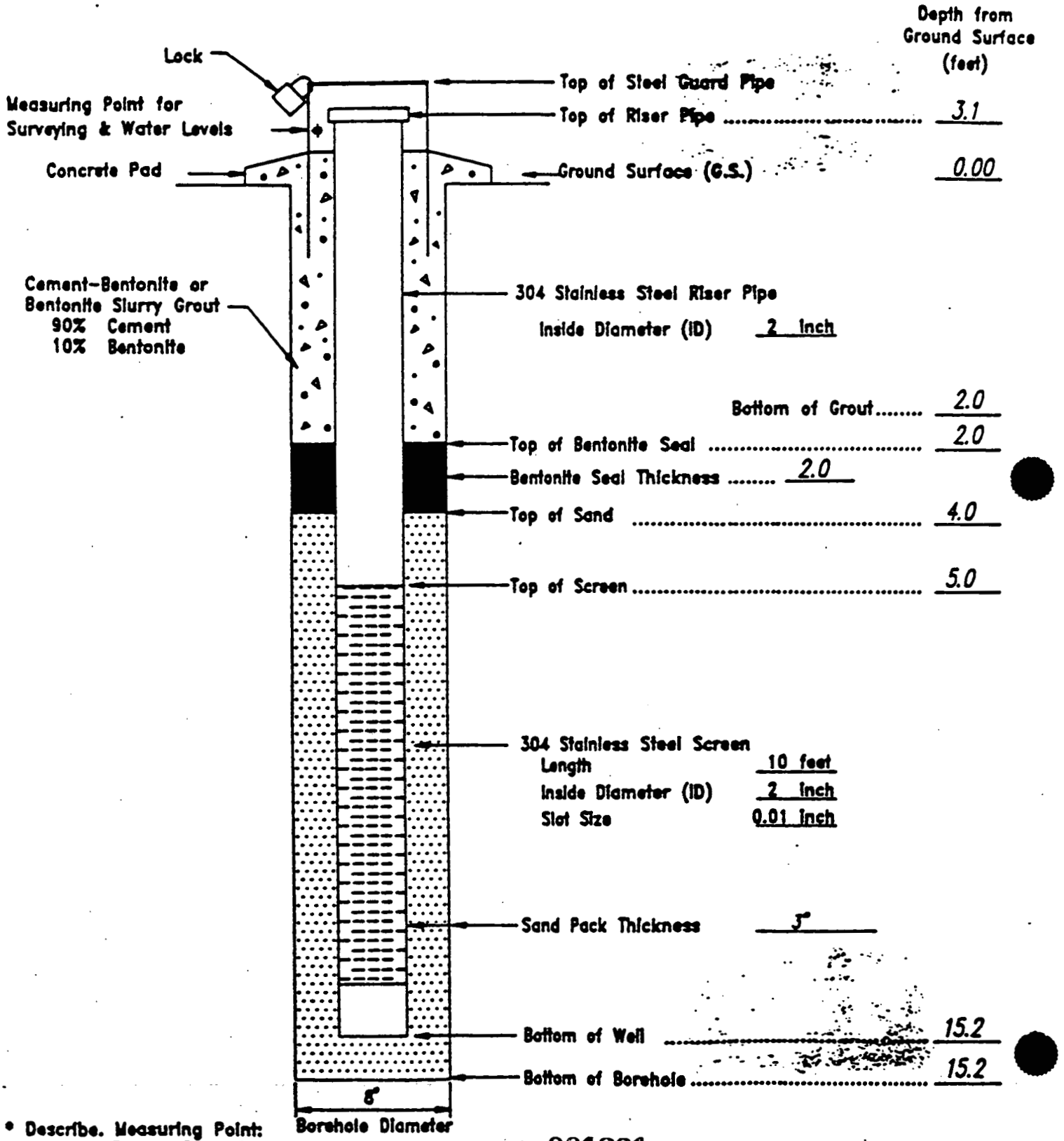
DRAFT

2637

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-21S 2639
Well Location: Off Site
Date Of Installation: 3/14/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 521.90
Geologist/Engineer: W.R.B.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

001221

2651

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

5711

Project 4700-016 Site PRRS BORING MW-21S Sh 1 of 1
Date Started 2/26/90 Completed 2/28/90 Ground Elev. 518.7
Total Depth 16.0 Ft Location Off-Site Logged by B.BERG
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
		2 4 9 11	0-2	.75	Top soil, clayey, stiff brown	0 Units No odor
2		6 12 15 17	2-4	.75	Soft-to stiff, brown to green-gray, clay	0 Units No odor no visual
4		7 11 17 17	4-6	1		0 Units No odor no visual
6		4 3 4 5	6-8	1		0 Units No odor no visual
8		2 1 1 2	8-10	2		0 Units No odor
10		9 17 22 19	10-12	2		200 Units Strong odor dark stain at 11 feet
12		9 11 17 21	12-14	1.7	Dense, brown, medium to coarse sand, and fine gravels, wet	100 Units Strong odor dark stain
14		21 39 17 18	14-16	1.7		300 Units Strong odor dark stain
16					Ground Water encountered at approximatley 9 feet.	

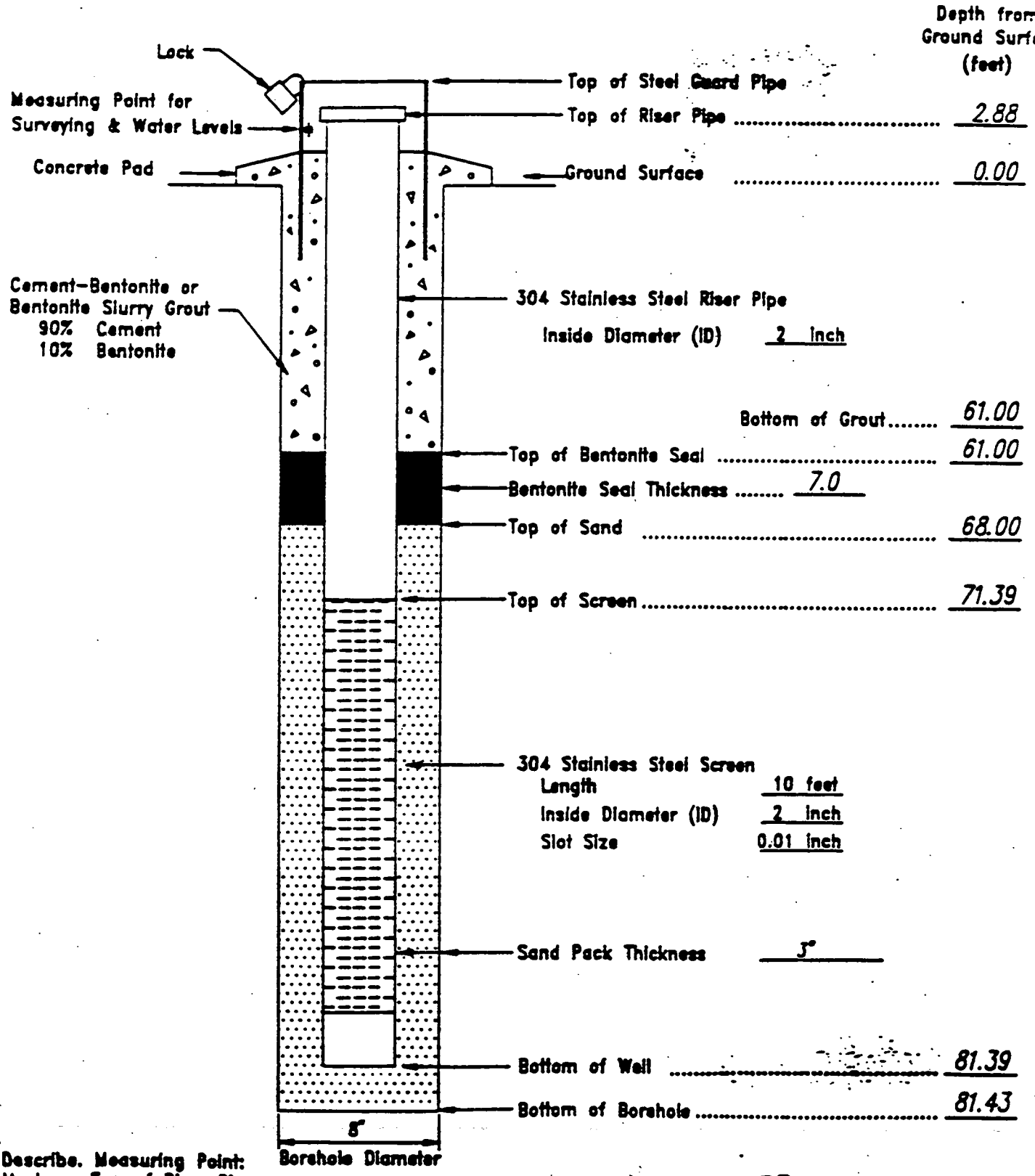
DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

3639

Well Identification: MW-210
Well Location: Off Site
Date Of Installation: 3/14/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 521.00
Geologist/Engineer: J.S.
Project Number: 4700-016



• Describe. Measuring Point: Mark on Top of Riser Pipe

001223

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-21D Sh 1 of 4
Date Started 3/13/90 Completed 3/14/90 Ground Elev. 518.5
Total Depth 80.0 Ft Location Logged by J. Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Blows Per 24"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
16–17	1	20	16-18	1.5	Sand, medium to coarse some clay and silt, greenish -brown, black staining	100 Units Slight Odor
18–19	2	36	18-20	0.7		20 Units Slight odor
20–21	3	25/1"	20-21	1.0	Sand, fine to medium, some fine gravel, some clay, greenish-brown, some black staining wet.	70 Units
22–23	4	50	21-23	2.0		56 Units Slight odor
24–25	5	59	23-25	1.7		3 Units No odor
26–27	6	29	25-27	1.1		7 Units No odor
28–29	7	65	27-29	1.7	Sand, fine, trace coarse, some clay, trace medium gravel, trace silt, brown, wet	26 Units slight odor
30–31	8	65	29-31	2.0		4 Units

DRAFT

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-21D Sh 2 of 4
Date Started 3/13/90 Completed 3/14/90 Ground Elev. 518.5
Total Depth 80.0 Ft Location Logged by J. Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
31	9	100	31-33	2	Sand, fine to coarse, trace fine gravel, some silty brown, wet	25 Units
33	10	90	33-35	2		12 Units
35	11	80	35-37	2		18 Units
37	12	73	37-39	1.7	Sand, fine to medium, some clay, some gravel, trace silt, gray, wet	40 Units Strong Odor
39	13	70	39-41	1.7		20 Units Slight odor
41	14	65	41-43	2		9 Units No odor
43	15	90	43-45	2		40 Units Slight odor
45	16	81	45-47	2		18 Units Slight odor
47						

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-21D Sh 3 of 4
Date Started 3/13/90 Completed 3/14/90 Ground Elev. 518.5
Total Depth 80.0 Ft Location Logged by J. Starkes
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
47	17	100	47-49	2		7 Units
49	18	39	49-51	1.5	Gravel, fine, some sand, fine to coarse, gray to brown, wet	18 Units Slight odor
51	19	89	51-53	2	Sand, fine to medium, some Gravel, medium, some clay, trace silt, brown to gray wet	3 Units slight odor
53	20	76	53-55	2		3 Units Slight odor
55	21	60	55-57	1.8		1 Unit slight odor
57	22	64	57-59	1.9		2 Units slight odor
59	23	41	59-61	1.7	Sand, fine, some silt, gray moist	1 Unit
61	24	75	61-63	1.5		2 Units
63						

DRAFT

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-21D Sh 4 of 4
ate Started 3/13/90 Completed 3/14/90 Ground Elev. 518.5
otal Depth 80.0 Ft Location Logged by J. Starkes
emarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 24"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
63	25	75	63-65	1.7		18 Units
65	26	68	65-67	1.5		18 Units
67	27	60	67-69	2	Gravel, fine to coarse, some sand, fine to coarse, brownish-gray, wet	3 Units
69	28	60	69-71	1.6	Sand, fine, some silt, trace clay, brownish-gray, moist to wet	2 Units
71	29	60	71-73	1.8		10 Units
73	30	75	73-75	1.7	Gravel, fine some sand, fine to medium, some clay, brownish-gray, wet	14 Units
75	31	80	75-77	1.6	Sand, coarse, some gravel, fine to medium, trace clay, brownish-gray, moist to wet	8 Units
77	32	65	77-79	1.5		6 Units
79	33	35/1'	79-80	0.8		4 Units
80						

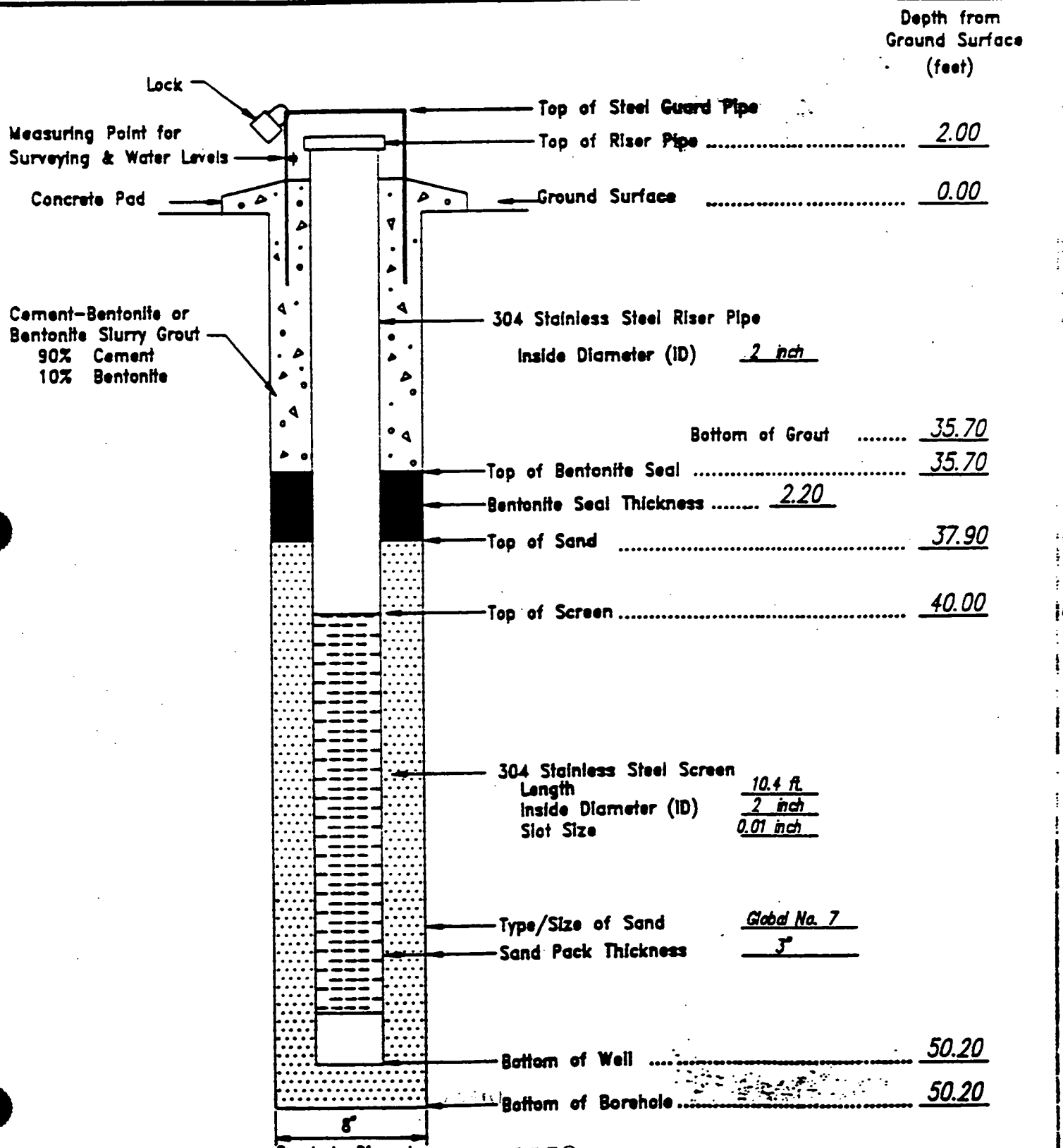
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

6639

5711

Well Identification: MW-211
Well Location: Off-Site
Date Of Installation: 12/10/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 520.45
Geologist/Engineer: M.A.F.
Project Number: 4700-062



* Describe. Measuring Point:

001228

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-21I Sh 1 of 1
Date Started 12/18/90 Completed 12/10/90 Ground Elev. 513.55
Total Depth 50 Feet Location Off-Site Logged by
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 2 ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units)
					See Soil Boring Logs From MW-21S and MW-21D For Geologic Record at Location MW-21I	

ENSR

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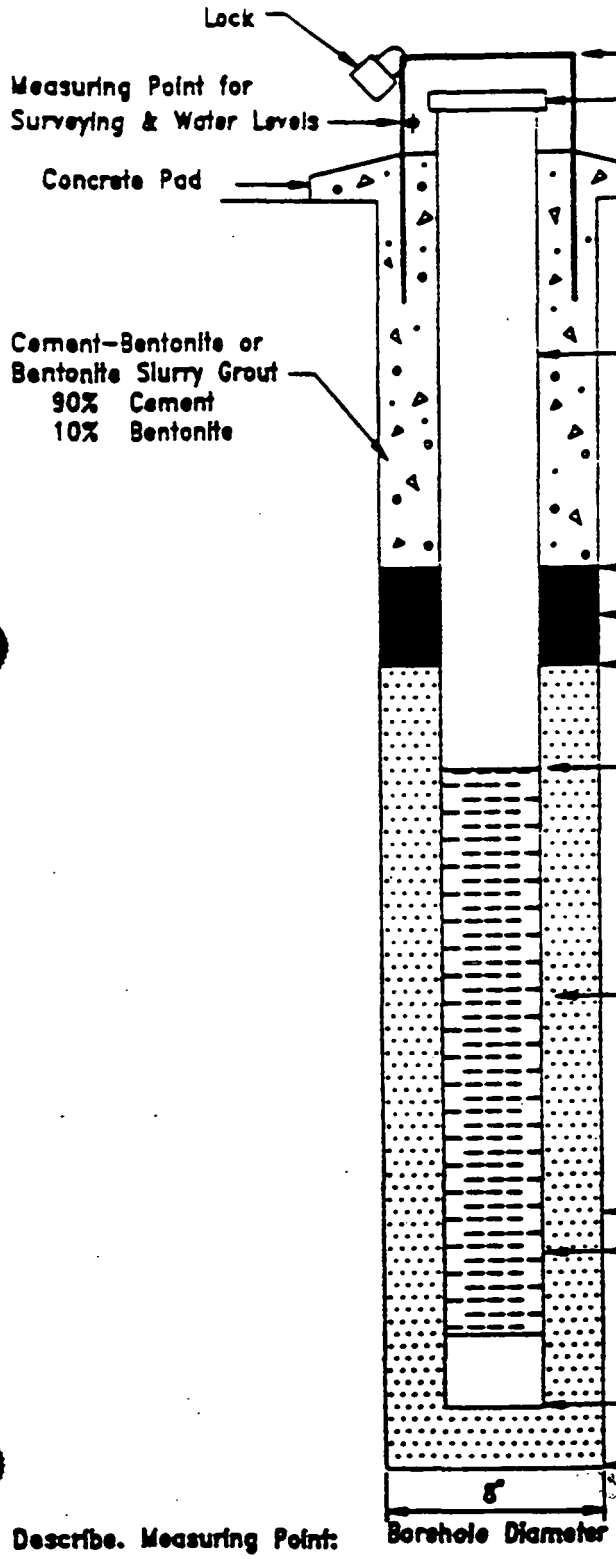
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

6639

5711

Well Identification: MW-211
Well Location: Off-Site
Date Of Installation: 12/10/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 520.45
Geologist/Engineer: M.A.F.
Project Number: 4700-062



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.00
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	35.70
Top of Bentonite Seal	35.70
Bentonite Seal Thickness 2.20	
Top of Sand	37.90
Top of Screen	40.00
304 Stainless Steel Screen — Length 10.4 ft; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Type/Size of Sand: Global No. 7	
Sand Pack Thickness: 3"	
Bottom of Well	50.20
Bottom of Borehole	50.20

• Describe. Measuring Point:

001230

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-21I Sh 1 of 1
Date Started 12/18/90 Completed 12/10/90 Ground Elev. 518.55
Total Depth 50 Feet Location Off-Site Logged by
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 2 ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units
					See Soil Boring Logs From MW-21S and MW-21D For Geologic Record at Location MW-21I	

NSR

001231

DRAFT

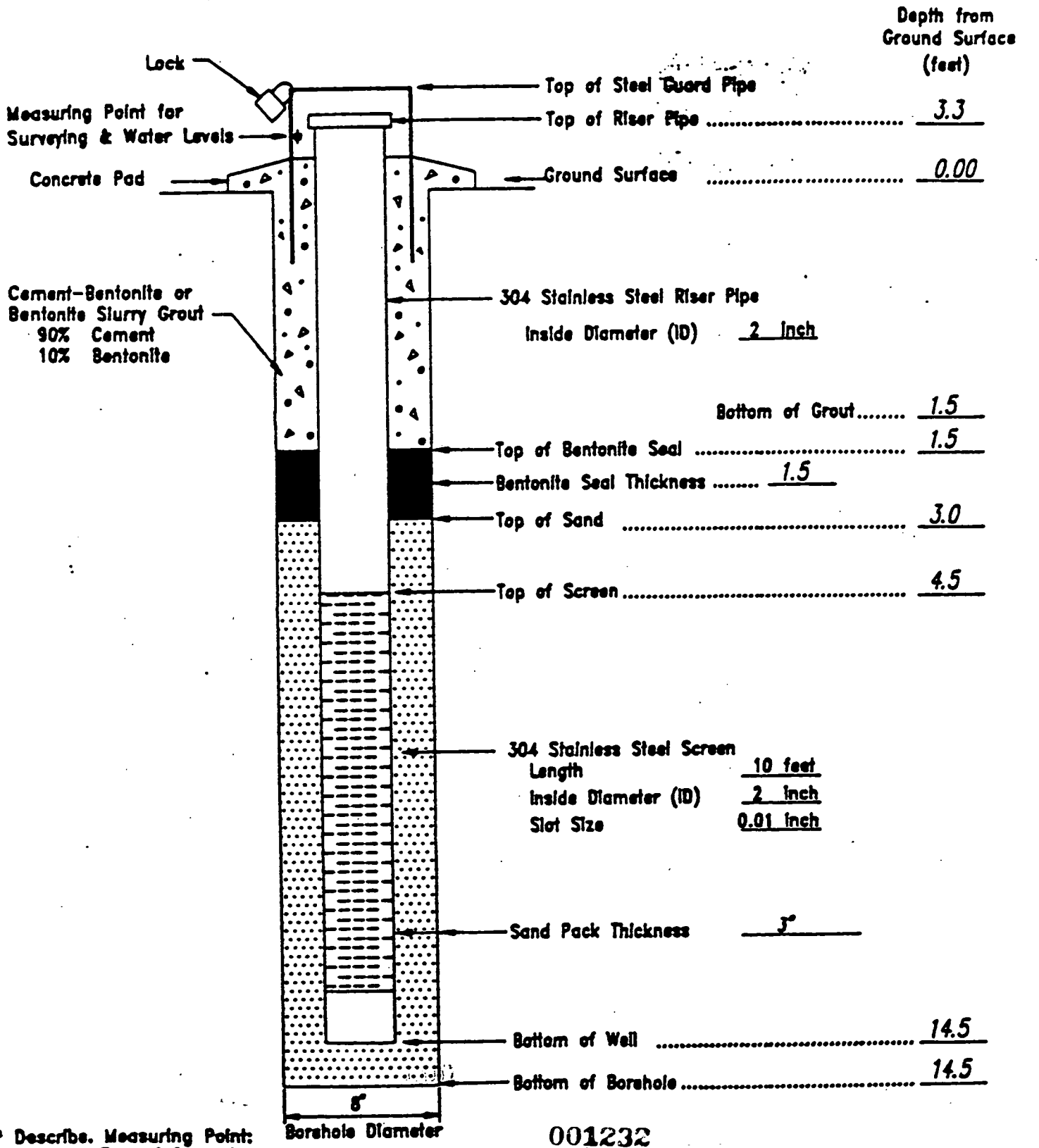
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-22S 2640
Well Location: Off Site
Date Of Installation: 3/14/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 520.41
Geologist/Engineer: M.A.F.
Project Number: 4700-016



* Describe. Measuring Point: Mark on Top of Riser Pipe

001232

2670

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-22S Sh 1 of 1
ate Started 3/14/90 Completed 3/14/90 Ground Elev. 517.0
Total Depth 14.0 Ft Location OA-SITE Logged by M.Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	1 1 2 3	0-2	0.3		0 Units No odor no visual
4	02	2 2 4 3	2-4	0.6	Soft, brown, clay and silt, moist	0 Units No odor no visual
6	03	1 2 2 2	4-6	1.5		0 Units No odor no visual
8	04	2 4 2 4	6-8	1.5		0 Units No odor no visual
10	05	1 2 4 3	8-10	1.1		0 Units No odor no visual
12	06	2 4 4 3	10-12	1.1		0 Units No odor no visual
14	07	3 6 6 3	12-14	0.6	Loose, medium to coarse sand and fine gravels with cobbles, wet	0 Units No odor no visual
16					Ground Water encountered at approximately 7.0 feet	

DRAFT

FERNALD RI/FS

2nd Settling Redrill

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.321	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1643 (REDRILL)	COORDINATES		DATE 10-17-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-17-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 10-20-90
DRILLING METHODS: CABLE TOOL			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
1	33219 10-17 0956	9 10 14	11	MEDIUM DENSE (10YR, 5/2) GRAYISH BROWN CLAYEY SILT. TRACE GRAVEL. DRY.	ML	NA		HNU = 0 α = 0 BG = 160 cpm
2 3	33220 10-17 1001	18 12 14	13	MEDIUM DENSE (10YR, 5/6) YELLOWISH BROWN CLAYEY SILT. TRACE FINE GRAVEL. DRY. (1.5-1.7 FT). MEDIUM DENSE (10YR, 2/1) BLACK ASH\CARBON. DRY. (1.7-2.5 FT)	ML NA	NA NA		HNU = 0 α = 0 BG = 200 cpm
4	33221 10-17 1005	14 18 20	12	DENSE (10YR, 2/1) BLACK ASH\CARBON, DRY. (3.0-3.5 FT). DENSE (10YR, 5/4) YELLOWISH BROWN CLAYEY SILT. TRACE FINE GRAVEL. DRY. (3.5-4.0 FT.)	NA ML	NA NA		HNU = 0 α = 0 BG = 140 cpm
5 6	33222 10-17 1009	10 15 20	5	~~DENSE~~ FIRM AS OF 10-17-90 (10YR, 5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 α = 0 BG = 120 cpm
7	33223 10-17 1015	13 13 14	3	~~DENSE~~ FIRM AS OF 10-17-90 (10YR, 5/1) GRAY SILTY CLAY. MEDIUM TO HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 α = 0 BG = 100 cpm
8 9	33224 10-17 1021	7 6 9	18	SOFT (10YR, 5/2) GRAYISH BROWN SILTY CLAY. HIGH PLASTICITY. MOIST.	CL	0.5		HNU = 0 α = 0 BG = 100 cpm
10	33225 10-17 1029	10 10 24	9	FIRM (10YR, 5/3) BROWN SILTY CLAY. TRACE FINE TO COARSE GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 BG = 120 cpm
11 12	33226 10-17 1530	5 8 12	6	FIRM (10YR, 5/3) BROWN SILTY CLAY. TRACE FINE GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 BG = 100 cpm
13	33227 10-17 1534	7 7 11	8	HARD (10YR, 6/6) BROWNISH YELLOW SILTY CLAY. TRACE FINE TO MEDIUM GRAVEL. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5		HNU = 0 α = 0 BG = 120 cpm
14 15	33228 10-17 1538	9 14 15	8	FIRM (10YR, 5/4) YELLOWISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 BG = 120 cpm

NOTES.

Drilling Contractor: PENNDRILL CO.

Drilling Equipment: CYCLONE 43

Driller: CHRIS COULTER
REVIN MYRES

BACKGROUND
HNU = 0 ppm
α = 0 cpm
BG = 60-140 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-3.2.1	PROJECT NAME: 602.3.2.1		
BORING NUMBER: 1643 (Redrill)	COORDINATES		DATE: 10-17-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-17-90
ENGINEER/GEOLOGIST: M. German	Depth	Date/Time	DATE COMPLETED: 10-20-90
DRILLING METHODS: Cable Tool			PAGE 2 OF 4

DEPTH (FT)	SAMPLE (TYPE & NO)	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15	33229 10-17 1611	8 10 12	18	FIRM (10YR,5/1) GRAY SILTY CLAY. TRACE FINE TO COARSE SAND. MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0 α = 0 Bγ = 100 cpm
16	33230 10-17 1616	7 11 12	17	FIRM (10YR,5/1) GRAY CLAY. SOME SILT. HIGH PLASTICITY. SLIGHTLY MOIST TO MOIST.	CL	1.0		HNU = 0 α = 0 Bγ = 80 cpm
17 18	33231 10-17 1632	7 8 11	8	SOFT (10YR,5/1) GRAY CLAY. SOME FINE GRAVEL. TRACE SAND AND SILT. HIGH PLASTICITY. MOIST.	CL	0.5		HNU = 0 α = 0 Bγ = 80 cpm
19 20	33232 10-18 1010	4 3 6	10	FIRM (10YR,5/1) GRAY CLAYEY SILT. TRACE FINE SAND AND GRAVEL. LOW PLASTICITY. MOIST.	ML	1.0		HNU = 0 α = 0 Bγ = 80 cpm
21	33233 10-18 1017	7 8 10	18	SOFT (10YR,5/1) GRAY SILTY CLAY. LOW TO MEDIUM PLASTICITY. MOIST TO VERY MOIST.	CL	0.5		HNU = 0 α = 0 Bγ = 80 cpm
22 23	33234 10-18 1025	22 14 11	15	MEDIUM DENSE (10YR,5/1) GRAY SILT. SOME FINE SAND. TRACE CLAY AND FINE GRAVEL. VERY MOIST.	ML	NA		HNU = 0 α = 0 Bγ = 80 cpm
24 25	33235 10-18 1410	5 4 5	6	LOOSE (10YR,5/1) GRAY SILT. SOME FINE SAND AND GRAVEL. TRACE CLAY. VERY MOIST.	ML	NA		HNU = 0 α = 0 Bγ = 60 cpm
26 27	33236 10-18 1447	12 10 7	0	NO RECOVERY	NA	NA		HNU = NA α = NA Bγ = NA
28	33237 10-18 1954	7 9 9	5	MEDIUM DENSE (10YR,5/1) GRAY GRAVELLY WELL GRADED SAND. SOME SILT. WET.	SW	NA		HNU = 0 α = 0 Bγ = 80 cpm
29 30	33238 10-18 1501	4 6 10	14	MEDIUM DENSE (10YR,5/1) GRAY WELL GRADED SAND. SOME SILT. WET. (28.5 TO 29.0 FT) FIRM (10YR,5/1) GRAY SILTY CLAY. SOME SAND. LOW PLASTICITY. MOIST.	SW CL	NA 1.0		HNU = 0 α = 0 Bγ = 80 cpm

NOTES: Bottom of Boring 30'
END of Sampling 30'

Drilling Contractor: Penn Drilling
Drilling Equipment: Cyclone 43
Driller: Chris Coulter
Asst. K. Myers

Background
H_{NU} = 0PPM
α = 0PPM
Bb = 60-140 cpm

001235

3/4

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Barman DATE 10-19-90
PROJECT NO. 602.3.2.1 CHECKED BY M.D. DATE 11-01-90
BORING NO. 1643 Bedr.11
PIEZOMETER NO. MW1643 DATE OF INSTALLATION 10-19-90 - 10-20-90

BOREHOLE DRILLING

DRILLING METHOD Cable tool	TYPE OF BIT
DRILLING FLUID (S) USED: H_2O	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0ft TO 30.0ft	SIZE 10.0 FROM ~~0.0~~ J.L ft TO 30.0ft
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless	RISER PIPE MATERIAL Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS ☐ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS 10ft sections
AVERAGE SIZE OF PERFORATIONS ~~.0ft~~ J.L .01D	JOINING METHOD Screw type flush jointed
TOTAL PERFORATED AREA 10.0ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0ft	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. 10.75	

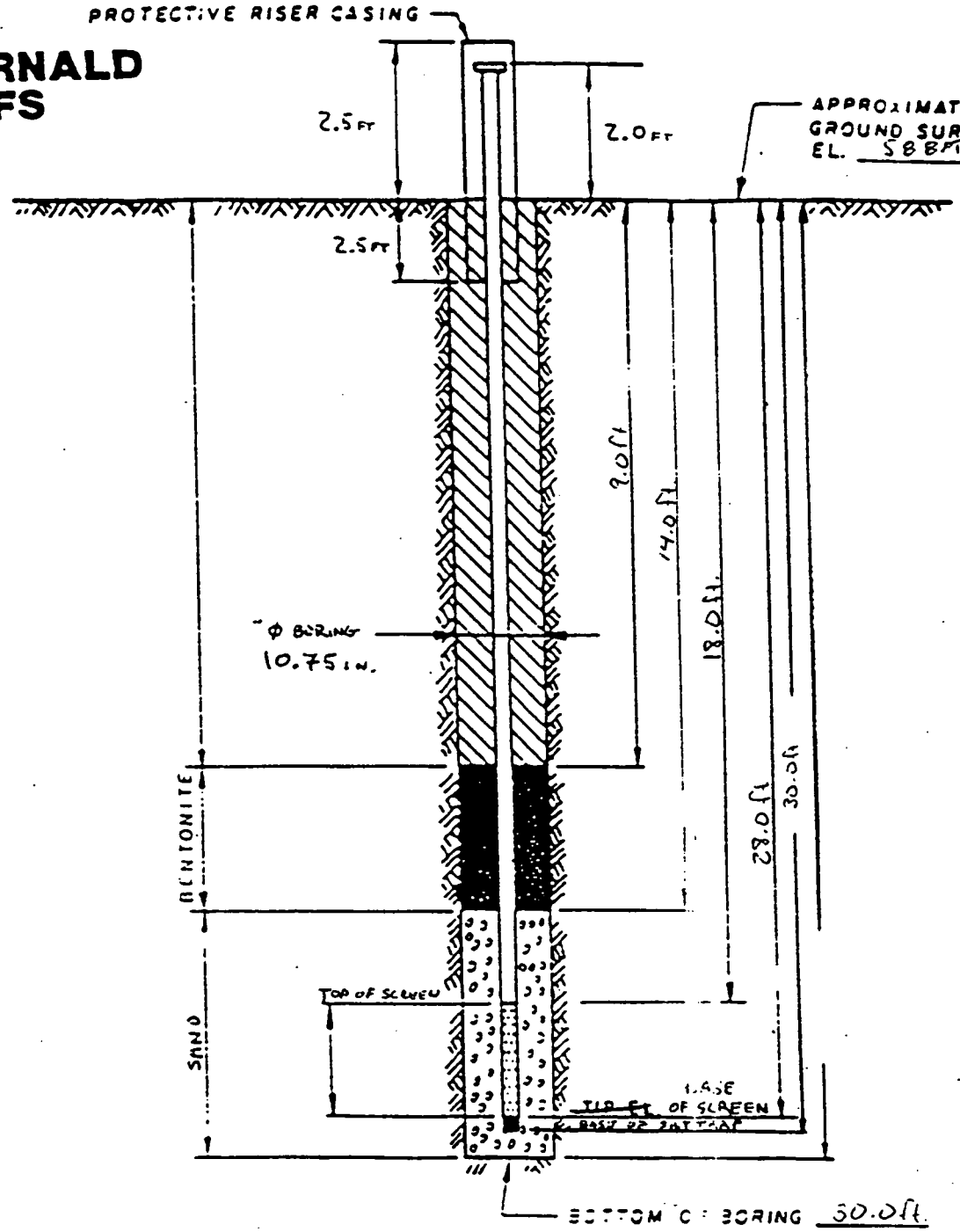
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5 ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.5 ft	BOTTOM 9.0ft	TOP	BOTTOM
BENTONITE	TOP 9.0 ft	BOTTOM 14.0ft	TOP	BOTTOM
SAND	TOP 14.0ft	BOTTOM 30.0ft	TOP	BOTTOM
~~GRAVEL~~ Cement	TOP 0.0ft	BOTTOM 0.5ft	TOP	BOTTOM
PERFORATED SECTION	TOP 18 ft	BOTTOM 28.0ft	TOP	BOTTOM
PIEZOMETER TIP	30.0ft			
BOTTOM OF BOREHOLE	30.0ft			
GWL AFTER INSTALLATION	1.25ft 10-20-90			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001236

FERNALD RI/FS



DRAWING NUMBER 1643 Redrill

CHECKED BY

APPROVED BY

J. Lear 10-20-90

DRAWN BY

NOTES:

1. RISER PIPE IS 4.0 IN ID SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 1.25 FT
5. WATER LEVEL READING ON 10-20-90

MATERIALS USED DURING WELL INSTALLATION:

8 80 LB. BAGS OF 10/20 SAND
2.5 50 LB. BAGS OF VOLCLAY GROUT
2.5 5 GAL. BUCKETS OF BENTONITE PELLETS
300 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 3 - 10 ft Sections

INSTALLATION DETAILS
MONITORING WELL #1643
Redrill

PREPARED FOR
FERNALD RI/FS

001237

1/2

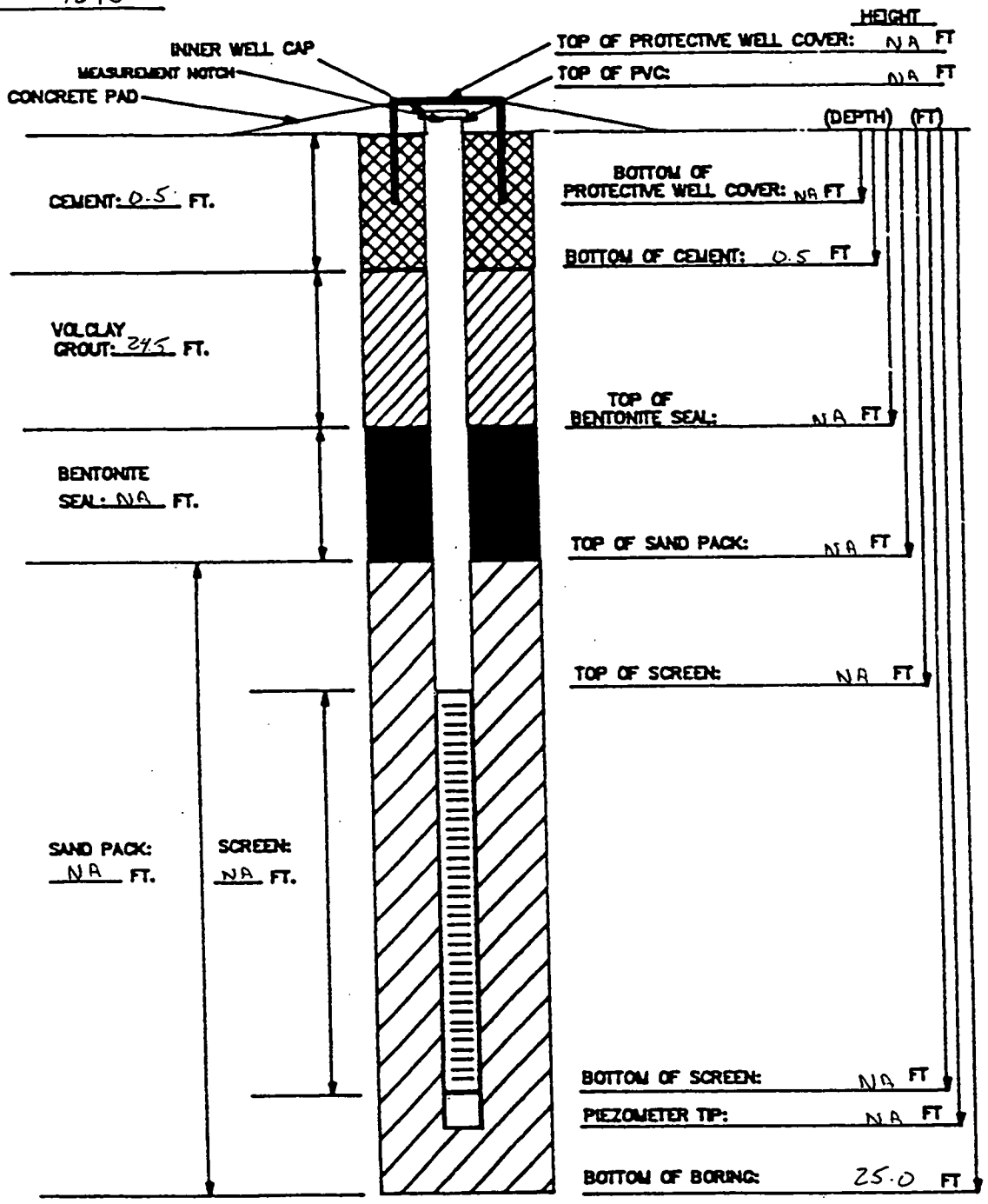
5711

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. Pugged 1643

INSTALLATION DATE: 10-16-90



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4 bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 100 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

Date	12-22-90			
Initial	MG			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2643	COORDINATES:	DATE: 9-27-90 ; 10-02-90	
ELEVATION:	GWL: Depth 58.3 FT Date/Time 10-07-90/1530	DATE STARTED: 9-27-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth Date/Time	DATE COMPLETED: 10-07-90	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 8	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	33156 0930 9-27-90	6 9 17	18	LOOSE, GRAYISH BROWN (10YR 5/2) SAND-SILT-CLAY MIXTURE, VERY SLIGHT PLASTICITY, DRY 0.7	SW	N/A	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 160-200 cpm
				FIRM, DARK GRAY (10YR 4/1) SANDY SILTY CLAY, SOME PEBBLES, TRACE OF COBBLES, DRY, LOW PLASTICITY 3.2	CL	1.5	
2	33157 0934 9-27	13 16 20	18				H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100-120 cpm
3				FIRM, DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY, SOME SAND, COBBLES, DRY TO SLIGHTLY MOIST, LOW PLASTICITY 4.3	CL	2.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100 cpm
4	33158 0939 9-27	23 22 22	18				
5	33159 0949 9-27	15 15 15	18	FIRM, VERY DARK GRAY (10YR 3/1), SILTY CLAY, SOME SAND, TRACE OF GRAVEL, SLIGHTLY MOIST, LOW PLASTICITY 6.0	CL	1.25	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100 cpm
6							
7	33160 0954 9-27	7 8 8	18	HARD, VERY DARK GRAY (10YR 3/1) SANDY SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST 6.7	CL	2.5	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100 cpm
				SOFT, VERY DARK GRAY (10YR 3/1), CLAY-SILT MIXTURE, LOW PLASTICITY, MOIST 8.0	ML	0.40	
8	33161 0958 9-27	9 6 5	18	DARK GRAY (5Y 4/1), CLAYEY SILT, TRACE OF SAND, GRAVEL, SATURATED 9.5	ML	N/A	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80-100 cpm
9							
10	33162 1012 9-27	5 7 6	18	FIRM, GRAY (5Y 4/1), SILTY CLAY, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST 10.7	CL	1.75	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80-100 cpm
11	33163 0950 10-02-90	5 5 5	18	FIRM, MOTTLED GRAY (5Y 4/1) AND YELLOWISH BROWN (10YR 5/6); SILTY CLAY, TRACE OF COBBLES, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST 12.8	CL	1.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 60-140 cpm
12							
13	33164 0958 10-02	5 8 11	18	VERY LOOSE, YELLOWISH BROWN (10YR 5/6) SILTY SAND, SOME PEBBLES, TRACE OF CLAY, MOIST TO WET 13.4	SM	N/A	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80-100 cpm
14	33165 1040 10-02	6 11 17	18	SOFT, DARK YELLOWISH BROWN (10YR 4/6) SANDY CLAY, SOME SILT, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 14.0	CL	0.50	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 60-100 cpm
15				FIRM, GRAY (5Y 4/1), SILTY CLAY, TRACE OF GRAVEL, LOW PLASTICITY, DRY 14.0	CL	2.0	

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
H_{NU}	A01344	0.0 ppm
α	ASI #3	0 cpm
$\beta\gamma$	ASI #10	80-160 cpm

243B-3-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2643	COORDINATES:		DATE: 10-02-90°, 10-03-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-27-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 10-07-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 8

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY ( ) in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33166	8	9	FIRM, DARK YELLOWISH BROWN (10YR 4/6) SANDY CLAY, SOME SILT, LOW PLASTICITY, MOIST	CL	1.5	H_{nu} = 0.0 ppm
	1050	12		↓			α = 0 cpm
16	10-02	13		16.5			βγ = 80-120 cpm
	33167	2	12	FIRM YELLOWISH BROWN (10YR 5/6), SANDY CLAY, SOME SILT, LOW PLASTICITY, MOIST 16.8	CL	0.75	H_{nu} = 0.0 ppm
17	1350	3		FIRM, GRAY (2.5Y 5/0), SILTY CLAY, TRACE OF SAND AND PEBBLES, LOW PLASTICITY, MOIST	CL	1.25	α = 0 cpm
	10-02	5		18.0			βγ = 100-120 cpm
18	33168	6	18	SOFT, GRAY (2.5Y 5/0) SAND-SILT MIXTURE, SOME CLAY, SLIGHT PLASTICITY, MOIST TO WET	SM	0.50	H_{nu} = 0.0 ppm
	1354	7		↓			α = 0 cpm
19	10-02	11					βγ = 100-110 cpm
20	33169	3	18	WET 0.25 IN. SAND SEAM AT 20.0 FT 20.0			H_{nu} = 0.0 ppm
	1422	7		VERY SOFT, GRAY (2.5Y 5/0), CLAYEY SILT, SOME PEBBLES AND GRAVEL, TRACE OF SAND, SLIGHT PLASTICITY, DRY TO MOIST	ML	0.25	α = 0 cpm
21	10-02	8		↓ 21.9			βγ = 100-120 cpm
	33170	9	18	MEDIUM DENSE, GRAY (2.5Y 5/0), SILT-SAND MIXTURE, SOME CLAY, SLIGHTLY MOIST 22.6	SM	N/A	H_{nu} = 0.0 ppm
22	1425	11					α = 0 cpm
	10-02	13					βγ = 80-100 cpm
23	33171	5	18	FIRM, GRAY (2.5Y 5/0), SILTY CLAY, SOME WET SAND SEAMS AT 23.0 AND 23.6 FT; TRACE OF PEBBLES, LOW PLASTICITY, MOIST 24.3	CL	1.50	H_{nu} = 0.0 ppm
	1540	7					α = 0 cpm
24	10-02	9					βγ = 90-110 cpm
	33172	8	16	FIRM, GRAY (2.5Y 5/0), SILT-CLAY MIXTURE, SOME GRAVEL AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST 25.5	CL	1.75	H_{nu} = 0.0 ppm
25	1546	9					α = 0 cpm
	10-02	10					βγ = 80-90 cpm
26	33173	5	7	MEDIUM DENSE, GRAY (5Y 5/1), WELL GRADED SILTY SANDS, SOME PEBBLES, WET	SW	N/A	H_{nu} = 0.0 ppm
	0835	6		↓			α = 0 cpm
27	10-03-90	7		27.0			βγ = 80-100 cpm
	33174	7	18	MEDIUM DENSE, GRAY (5Y 5/1), SANDY SILTY GRAVEL, SOME PEBBLES, TRACE OF COBBLES, WET	GM	N/A	H_{nu} = 0.0 ppm
28	0844	8		↓			α = 0 cpm
	10-03	13		28.8			βγ = 70-90 cpm
29	33175	6	6	FIRM, GRAY (5Y 5/1), SILTY CLAY, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST	CL	1.5	H_{nu} = 0.0 ppm
	0905	5					α = 0 cpm
30	10-03	11					βγ = 100 cpm

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: R. JOHNSON

BACKGROUND

H_{nu} = 0.0 ppm

α = 0 cpm

βγ = 80-160 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2643	COORDINATES:		DATE: 10-03-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-27-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 10-07-90
DRILLING METHODS: CABLE TOOL			PAGE 3 OF 8

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	33176	5	5	MEDIUM DENSE, DARK GRAY (5Y 4/1), SILTY-SAND, SOME PEBBLES, TRACE OF CLAY, WET	SM	N/A	H_{av} = 0.0 ppm
31	0912	10		30.5 — 31.5			α = 0 cpm
	10-03	12					βγ = 100 cpm
32	33177	1	18	FIRM, DARK GRAY (5Y 5/1), SILTY CLAY, SOME SAND, TRACE OF GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST TO MOIST	CL	.75	H_{av} = 0.0 ppm
	0928	3					α = 0 cpm
33	10-03	6					βγ = 100 cpm
	33178	7	18		CL	1.80	H_{av} = 0.0 ppm
34	0947	10					α = 0 cpm
	10-03	13		34.7 — 34.7			βγ = 100-110 cpm
35	33179	9	18	HARD, DARK GRAY (5Y 5/1), SILTY CLAY, TRACE OF SAND AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	2.5	H_{av} = 0.0 ppm
	1003	12					α = 0 cpm
	10-03	17					βγ = 100 cpm
36	33180	18	18				H_{av} = 0.0 ppm
37	1026	26					α = 0 cpm
	10-03	32		37.3 — 37.3			βγ = 90-100 cpm
				SOFT, DARK GRAY (5Y 5/1), CLAYEY SILT, SLIGHT PLASTICITY, SLIGHTLY MOIST	ML	0.50	
38	33181	11	18				H_{av} = 0.0 ppm
	1240	21		38.5 — 38.5			α = 0 cpm
39	10-04	34					βγ = 100 cpm
				DENSE, DARK YELLOWISH BROWN (10YR 4/6) POORLY GRADED COARSE SAND, SOME SILT, MOIST 39.4 — 39.4	SP	N/A	
	33182	22	18	SOFT, DARK YELLOWISH BROWN (10YR 4/4), CLAYEY SILT, NO PLASTICITY, MOIST TO WET 39.4 — 39.4	ML	.50	H_{av} = 0.0 ppm
40	1250	36					α = 0 cpm
	10-04	28		MEDIUM DENSE, GRAYISH BROWN (10YR 5/2), POORLY GRADED FINER SAND, SOME SILT, DRY TO SLIGHTLY MOIST	SP	N/A	βγ = 90-110 cpm
41				TILL ENDS AT 38.5 FT. AQUIFER WILL BE SAMPLED EVERY 5 FT, STARTING AT 45.0 FT, UNTIL SATURATED ZONE IS ENCOUNTERED. 15 MORE FEET WILL THEN BE SAMPLED.			
42							
43							
44							
45							

TOP OF TILL

TOP OF AQUIFER

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{av} = 0.0 ppm

α = 0 cpm

βγ = 80-140 cpm

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2643	COORDINATES		DATE 10-04-90
ELEVATION:	GWL: Depth 2.7 FT	Date/Time 10-04-90 @ 1230	DATE STARTED 9-27-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 10-07-90
DRILLING METHODS CABLE TOOLS			PAGE 4 OF 8

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (PPM)	REMARKS
45	33183	47		VERY DENSE, DARK BROWN (10YR 4/3) POORLY GRADED FINE SILTY SAND, TRACE OF COBBLES, MOIST TO 45.5 FT - DRY TO 46.2 FT	SP	N/A	H_{av} = 0.0 ppm
46	1358	36	14				α = 0 cpm
	10-04	50/5"					$\beta\gamma$ = 100-120 cpm
47							
48							
49							
50	33184	24		VERY DENSE, BROWNISH YELLOW (10YR 6/8). POORLY GRADED FINE SAND, TRACE OF SILT, DRY	SP	N/A	H_{av} = 0.0 ppm
51	1510	32	12				α = 0 cpm
	10-04	44					$\beta\gamma$ = 100 cpm
52							
53							
54							
55	33185	17		VERY DENSE, PALE BROWN (10YR, 6/3) POORLY GRADED FINE SAND. SOME SILT. DRY.	SP	NA	H_{av} = 0 ppm
56	0940	28	16				α = 0 cpm
	10-05	33					$\beta\gamma$ = 120 cpm
57							
58							
59							
60							

NOTES

Drilling Contractor: PENNDRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{av} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 80-140 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2643	COORDINATES	DATE 10-05-90	
ELEVATION:	GWL: Depth 2.96 FT Date/Time 10-05-90 @ 0955	DATE STARTED: 9-27-90	
ENGINEER/GEOLOGIST: M. GARMAN	Depth / Date/Time	DATE COMPLETED: 10-07-90	
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
60	33186 1034 10-05	7 16 25	16	DENSE DARK GRAY (10YR, 4/1) POORLY GRADED FINE SAND, SOME SILT, MOIST.	SP	NA		HNU = 0 ppm α = 0 cpm βγ = 100 cpm
61								
62								
63								
64								
65	33187 1356 10-05	3 5 8	14	MEDIUM DENSE DARK YELLOWISH BROWN (10YR, 4/4) WELL GRADED SAND. TRACE SILT. WET.	SW	NA		HNU = 0 ppm α = 0 cpm βγ = 60 cpm
66								
67								
68								
69								
70	33188 1450 10-05	3 15 16	18	DENSE DARK BROWN (10YR, 4/3) WELL GRADED SAND. TRACE SILT. WET. (70.0' TO 71.0')	SW	NA		HNU = 0 ppm α = 0 cpm βγ = 80 cpm
71				DENSE DARK BROWN (10YR 4/3) WELL GRADED GRAVEL. SOME COARSE SAND. WET. (71.0' TO 71.5')	GW	NA		
72								
73								
74								
75								

NOTES.

Drilling Contractor: PENNDRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

βγ = 40 - 120 cpm

001243

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.2.1	PROJECT NAME FMPC RI\FS		
BORING NUMBER 2643	COORDINATES	DATE 10-05-90	
ELEVATION	GWL: Depth 67.50' Date/Time 10-06-90 00810	DATE STARTED: 9-27-90	
ENGINEER/GEOLOGIST M.GARMAN	Depth 67.04' Date/Time 10-06-90 @ 1310	DATE COMPLETED: 10-07-90	
DRILLING METHODS CABLE TOOL		PAGE 6 OF 8	

DEPTH (FT)	SAMPLE (TYPE & NO)	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
75	33189	3		MEDIUM DENSE DARK BROWN (10YR, 4/3) POORLY GRADED, GRAVELLY COARSE SAND. WET.	SP	NA	NA	HNU = 0 ppm
76	1558 10-05	3 20	18					α = 0 cpm BY = 80 cpm
77								
78								
79								
80	33190	3		MEDIUM DENSE VERY DARK GRAYISH BROWN (10YR 3/2) WELL GRADED GRAVEL. SOME COARSE SAND. WET.	GW	NA		HNU = 0 ppm
81	1045 10-06	8 15	10					α = 0 cpm BY = 100 cpm
82				BOTTOM OF BORING = ~~81.5 FT~~ 82.0 FT AS 10-8-90. DRILLED AND SAMPLED TO 82.0 FT.				

NOTES.

Drilling Contractor PENNDRILL CO.

Drilling Equipment BUCYRUS ERIE

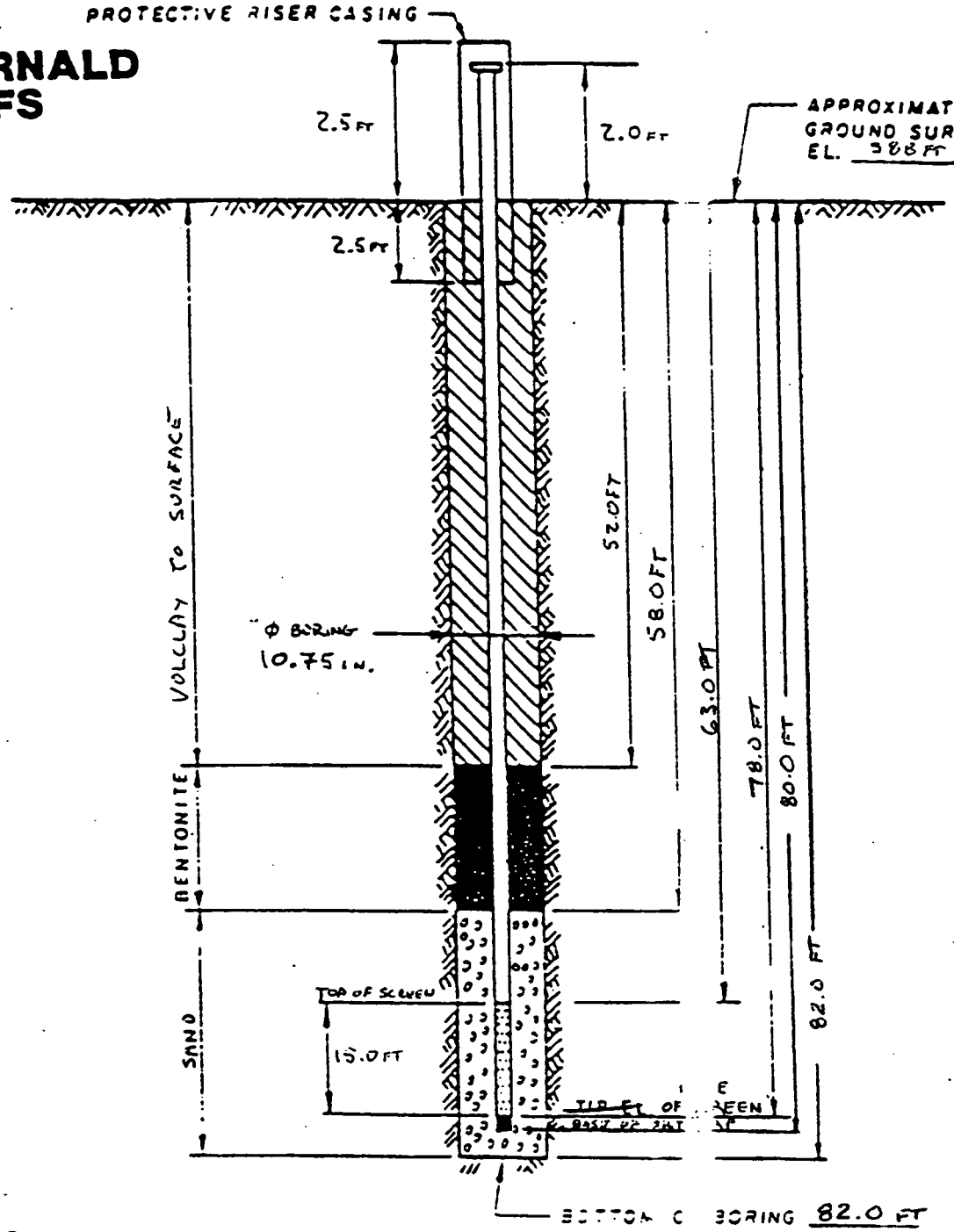
Driller: D. NEWMAN

ASST: B. JOHNSON

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
BY = 40 - 120 cpm

001244

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 58.3 FT
5. WATER LEVEL READING ON 10-07-90

MATERIALS USED DURING WELL INSTALLATION:

20 80 LB. BAGS OF 10/20 SAND
12 50 LB. BAGS OF VOLCLAY GROUT
8 5 GAL. BUCKETS OF BENTONITE PELLETS
800 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-15 FT. SCREEN WITH 2.0 FT. WELDED SILT TRAP. 6-10 FT. SECTIONS, 1-5 FT SECTION STAINLESS STEEL RISER.

INSTALLATION DETAILS
MONITORING WELL #2643

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DRAWN BY	10-07-90

8/8

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 02 3.2.1
BORING NO. 2643
PIEZOMETER NO. 2643

FIELD ENG./GEO. M. SWANSON DATE 10-06-90
CHECKED BY MG DATE 10-23-90
DATE OF INSTALLATION 10-07-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID(S) USED:
FLUID H_2O FROM 0 FT TO 82.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 80.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION HINGED, LOCKING LID COVER

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0.0	BOTTOM 52.0	TOP	BOTTOM
BENTONITE	TOP 52.0	BOTTOM 58.0	TOP	BOTTOM
SAND	TOP 58.0	BOTTOM 82.0	TOP	BOTTOM
GRAVEL NONE USED	TOP MS ~~58.0~~ N/A	BOTTOM MS ~~82.0~~ N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 63.0	BOTTOM 78.0	TOP	BOTTOM
PIEZOMETER TIP	80.0 FT			
BOTTOM OF BOREHOLE	82.0 FT			
GWL AFTER INSTALLATION	58.3 FT BELOW GROUND			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS

REDRILL OF 1644
PLUGGING OF 1644 ORIGINAL ATTACHED.

VISUAL CLASSIFICATION OF SOILS

	Field Check	1st Key In	2nd Key In	Hard Copy Verification
Date	11-01-90			
Initial	M.J.			

PROJECT NUMBER: 602.3.2.1	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1644	COORDINATES		DATE 10-07-90
ELEVATION: REDRILLED 1944	GWL: Depth	Date/Time	DATE STARTED: 10-07-90
ENGINEER/GEOLOGIST: M.GARMAN	Depth	Date/Time	DATE COMPLETED: 10-11-90
DRILLING METHODS: CABLE TOOL			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
1	33091 10-07 0920	17 16 19	14	DENSE (10YR,5/3) BROWN SANDY SILT. DRY.	ML	NA		HNU = 0 ppm; α = 0 cpm; βγ = 600 cpm
2, 3	33092 10-07 0923	25 10 12	12	MEDIUM DENSE (10YR,2/1) BLACK SLUDGE\ ASH MATERIAL. DRY. (1.5'-1.9'); MEDIUM DENSE (10YR,4/1) DARK GRAY CLAYEY SILT. LOW MOISTURE. (1.9'-2.5')	NA; ML	NA; NA		HNU = 0 ppm; α = 0 cpm; βγ = 4500 cpm
4	33093 10-07 0928	19 26 25	9	VERY DENSE (10YR,4/1) DARK GRAY CLAYEY SILT. SOME SAND. DRY.	ML	NA		HNU = 0 ppm; α = 0 cpm; βγ = 400 cpm
5, 6	33094 10-07 1340	15 20 19	3	DENSE (5Y,3/1) VERY DARK GRAY CLAYEY GRAVEL, SOME SLUDGE. MOIST.	GC	NA.		HNU = 0; α = 0; βγ = 2800 cpm
7	33095 10-07 1343	10 15 17	10	HARD ~~DENSE~~ (10YR,4/1) DARK GRAY SILTY CLAY. TRACE GRAVEL AND SLUDGE. LOW PLASTICITY. SLIGHTLY MOIST.	CL	2.5		HNU = 0; α = 0; βγ = 2200 cpm
8, 9	33096 10-07 1406 ~~1606~~	9 10 11	8	HARD (2.5Y,5/2) GRAYISH BROWN SILTY CLAY. TRACE WOOD CHIPS. SLIGHTLY MOIST. MED. PLASTICITY.	CL	2.5		HNU = 0; α = 0; βγ = 360 cpm
10	33097 10-07 1410 ~~1610~~	4 5 5	6	HARD (2.5Y,5/2) GRAYISH BROWN SILTY CLAY. TRACE GRAVEL. MEDIUM PLASTICITY, SLIGHTLY MOIST.	CL	2.0		HNU = 0; α = 0; βγ = 700 cpm
11, 12	33098 10-07 1417 ~~1617~~	2 — —	8	FIRM (2.5Y,5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM PLASTICITY. MOIST TO VERY MOIST.	CL	1.5		HNU = 0.5 ppm; α = 0 cpm; βγ = 300 cpm
13	33099 10-07 1423 ~~1623~~	1 1 1	9	SOFT (2.5Y,5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM PLASTICITY. VERY MOIST TO WET.	CL	0.5		HNU = 0.5 ppm; α = 0 cpm; βγ = 500 cpm
14, 15	33100 10-07 1429 ~~1629~~	1 2 2	7	VERY SOFT (2.5Y,5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. WET.	CL	<0.25		HNU = 0 ppm; α = 0 cpm; βγ = 200 cpm

NOTES.

Drilling Contractor: PENNDRILL CO.

Drilling Equipment: CYCLONE 43

Driller: CRAIG COULTER

ASST: CHRIS COULTER

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
βγ = 80-180 cpm

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.32.1	PROJECT NAME: FMPC RI\FS		
BORING NUMBER: 1644	COORDINATES		DATE 10-07-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-07-90
ENGINEER/GEOLOGIST: M. GARMAN	Depth	Date/Time	DATE COMPLETED: 10-11-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15 -16	33101 10-07 1436	3 6 6	14	SOFT (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM PLASTICITY. MOIST TO VERY MOIST.	CL	0.5		HNU = 0 α = 0 BY = 140 cpm
-17 -18	33102 10-07 1523	6 5 5	10	FIRM (2.5Y, 4/2) Dark Grayish brown mottled silty clay, med plasticity, moist to very moist	CL	0.75		HNU = 0 α = 0 BY = 200 cpm
-19	33103 10-07 1530	7 9 9	16	VERY SOFT (2.5Y, 4/2) Dark grayish BROWN, SILTY CLAY, some fine gravel, low plasticity, wet	CL	<0.25		HNU = 0 α = 0 BY = 140 cpm
-20 -21	33104 10-07 1546	2 3 3	6	FIRM (2.5Y, 5/4) Light OLIVE BROWN SILTY CLAY, TRACE FINE SAND, AND GRAVEL, MED PLASTICITY, MOIST TO VERY MOIST	CL	.75		HNU = 0 α = 0 BY = 140
-22	33105 10-07 1549	3 3 4	10	FIRM (2.5Y, 4/2) Grayish BROWN, MOTTLED SILTY CLAY, TRACE FINE GRAVEL, MED PLASTICITY, MOIST TO VERY MOIST	CL	1.0		HNU = 0 α = 0 BY = 180
-23 -24	33106 10-07 1615	1 2 2	2	VERY SOFT (2.5Y, 4/2) Dark Grayish BROWN, SILTY CLAY, SOME FINE GRAVEL, LOW PLASTICITY, VERY MOIST TO WET	CL	<0.25		HNU = 0 α = 0 BY = 180
-25	33107 10-07 1621	2 3 4	5	SOFT (5Y 3/2) Dark OLIVE GRAY SILTY CLAY, TRACE FINE GRAVEL, MED PLASTICITY, MOIST	CL	0.5		HNU = 0 α = 0 BY = 160
-26 -27	33108 10-07 1630	3 4 6	14	FIRM (5Y 4/2) OLIVE GRAY, mottled silty clay, trace fine gravel low to med plasticity, slightly moist to moist	CL	1.0		HNU = 0 α = 0 BY = 120
-28	33109 10-07 1633	3 5 5	11	LOOSE (5Y 4/1) Dark GRAY, CLAYEY SILT, SOME WOOD CHIPS, SLIGHTLY MOIST TO MOIST	ML	NA		HNU = 0 α = 0 BY = 100
-29 -30	33215 10-07 1645	11 20 26	10	HARD (5Y 4/1) Dark gray, mottled silty clay, trace fine gravel low plasticity, slightly moist	CL	3.0		HNU = 0 α = 0 BY = 100

NOTES.

Drilling Contractor PENNDRILL CO.

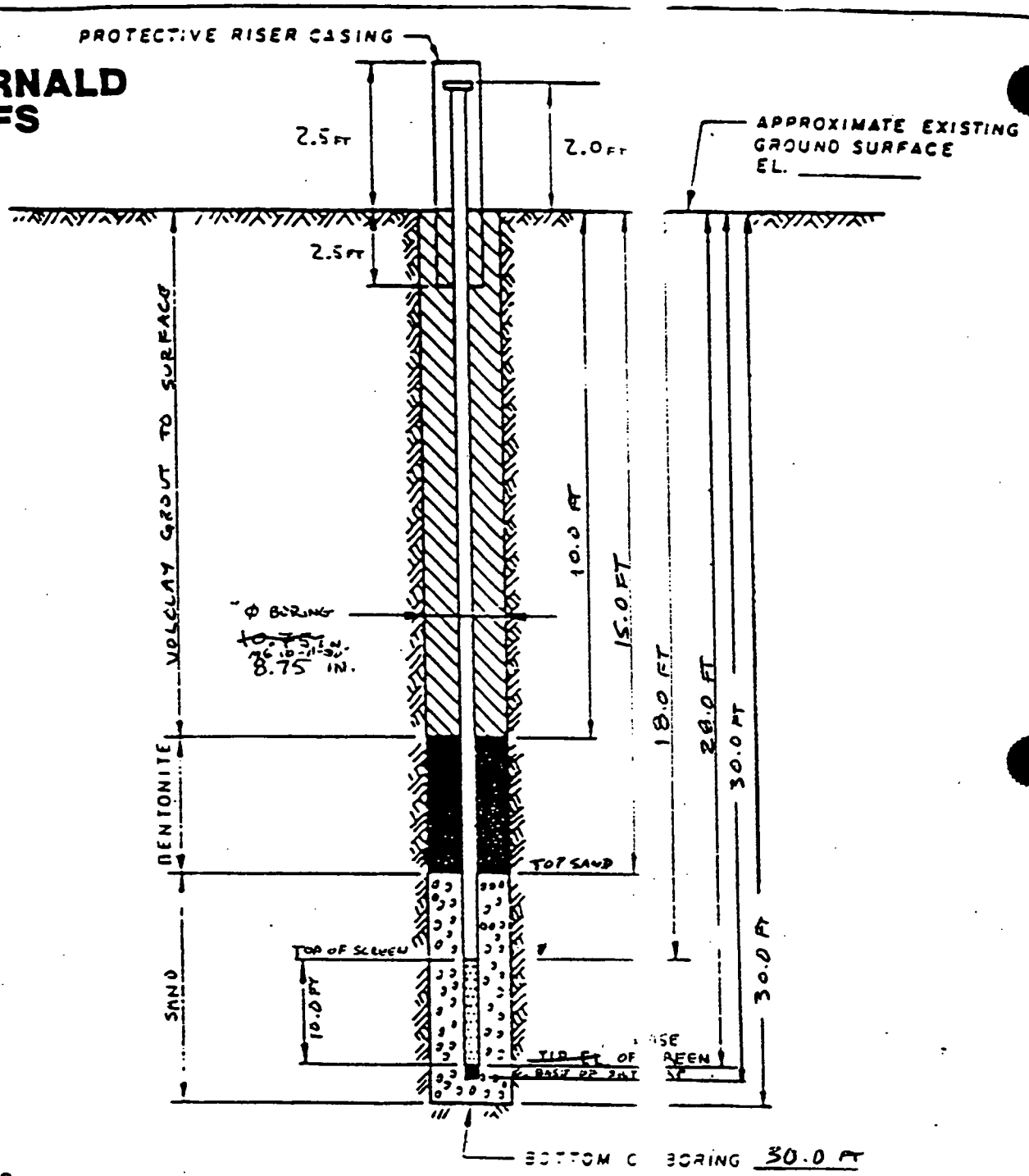
Drilling Equipment CYCLONE 43

Driller: CRAIG COULTER

ASST: CHRIS COULTER

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
BY = 100-220 cpm

FERNALD RI/FS



DRAWING NUMBER	
CHECKED BY	APPROVED BY
MG 10-08-90	
DRAWN BY	

NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 3.05 FT @ T.O.C.
5. WATER LEVEL READING ON 10-11-90

MATERIALS USED DURING WELL INSTALLATION:

8 80 LB. BAGS OF 10/20 SAND
4 50 LB. BAGS OF VOLCLAY GROUT
~~8~~ 3 5 GAL. BUCKETS OF BENTONITE PELLETS
100 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-10.0 FT SCREEN WITH 2.0 FT. WELDED SILT TRAP. 2-10.0 FT. SECTIONS OF STAINLESS STEEL RISER

INSTALLATION DETAILS
MONITORING WELL #1644

PREPARED FOR
FERNALD RI/FS

4/5
ADDITION
5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 3.2.1
BORING NO. 1644
PIEZOMETER NO. 1644
FIELD ENG./GEO. M. GARMAN DATE 10-08-90
CHECKED BY M.O. DATE 11-01-90
DATE OF INSTALLATION 10-11-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID(S) USED:
FLUID H_2O FROM 0 FT TO 30.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE ~~10~~ 8.0 IN ID 10-11-90 FROM 0 FT TO 30.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 IN. I.D.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION HINGED, LOCKING LID COVER

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 10.0	TOP	BOTTOM
BENTONITE	TOP 10.0	BOTTOM 15.0	TOP	BOTTOM
SAND	TOP 15.0	BOTTOM 30.0	TOP	BOTTOM
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 18.0	BOTTOM 28.0	TOP	BOTTOM
PIEZOMETER TIP	30.0			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	3.05			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 1 BUCKET BENTONITE PELLETS USED IN AND AROUND WELL COVER

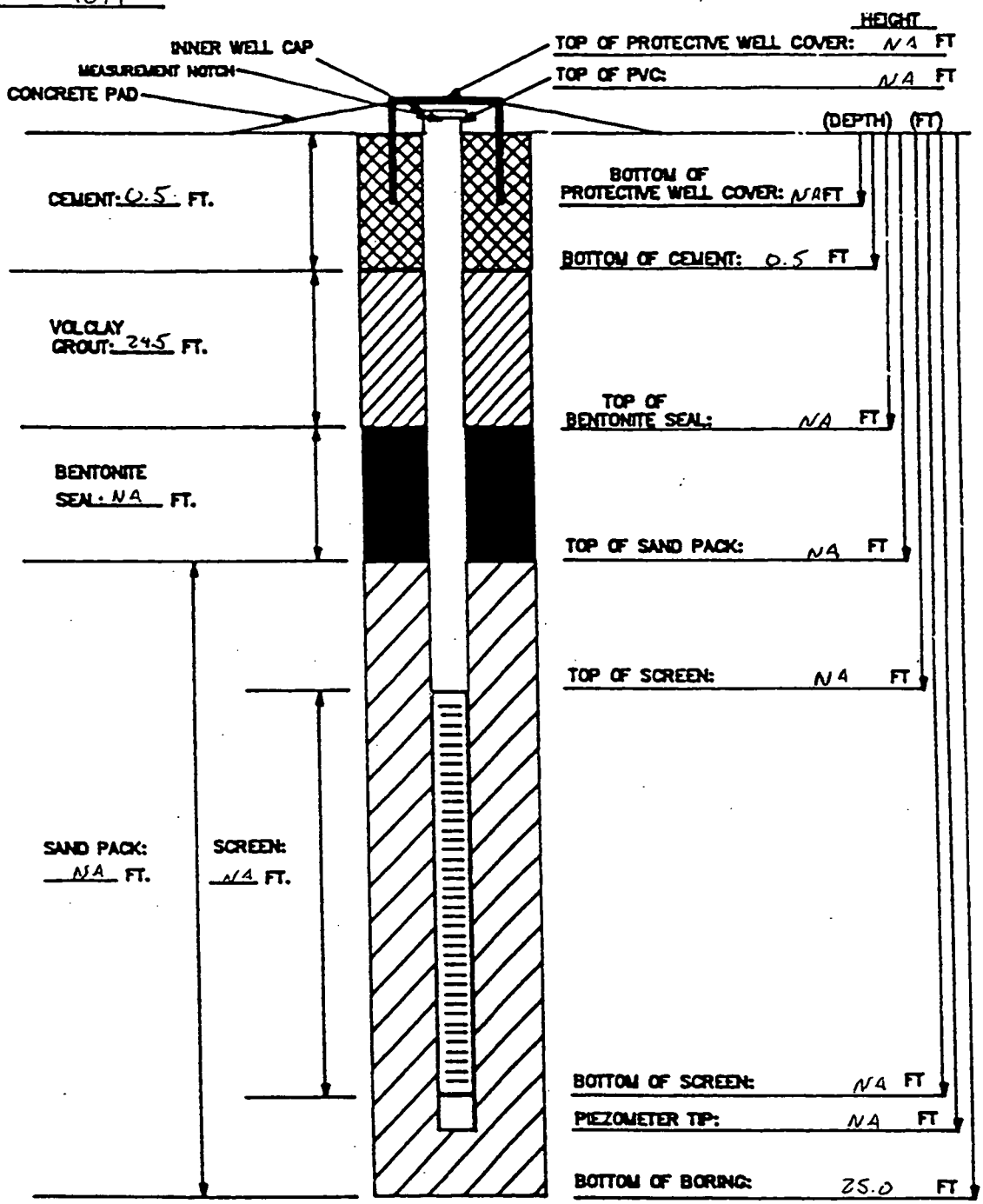
001250

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1644

Plugging date ~~INSTALLATION~~ DATE: 10-6-90



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 5

AMOUNT OF CEMENT: 1/2 bag

AMOUNT OF WATER USED: 100 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-3.7.

GEOLOGIST/ENGINEER: J. Leor

FERNALD RI/FS

K-65 PIT 4

Date	9/20/90		571
Initial	E.T.		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1645	COORDINATES:	DATE: 9-11-90	
ELEVATION:	GWL: Depth 16.2 ft Date/Time 9-18-90 @ 0900	DATE STARTED: 9-11-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-12-90
DRILLING METHODS: CABLE TOOLS		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONDITIONS (PPM)	REMARKS
0	33063 0912 9-11-90	3 5 8	12	SOFT, YELLOWISH BROWN (10YR 5/4) SAND-CLAY-SILT MIXTURE, SOME GRAVELY AND COBBLES SLIGHTLY MOIST	SM	.25	Hnu = 0.0 PPM α = 0 CPM βγ = 200-300 CPM
1	33064 0915 9-11	7 10 13	18	FIRM, VERY DARK GRAY (10YR 3/1), CLAYEY SILT, SOME GRAVEL AND COBBLES, SLIGHT PLASTICITY, TRACE OF SAND, DRY	ML	.75	Hnu = 0.0 PPM α = 0 CPM βγ = 200-250 CPM
2	33065 0918 9-11	5 8 11	18	FIRM, MOTTLED DARK YELLOWISH BROWN (10YR 4/6) SILTY CLAY, SOME GRAVEL, LOW PLASTICITY, DRY TO SLIGHTLY MOIST	CL	1.0	Hnu = 0.0 PPM α = 0 CPM βγ = 150-250 CPM
3	33066 0926 9-11	6 9 K 13	18	3.0 — 5.0 SOFT, YELLOWISH BROWN (10YR 5/6), SILT-CLAY MIXTURE, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST	CL	.50	Hnu = 0.0 PPM α = 0 CPM βγ = 100-225 CPM
4	33067 0937 9-11	5 5 5	18	↓			Hnu = 0.0 PPM α = 0 CPM βγ = 150-200 CPM
5	33068 0946 9-11	4 3 3	18	7.7 — 7.7 VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6) CLAYEY SILT, TRACE OF SAND, SLIGHT PLASTICITY, WET ↓	ML	1.25	Hnu = 0.0 PPM α = 0 CPM βγ = 200-270 CPM
6	33069 0953 9-11	2 5 10	18	9.4 — 9.4 HARD, MOTTLED GRAYISH BROWN (10YR 5/2), SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.0	Hnu = 0.0 PPM α = 0 CPM βγ = 150-250 CPM
7	33070 1408 9-11	10 11 13	18	HARD, MOTTLED YELLOWISH BROWN (10YR 5/6), SILTY CLAY, SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST	CL	2.25	Hnu = 0.0 PPM α = 0 CPM βγ = 150-200 CPM
8	33071 1411 9-11	18 22 23	18	IRON STAINING IN TRANSITION ZONE 12.7 — 12.7			Hnu = 0.0 PPM α = 0 CPM βγ = 150-220 CPM
9	33072 1512 9-11	11 12 12	18	HARD, DARK GRAY (2.5Y 4/0), SILTY CLAY, SOME GRAVEL & PEBBLES, LOW PLASTICITY, MOIST ↓	CL	3.0	Hnu = 0.0 PPM α = 0 CPM βγ = 100-200 CPM

NOTES

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
Hnu	A01344	0.0 PPM
α	ASI #4	0 CPM
βγ	ASI #7	100-300 CPM

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 60Z 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1645	COORDINATES:		DATE: 9-11-90 & 9-12-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-11-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-12-90
DRILLING METHODS: CABLE TOOLS			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33073	18		HARD, DARK GRAY (2.5Y 4/0), SILTY CLAY, SOME PEBBLES, TRACE OF GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.5	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-280 cpm
16	1519	20	18				
	9-11	21		16.5 16.5			
17	33074	10		FIRM, GRAY (2.5Y 5/0), SAND-SILT-CLAY MIXTURE, SOME PEBBLES, VERY SLIGHT PLASTICITY, WET	ML	1.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80-150 cpm
	1541	9	18				
18	9-11	8					
	33110	12		FIRM, GRAY (2.5Y 5/0), SANDY CLAYEY SILT, SOME PEBBLES, LIMESTONE COBBLES, LOW TO MEDIUM PLASTICITY, MOIST TO WET	ML	0.50	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100-150 cpm
19	1544	13	9				
	9-11	15					
20	33111	5		FIRM, GRAY (2.5Y 5/0), SILTY CLAY, SOME SAND, TRACE OF PEBBLES, LOW PLASTICITY, MOIST	CL	1.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-180 cpm
	1343	7 8	12				
21	9-12 90						
	33112	15		FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, SOME PEBBLES AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	1.5	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-150 cpm
22	1349	18	16				
	9-12	20					
23	33113	21		HARD, GRAY (5Y 5/1), SILTY CLAY, SOME PEBBLES, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST	CL	2.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 100-150 cpm
	1352	23	18				
24	9-12	19					
	33114	16		HARD, GRAY (5Y 5/1), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST,	CL	3.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-160 cpm
25	1356	19	17				
	9-12	24					
				BOTTOM OF BORING = 25.5 FT. DRILLED, SAMPLED TO 25.5 FT. TCLP SAMPLE ⇒ 33060 TOTAL U WMCO ⇒ 33062 TOTAL U IT 33061			

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{NU} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 100-300 cpm

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 9-12-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger DATE 9-20-90
BORING NO. 1645
PIEZOMETER NO. 1645
DATE OF INSTALLATION 9-12-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 25.5 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0 FT TO 25.5 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL PERFORATED AREA 10 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4 in.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

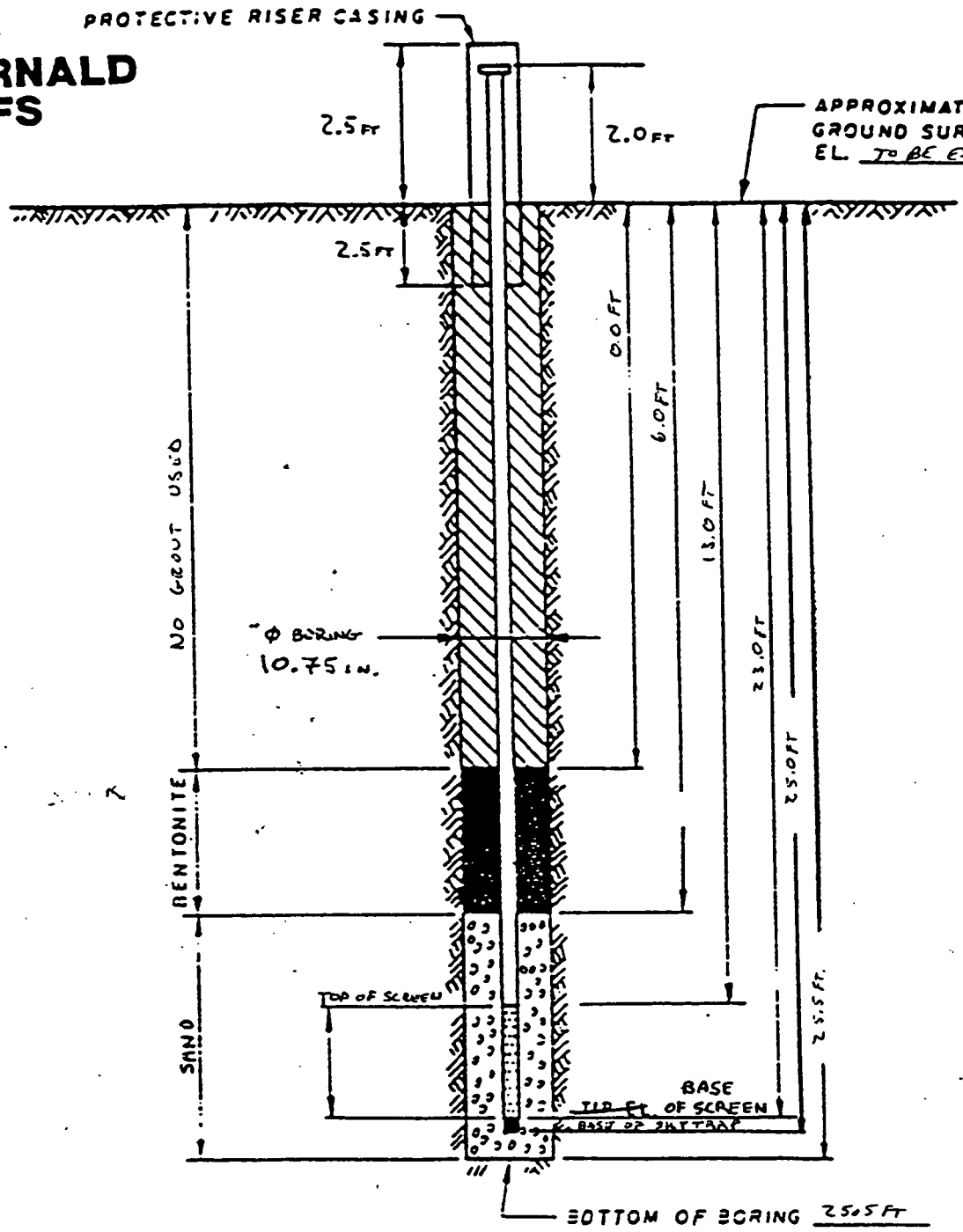
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 in.
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP 6.0	BOTTOM 25.5	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 13.0	BOTTOM 23.0	TOP	BOTTOM
PIEZOMETER TIP	25.0			
BOTTOM OF BOREHOLE	25.5			
GWL AFTER INSTALLATION	16.2 FT. below Surface			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 1 BUCKET OF BENTONITE PELLETS PACKED AROUND PROTECTIVE CASING.

FERNALD RI/FS



DRAWN BY	DATE	CHECKED BY	DRAWING NUMBER
PMM	9-18-90	APPROVED BY	

NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS - SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 16.2 FT
5. WATER LEVEL READING ON 9-18-90 @ 0900

MATERIALS USED DURING WELL INSTALLATION:

12 80 LB. BAGS OF 10/20 SAND
8 50 LB. BAGS OF VOLCLAY GROUT
4 5 GAL. BUCKETS OF BENTONITE PELLETS
250 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-10 FT SCREEN; 1-10 FT RISER; 1-5 FT RISER

INSTALLATION DETAILS
MONITORING WELL # 1645

PREPARED FOR
FERNALD RI/FS

FERNALD RI/FS

K-65 PIT 4

	Date	Initial	Field Check	1st Key In	2nd Key In	Hard Copy Checked
	9/25/90	E.T.				

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1646	COORDINATES:	DATE: 9-06-90 & 9-07-90	
ELEVATION:	GWL: Depth 14.9 FT Date/Time 9-08-90 @ 1000	DATE STARTED: 9-06-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth Date/Time	DATE COMPLETED: 9-09-90	
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 4	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33043 0951 9-06-90	5 8 15	16	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4) POORLY GRADED SILTY SAND, SOME PEBBLES, DRY .75 FT	SP	N/A	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 400-500 cpm
1				HARD, DARK GRAY (5Y 4/1), SANDY-SILTY CLAY, SOME PEBBLES LOW PLASTICITY, DRY 1.75 FT	CL	2.5	
2	33044 0958 9-06	8 7 10	12	HARD, DARK YELLOWISH BROWN (10YR 4/4), SANDY CLAY, SOME SILT AND PEBBLES, DRY	CL	2.0	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 300-400 cpm
3	33045 1007 9-06	9 6 12	13	FIRM, GRAY (5Y 5/1), SILTY CLAY, TRACE OF SAND AND WOOD FRAGMENTS, SLIGHTLY MOIST TO MOIST ↓ 5.0 FT.	CL	1.0	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 300-500 cpm
5	33046 1015 9-06	11 8 7	18	VERY SOFT, MOTTLED LIGHT OLIVE BROWN (2.5Y 5/4), SAND-CLAY-SILT MIXTURE, SOME PEBBLES, SLIGHTLY MOIST	ML	N/A	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-400 cpm
7	33047 1021 9-06	5 6 7	18	SOFT, OLIVE BROWN (2.5Y 4/4), SILTY CLAY, SOME PEBBLES AND SAND, LOW PLASTICITY, MOIST ↓ 8.5 FT.	CL	0.5	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 300-400 cpm
8	33048 1026 9-06	5 7 9	18	FIRM, GRAY TO YELLOWISH BROWN (5Y 6/1 TO 10YR 5/6) SILTY CLAY, TRACE OF PEBBLES AND SAND, LOW TO MEDIUM PLASTICITY, MOIST	CL	1.25	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-400 cpm
9	33049 1033 9-06	6 12 18	18	HARD, YELLOWISH BROWN (10YR 5/4), SANDY, SILTY CLAY, SOME PEBBLES, IRON OXIDE STAINING, LOW PLASTICITY, SAND SEAM AT 9.6 FT, MOIST TO WET	CL	2.5	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-300 cpm
11	33050 1618 9-06	7 11 19	18	FIRM, YELLOWISH BROWN (10YR 5/6) SOME GRAY (10YR 6/1), SILTY CLAY, TRACE OF SAND, MOIST, LOW PLASTICITY	CL	1.0	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-300 cpm
12 13	33051 1622 9-06	9 21 30	18	SOFT, YELLOWISH BROWN (10YR 5/8), SILT-CLAY MIXTURE, SOME PEBBLES, TRACE OF SAND, MOIST ↓ 14.0 FT	ML	0.50	H_{nu} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 200-300 cpm
14 15	33052 0942 9-07-90	7 13 20	18	HARD, GRAY (2.5Y 5/0), SILTY CLAY, SOME SAND AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	2.5	H_{nu} = 0.0 α = 0 $\beta\gamma$ = 200-400

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN - C. COULTER

ASST.: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SAMPLE COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

METER	SERIAL NUMBER	BACKGROUND READINGS
H_{nu}	A01344	0.0 ppm
α	ASI #6	0 cpm
$\beta\gamma$	ASI #11	400-600 cpm

2438-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1646	COORDINATES:		DATE: 9-07-90 ; 9-08-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-06-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-09-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33053	4		FIRM, GRAY (2.5Y 5/0), SILTY CLAY, SOME PEBBLES, ~~LOW~~ HIGH PLASTICITY, SLIGHTLY MOIST	CH	2.0	H_{nu} = 0.0
	0951	9	15				α = 0
16	9-07	17					$\beta\gamma$ = 200-300
17	33054	2		HARD, GRAY (2.5Y 5/0), SILTY CLAY, SOME PEBBLES AND GRAVEL, MEDIUM TO HIGH PLASTICITY, SLIGHTLY MOIST	CH	3.0	H_{nu} = 0.0
	1026	3	18				α = 0
	9-07	5					$\beta\gamma$ = 200-300
18	33055	3					H_{nu} = 0.0
	1403	5	18				α = 0
19	9-07	7					$\beta\gamma$ = 200-280
20	33056	3		20.0 FT.			H_{nu} = 0.0
	1417	10	18	FIRM, DARK GRAY (2.5Y 4/0), CLAY, SOME SILT AND PEBBLES AND GRAVEL, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST	CL	1.5	α = 0
	9-07	11					$\beta\gamma$ = 170-250
21	33057	2		VERY SOFT, DARK GRAY (5Y 4/1) CLAY, SOME SILT, PEBBLES AND GRAVEL, NO TO LOW PLASTICITY, WET	CL	<.25	H_{nu} = 0.0
	1510	4	16				α = 0
22	9-07	7					$\beta\gamma$ = 200-250
23	33058	1		VERY SOFT, DARK GRAY (5Y 4/1), SILTY CLAY, SOME GRAVEL, LOW PLASTICITY, MOIST TO WET 23.5 FT	CL	<.25	H_{nu} = 0.0
	1519	3	18				α = 0
	9-07	12					$\beta\gamma$ = 200-250
24	33059	6		FIRM, DARK GRAY (5Y 4/1), SILTY CLAY, SOME GRAVEL, LOW PLASTICITY, MOIST	CL	0.50	H_{nu} = 0.0
	0820	17	18				α = 0
25	9-08	15					$\beta\gamma$ = 180-250
26				BOTTOM OF BORING = 25.5 FT. DRILLED AND SAMPLED TO 25.5 FT.			
				TCLP ⇒ 33041			
				TOTAL U ⇒ 33042 IT			
				TOTAL U ⇒ ONLY ~~WATER~~ SENT TO IT LAB			

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

H_{nu} = 0.0 ppm

α = 0 cpm

$\beta\gamma$ = 300-600 cpm

2438-3-86

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 9-08-90
PROJECT NO. 602 3.2.1
CHECKED BY E. Trollinger DATE 9-23-90
BORING NO. 1646
PIEZOMETER NO. 1646
DATE OF INSTALLATION 9-09-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 25.5 FT
FLUID — FROM — TO —
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 25.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 10 FT
RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT, 5 FT, 2 FT.
JOINING METHOD THREADED - FLUSH JOINTED

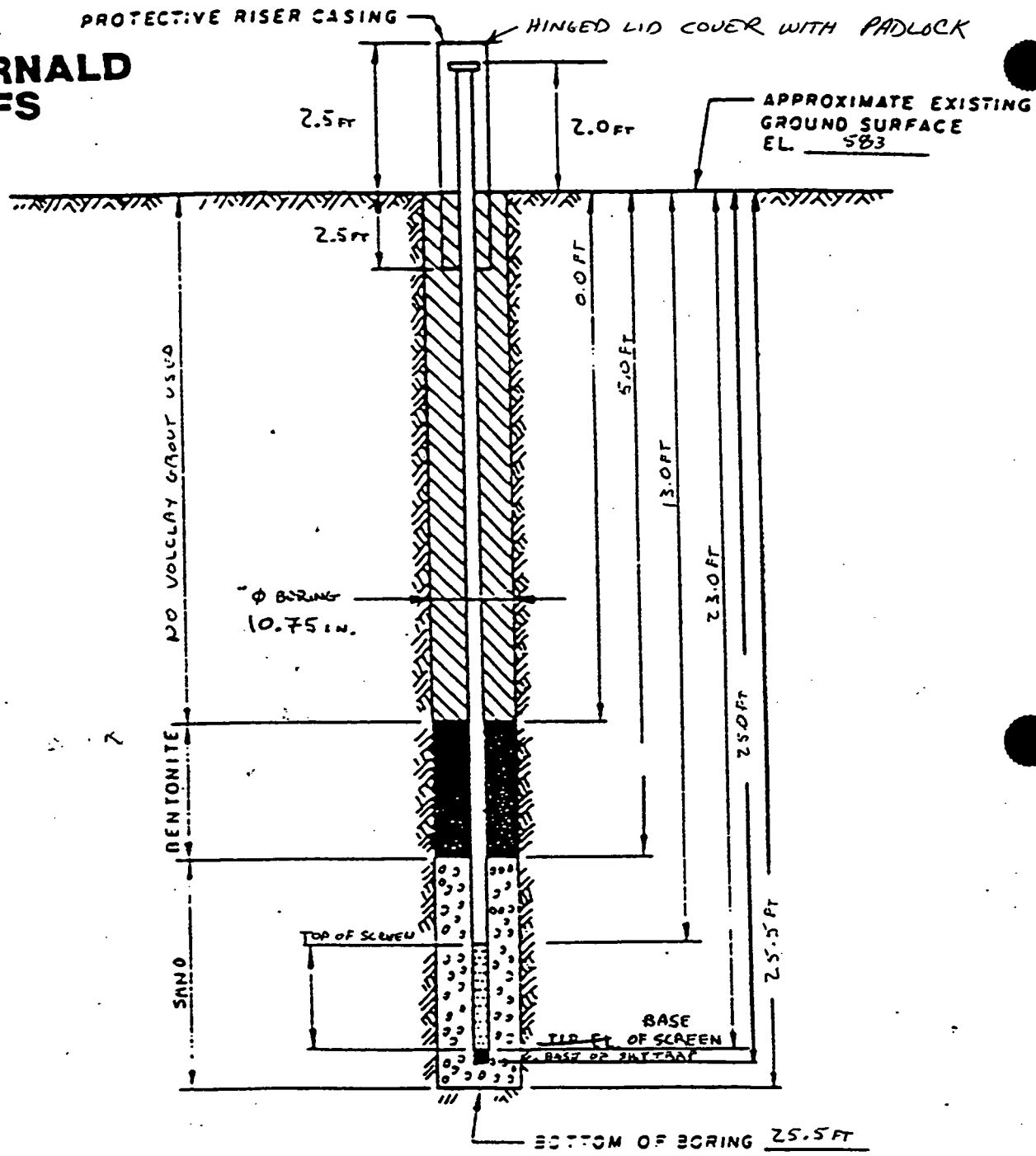
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 0.0	BOTTOM 5.0	TOP	BOTTOM
SAND	TOP 5.0	BOTTOM 25.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 13.0 FT	BOTTOM 23.0 FT	TOP	BOTTOM
PIEZOMETER TIP	25.0 FT			
BOTTOM OF BOREHOLE	25.5 FT			
GWL AFTER INSTALLATION	14.9 FT ON 9-8-90 @ 1000			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS SAND PACK BROUGHT UP TO 5.0 FT TO INCLUDE SILT LAYER AT 5.0 - 6.0 FT.
1 BUCKET OF BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING.

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 14.9 FT
5. WATER LEVEL READING ON 9-08-90 @ 1000

MATERIALS USED DURING WELL INSTALLATION:

12 80 LB. BAGS OF 10/20 SAND
0 50 LB. BAGS OF VOLCLAY GROUT
4 5 GAL. BUCKETS OF BENTONITE PELLETS
250 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-10' SCREEN w/ WELDED SILTTRAP (2 FT); 1-10' RISER; 1-5 FT RISER

INSTALLATION DETAILS
MONITORING WELL #1646

PREPARED FOR
FERNALD RI/FS

DRAWING NUMBER
CHECKED BY
APPROVED BY
9-10-90
DRAWN BY

FERNALD RI/FS

	Date		5711
Initial	10/90		
	ET		
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2648	COORDINATES:	DATE: 9-18-90 ; 9-19-90	
ELEVATION:	GWL: Depth 61.3 FT Date/Time 9-24-90 @ 0900	DATE STARTED: 9-18-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth 60.6 FT Date/Time 9-25-90 @ 1600	DATE COMPLETED: 9-25-90	
DRILLING METHODS: CABLE TOOLS		PAGE 1 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	WELL CONSTRUCTION	REMARKS
0	33118 1430 9-18	5 11 18	18	CLAYEY SILT, BROWNISH YELLOW (10YR 6/6), NO PLASTICITY SOME SAND, SILT, DRY 0.4	ML	N/A	N/A	Hnu: 0.0 PPM α: 0 CPM βγ: 100-120 CPM
1				DENSE, BROWNISH YELLOW (10YR 6/6), POORLY GRADED CLAYSAND, SOME SILT, TRACE OF PEBBLES, DRY 2.5	SP	N/A		
2	33119 1434 9-18	30 23 25	18	HARD OLIVE YELLOW (2.5Y 6/6), SANDY SILTY CLAY, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 2.5	CL	3.0		Hnu: 0.0 PPM α: 0 CPM βγ: 90-100 CPM
3								
4	33120 1439 9-18	27 28 20	18	5.0				Hnu: 0.0 PPM α: 0 CPM βγ: 80-100 CPM
5	33121 1442 9-18	19 18 18	18	FIRM, LIGHT YELLOWISH BROWN (2.5Y 6/4), SANDY CLAY, SOME SILT, PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 6.3	CL	1.0		Hnu: 0.0 PPM α: 0 CPM βγ: 120-160 CPM
6								
7	33122 1449 9-18	12 15 15	18	SOFT, LIGHT YELLOWISH BROWN (2.5Y 6/4) SILTY CLAY, SOME SAND & GRAVEL AND GRAYISH (7.5YR 6/8) POWDER - NO READINGS - DRY	CL	0.50		Hnu: 0.0 PPM α: 0 CPM βγ: 80-120 CPM
8	33123 1500 9-18	21 21 23	18	9.0				Hnu: 0.0 PPM α: 0 CPM βγ: 80-100 CPM
9								
10	33124 1507 9-18	20 22 23	18	SOFT, LIGHT OLIVE BROWN (2.5Y 5/4), SILTY CLAY, SOME PEBBLES AND GRAVEL, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST 10.7	CL	0.50		Hnu: 0.0 PPM α: 0 CPM βγ: 80-110 CPM
11	33125 1412 9-19-90	6 9 11	8	MEDIUM DENSE, DARK GRAY (2.5Y 4/0), CLAYEY GRAVEL, SOME SILT AND SAND, SLIGHT PLASTICITY IN CLAY, MOIST TO WET	GC	N/A		Hnu: 0.0 PPM α: 0 CPM βγ: 100-110 CPM
12	33126 1417 9-19	11 7 12	6	MEDIUM DENSE, DARK GRAY (2.5Y 4/0), CLAYEY GRAVEL, SOME COBBLES, SILT, MOIST	GC	N/A		Hnu: 0.0 PPM α: 0 CPM βγ: 80-100 CPM
13								
14	33127 1422 9-19	3 2 2	5	VERY LOOSE, GRAY (2.5Y 5/0), CLAY-SAND-GRAVEL MIXTURE, SOME SILT AND COBBLES, WET	GC	N/A		Hnu: 0.0 PPM α: 0 CPM βγ: 80-100 CPM
15								

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	SERIAL #	BACKGROUND READINGS
Hnu	A01-344	0.0 PPM
α	A01-64	0 CPM
βγ	A01-411	80-140 CPM

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2648	COORDINATES:		DATE: 9-19-90; 9-20-90
ELEVATION:	GWL: Depth 61.3 ft	Date/Time 900 9-24-90	DATE STARTED: 9-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-25-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 8

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (") in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	33128	5		LOOSE, GRAY (2.5Y 5/0), SILT-CLAY-GRAVEL MIXTURE, SOME COBBLES, TRACE OF SAND, WET 15.6	GC	N/A	H_{AU}: 0.0 PPM
16	1426 9-19	5 5	7	LOOSE, GRAY (2.5Y 5/0), CLAYEY-SILTY SAND, TRACE OF GRAVEL AND COBBLES, WET	SM	N/A	α: 0 CPM; βγ: 80-100 CPM
17	33129 1439 9-19	5 7 9	18	LOOSE, GRAY (2.5Y 5/0), SILTY CLAYEY SAND, SOME GRAVEL, WET 17.3	SM	N/A	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 100-110 CPM
18				VERY SOFT, GRAY (2.5Y 5/0), GRAVELLY-SILTY CLAY, SOME SAND, LOW PLASTICITY, WET 18.8	CL	<.25	
19	33130 1447 9-19	2 3 5	18	SOFT, GRAY (2.5Y 5/0), SILTY CLAY, SOME PEBBLES AND GRAVEL, MEDIUM TO HIGH PLASTICITY, WET 19.5	CH	0.25	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 100-120 CPM
20	33131 0820 9-20-90	2 2 3	4	LOOSE, GRAY (5Y 5/1), GRAVEL-SAND-CLAY MIXTURE, SOME SILT, COBBLES, MEDIUM PLASTICITY IN CLAY, WET 21.0	GC	N/A	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 80-100 CPM
21 22	33132 0900 9-20	11 7 8	6	FIRM, GRAY (5Y 5/1), GRAVELLY CLAY, SOME SILT AND COBBLES, LOW TO MEDIUM PLASTICITY, WET	CL	1.0	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 90 CPM
23	33133 0938 9-20	4 5 14	10	FIRM, GRAY (5Y 5/1), SILTY, GRAVELLY CLAY, SOME COBBLES, LOW PLASTICITY, MOIST	CL	1.5	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 80 CPM
24 25	33134 0943 9-20	7 6 7	8	FIRM, GRAY (5Y 5/1), SILTY CLAY, TRACE OF GRAVEL AND COBBLES, LOW TO MEDIUM PLASTICITY, MOIST 25.5	CL	1.0	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 110-112 CPM
26	33135 1414 9-20	6 3 5	0	NO RECOVERY AFTER TWO (2) ATTEMPTS, COBBLE BLOCKING SPOON IN LOOSE MATERIAL - SAMPLED WASH MATERIAL	N/A	N/A	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 100 CPM — ON WASH MATERIAL ON SPOON
27 28	33136 1418 9-20	2 3 3	4	LOOSE, GRAY (5Y 6/1), SILTY GRAVEL WITH LIMESTONE COBBLE FRAGMENTS, TRACE OF CLAY, MOIST TO WET 28.5	GM	N/A	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 100 CPM
29 30	33137 1433 9-20	11 5 8	13	FIRM, GRAY (5Y 6/1), SILTY CLAY, SOME SAND AND PEBBLES, LOW TO MEDIUM PLASTICITY, MOIST	CL	1.5	H_{AU}: 0.0 PPM; α: 0 CPM; βγ: 110 CPM

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
H_{AU}: 0.0 PPM
α: 0 CPM
βγ: 80-140 CPM

2438-3-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2648	COORDINATES:		DATE: 9-20-90; 9-21-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-25-90
DRILLING METHODS: CABLE TOOL			PAGE 3 OF 8

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	33138	7	18	HARD, DARK GRAY (5Y 4/1), SILTY CLAY SOME SAND AND PEBBLES, TRACE OF LIME STONE COBBLE, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.5	Hnv = 0.0 ppm
	1438	16					α = 0 cpm
31	9-20	17					βγ = 80 cpm
	33139	26	18	VERY HARD, DARK GRAY (5Y 4/1), SILTY CLAY, SOME SAND AND PEBBLES, COBBLE FRAGMENT, ROOT PARTICLE, LOW PLASTICITY, DRY TO SLIGHTLY MOIST	CL	>4.0	Hnv = 0.0 ppm
32	1547	42					α = 0 cpm
	9-20	50					βγ = 100-120 cpm
33	33140	14	18	HARD,	CL	4.0	Hnv = 0.0 ppm
	1611	22					α = 0 cpm
34	9-20	33					βγ = 100 cpm
	33141	23	12	VERY HARD	CL	>4.0	Hnv = 0.0 ppm
35	1614	57/6					α = 0 cpm
	9-20						βγ = 100 cpm
36	33142	13	18	36.4			Hnv = 0.0 ppm
	0906	17		HARD, GRAY (5Y 4/1), PEBBLEY-SILTY CLAY, SOME GRAVEL AND COBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.5	α = 0 cpm
37	9-21	24					βγ = 120 cpm
	33143	27	6	FIRM, GRAY (5Y 4/1), SILT-CLAY MIXTURE, TRACE OF SAND AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	1.25	Hnv = 0.0 ppm
38	0911	29					α = 0 cpm
	9-21	30					βγ = 120 cpm
39	33144	4	10	HARD, DARK GRAY (2.5Y 4/0), SILTY CLAY; SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 39.4	CL	3.0	Hnv = 0.0 ppm
9.4 FT ART OF LIBER				MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6), POORLY GRADED 39.7 SILTY SAND, MOIST	SP	N/A	α = 0 cpm
40	0926	12		VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6), CLAYEY SILT, SOME SAND, VERY SLIGHT PLASTICITY, WET	ML	<.25	βγ = 100 cpm
	9-21	17					
41				AQUIFER WILL BE SAMPLED EVERY 5.0 FT, STARTING AT 45.0 FT, UNTIL THE SATURATED ZONE IS ENCOUNTERED. AN ADDITIONAL 15 FT WILL THEN BE SAMPLED.			Hnv = α = βγ =
42							Hnv = α = βγ =
43							
44							Hnv = α = βγ =
45							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND

Hnv = ~~80~~ 0.0 ppm

α = 0 cpm

βγ = 80-120 cpm

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2648	COORDINATES:		DATE: 9-21-90; 9-25-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-25-90
DRILLING METHODS: CABLE TOOLS			PAGE 4 OF 8

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED EXPLOSIVE ENERGY (PPM)	REMARKS
45–46	33145 1519 9-21	50+/5in	3	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6), WELL-GRADED GRAVELLY SAND, SOME SILT AND PEBBLES, SUBANGULAR TO SUBROUNDED, MOIST	SW	N/A	Hnu = 0.0 ppm; α = 0 cpm; βγ = 80-90 cpm
46–47							
47–48							
48–49							
49–50							
50–51	33146 1552 9-21	23 K 41 50/4	15	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6), POORLY GRADED FINER SAND, SOME SILT, TRACE OF PEBBLES, SUBROUNDED, MOIST.	SP	N/A	Hnu = 0.0 ppm; α = 0 cpm; βγ = 80 cpm
51–52							
52–53							
53–54							
54–55							
55–56	33147 0849 9-23	19 30 50/4	14	DENSE, BROWNISH YELLOW (10YR 6/8), POORLY GRADED FINE SAND, SOME SILT, DRY TO SLIGHTLY MOIST 55.6	SP	N/A	Hnu = 0.0 ppm; α = 0 cpm; βγ = 80 cpm
				55.6 VERY DENSE, GRAYISH BROWN (10YR 5/2), POORLY GRADED COARSER SAND, SOME SILT, TRACE OF CLAY, DRY	SP	N/A	
56–57							
57–58							
58–59							
59–60							

NOTES:

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
Hnu = 0.0 ppm
α = 0 cpm
βγ = 80-110 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER Z648	COORDINATES		DATE 9-23-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-18-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 9-25-90
DRILLING METHODS CABLE TOOLS			PAGE 5 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONDITIONS (PPM)	REMARKS
60	33148	6		DENSE, GRAY (10YR 5/1) WITH SOME VERY DARK GRAY (10YR 3/1) MEDIUM GRADED SILTY SAND, TRACE OF SUBROUNDED PEBBLES, WET	SP TO SW	N/A	H_{AU} = 0.0 PPM
	2103	14	9				α = 0 CPM
61	9-23	23					$\beta\gamma$ = 100 CPM
62							
63							
64							
65	33149	29 K		VERY DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED COARSE SAND, SOME SUB-ANGULAR PEBBLES, SILT, TRACE OF CLAY, MOIST TO WET	SP	N/A	H_{AU} = 0.0 PPM
	1405	41	14				α = 0 CPM
66	9-23	49					$\beta\gamma$ = 100-110 CPM
67							BLOW SANDS
68							
69							
70	33150	6		DENSE, YELLOWISH BROWN (10YR 5/4), WELL GRADED GRAVEL, SAND, PEBBLE MIXTURE, SUBROUNDED TO SUBANGULAR, SOME SILT, WET	GW	N/A	H_{AU} = 0.0 PPM
	1532	21	10				α = 0 CPM
71	9-23	28					$\beta\gamma$ = 100 CPM
72							HEAVY BLOW SANDS
73							
74							
75							

NOTES

Drilling Contractor: BUCYRUS ERIE

Drilling Equipment: PENN DRILL CO

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
H_{AU}: 0.0 PPM
α: 0 CPM
$\beta\gamma$: 80-120 CPM

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2646	COORDINATES:		DATE: 9-23-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 9-25-90
DRILLING METHODS: LARGE TOOLS			PAGE 6 OF 8

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANT (PPM)	REMARKS
75	33151	11		DENSE, DARK GRAYISH BROWN (10YR 4/2), WELL GRADED GRAVELLY SAND, SOME SUBROUNDED PEBBLES, SILT; WET	SW	N/A	H_{nu} = 0.0 PPM
76	1610	17	12				α = 0 CPM
	9-23	29					$\beta\gamma$ = 100
77							BLOW SANDS
78							
79	33152	10		VERY DENSE, GRAYISH BROWN (10YR 5/2), POORLY GRADED COARSE SAND, SOME GRAVEL, SILT, WET	SP	N/A	H_{nu} = 0.0 PPM
	1624	26	7				α = 0 CPM
	9-23	38					$\beta\gamma$ = 100 CPM
80				BOTTOM OF BORING: 80.0 FT DRILLED AND SAMPLED TO 80.0 FT.			

NOTES

Drilling Contractor: PENN-DRILL CO

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B JOHNSON

BACKGROUND

H_{nu} = 0.0 PPM

α = 0 CPM

$\beta\gamma$ = 80-110 CPM

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 3.2.1
BORING NO. 2648
PIEZOMETER NO. 2648

FIELD ENG./GEO. M. SWANSON DATE 9-24-90
CHECKED BY E. Trollinger DATE 10-2-90
DATE OF INSTALLATION 9-25-90 @ 1530

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 80.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 80.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 15 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

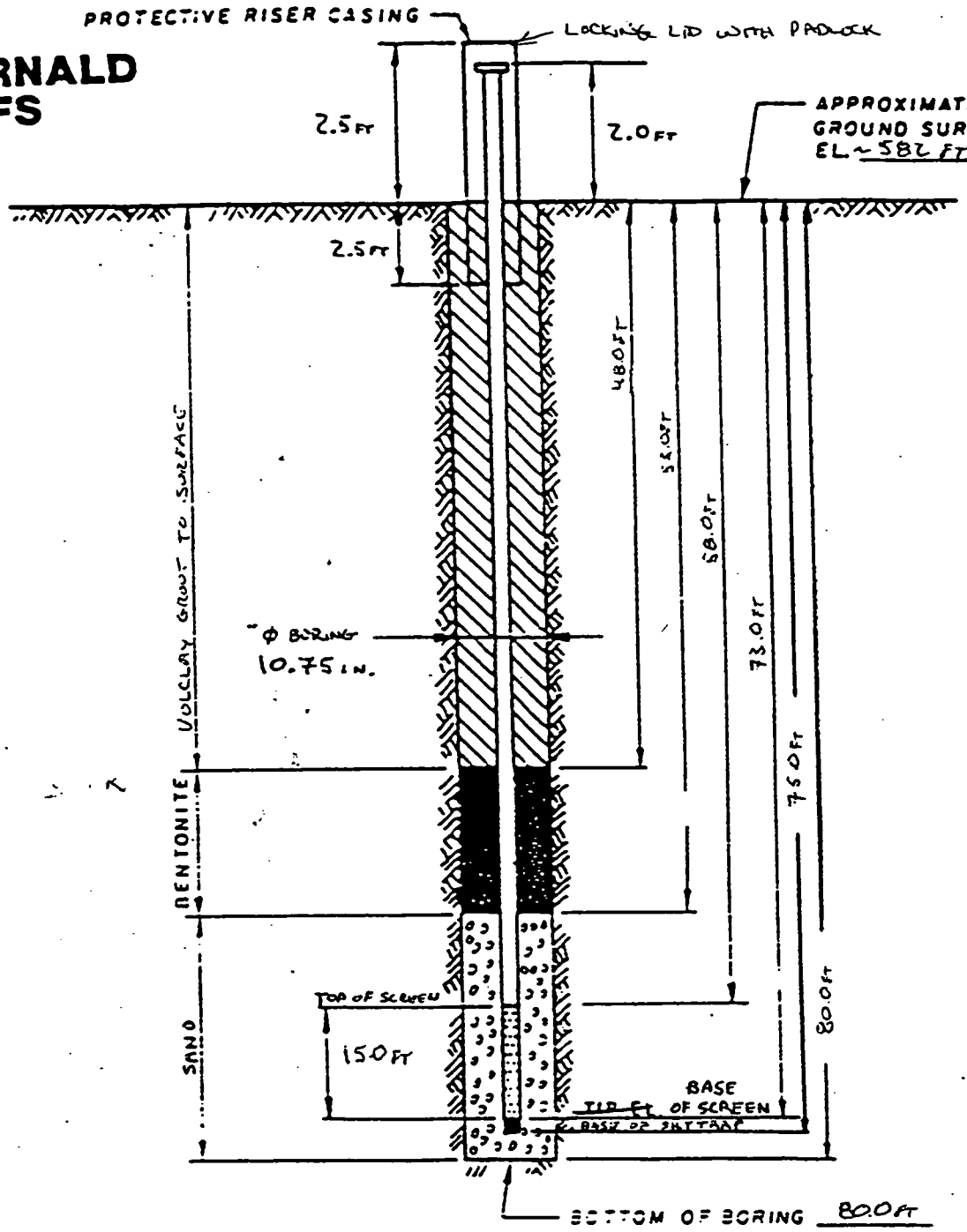
OTHER PROTECTION HINGED, LOCKING LID COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS:				
Volcay GROUT/SLURRY	TOP 0.0 FT	BOTTOM 48.0 FT	TOP	BOTTOM
BENTONITE	TOP 48.0 FT	BOTTOM 53.0 FT	TOP	BOTTOM
SAND	TOP 53.0 FT	BOTTOM 75.0 FT	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 58.0 FT	BOTTOM 73.0 FT	TOP	BOTTOM
PIEZOMETER TIP	75.0 FT			
BOTTOM OF BOREHOLE	80.0 FT			
GWL AFTER INSTALLATION	60.6 FT 9-25-90 @ 1600			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS TWO (2) BUCKETS OF BENTONITE ADDED AROUND PROTECTIVE CASING. BLOW SANDS TO 75.0 FT.

FERNALD RI/FS



DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DRAWN BY	9-25-90

NOTES:

1. RISER PIPE 1 SH.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN 1 SH.0 IN I.D SS PIPE CONTINUOUS - SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 61.3 FT ; 60.6 FT
5. WATER LEVEL READING ON 9-24-90 ; 9-25-90

MATERIALS USED DURING WELL INSTALLATION:

16 80 LB. BAGS OF 10/20 SAND
11 50 LB. BAGS OF VOLCLAY GROUT
7 5 GAL. BUCKETS OF BENTONITE PELLETS
700 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1-15' SCREEN + 2' WELDED SILTTRAP; 6-10' RISERS

INSTALLATION DETAILS
MONITORING WELL #2648

PREPARED FOR
FERNALD RI/FS

FERNALD RI/FS

Date	10-23-90			
Initial	MG			
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2649	COORDINATES:		DATE: 10-16-90
ELEVATION:	GWL: Depth 51.05	Date/Time 10-19-90 @ 0900	DATE STARTED: 10-16-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth 51.28	Date/Time 10-19-90 @ 0750	DATE COMPLETED: 10-19-90
DRILLING METHODS: CABLE TOOL			PAGE 1 OF 7

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	33194 1340 10-16-90	2 3 3	18	VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6) ORGANIC CLAYEY SILT, SOME SAND, SLIGHT PLASTICITY, DRY 0.5	OL	0.25	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 180-260 cpm
1				FIRM, DARK BROWN (10YR 3/3), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, DRY 2.0	CL	2.5	
2	33195 1346 10-16-90	9 7 8	18	HARD, DARK BROWN (10YR 3/3), SANDY SILTY CLAY, LOW PLASTICITY, DRY 3.2	CL	3.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 180-220 cpm
3	33196 1352 10-16-90	9 15 8	18	HARD, DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY, SOME PEBBLES AND GRAVEL, TRACE OF SAND, LOW PLASTICITY, DRY 4.5	CL	3.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 140-220 cpm
4	33197 1355 10-16-90	5 6 7	3	FIRM, VERY DARK GRAY (10YR 3/1), SANDY SILTY CLAY, SOME COBBLES, LOW PLASTICITY, DRY	CL	2.0	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 180-220 cpm
5	33198 1401 10-16-90	6 15 19	3	HARD, VERY DARK GRAY (10YR 3/1), SILTY CLAY, SOME COBBLES AND GRAVEL, LOW PLASTICITY, DRY	CL	2.5	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 140-240 cpm
6	33199 1407 10-16-90	5 7 8	10	FIRM, OLIVE GRAY (5Y 4/2), SILTY CLAY, TRACE OF GRAVEL, LOW PLASTICITY, DRY	CL	1.75	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-180 cpm
7	33200 1415 10-16-90	6 9 16	12	FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, SOME GRAVEL; LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST TO MOIST	CL	1.5	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 140-200 cpm
8	33201 1530 10-16-90	2 3 3	18	SOFT, OLIVE GRAY (5Y 5/2), SILTY CLAY, SOME PEBBLES, MEDIUM PLASTICITY, MOIST	CL	.50	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 140-240 cpm
9	33202 1537 10-16-90	3 5 6	6	FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, TRACE OF PEBBLES, SAND, MEDIUM PLASTICITY, MOIST TO WET 13.5	CL	.60	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 180-250 cpm
10	33203 1544 10-16-90	12 19 23	18	FIRM, OLIVE GRAY (5Y 5/2), CLAY, SOME SILT, HIGH PLASTICITY, MOIST 14.2	CH	1.25	H_{NU} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-220 cpm
11				FIRM, MOTTLED OLIVE GRAY (5Y 5/2) AND DARK YELLOWISH BROWN (10YR 4/6), SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	.75	
12							
13							
14							
15							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: B. JOHNSON

ASST.: C. COULTER

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

INSTRUMENT	S.N.	BACKGROUND READING
H_{NU}	A01344	0.0 ppm
α	ASI #3	0 cpm
$\beta\gamma$	ASI #10	120-260 cpm

243B-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2649	COORDINATES:		DATE: 10-17-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-16-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 10-19-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 7

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15 16	33204 0846 10-17-90	3 5 6	18	FIRM, OLIVE GRAY (5Y 4/2), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST, TRACE OF ORGANICS AT 16.0 FT 16.5	CL	1.5	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 120-180 CPM
17 18	33205 0855 10-17	5 10 11	10	MEDIUM DENSE, OLIVE GRAY (5Y 4/2), CLAYEY GRAVEL, SOME SILT, TRACE OF SAND, MOIST TO WET 18.0	GC	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 120-160 CPM
18 19	33206 0935 10-17	6 6 7	18	HARD, DARK GRAY (5Y 4/1), CLAY, SOME SILT AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST 19.1	CL	2.5	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 100-200 CPM
20 21	33207 0943 10-17	5 6 7	18	FIRM, DARK TO VERY DARK GRAY (5Y 4/1 TO 3/1), SILT-CLAY MIXTURE, TRACE OF SAND AND GRAVEL, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 21.0	CL	1.25	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 80-160 CPM
22	33208 0951 10-17	3 7 8	3	VERY SOFT, VERY DARK GRAY (5Y 3/1), CLAYEY SILT, SLIGHT PLASTICITY, SLIGHTLY MOIST 22.5	ML	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 80-160 CPM
23 24	33209 0958 10-17	7 10 23	18	FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, LOW PLASTICITY, MOIST 22.9 VERY SOFT, VERY DARK GRAY (5Y 3/1), CLAYEY SILT, SOME SAND, NO PLASTICITY, TRACE ORGANICS, DRY 23.7 YELLOWISH BROWN (10YR 5/4), MEDIUM DENSE, SILTY SAND, SOME GRAVEL, SLIGHTLY MOIST 24.3	CL ML SM	2.0 1.25 N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 140-220 CPM
25 26	33210 1013 10-17	22 40 50	18	VERY DENSE, YELLOWISH BROWN (10YR 5/6), WELL GRADED SILTY SAND, TRACE OF PEBBLES, DRY 26.0	SW	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 100-180 CPM
27	33211 1048 10-17	12 28 40	18	SOFT, OLIVE (5Y 5/4), SAND-CLAY MIXTURE, SOME SILT, SLIGHT PLASTICITY IN CLAY, SLIGHTLY MOIST 27.2	SC	.50	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 120-180 CPM
28	33212 1116 10-17	12 50/5in	9	VERY DENSE, YELLOWISH BROWN (10YR 5/6), WELL GRADED COARSE SAND, SOME SILT AND PEBBLES, DRY	SW	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 100-200 CPM
29 30				AQUIFER WILL BE SAMPLED EVERY 5.0 FT, STARTING AT 35.0 FT, TILL SATURATED ZONE IS ENCOUNTERED. 15.0 MORE FEET WILL THEN BE SAMPLED.			

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: C. COULTER

ASST.: B. JOHNSON

BACKGROUND

H_{nu} = 0.0 PPM

α = 0 CPM

$\beta\gamma$ = 100-220 CPM

001269

243B-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI\FS		
BORING NUMBER 2649	COORDINATES		DATE 10-17-90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10-16-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 10-19-90
DRILLING METHODS CABLE TOOL			PAGE 3 OF 7

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINATION (PPM)	REMARKS
30							
31							
32							
33							
34							
35							
36	33213 1349 10-17	16 21 38	11	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6) POORLY GRADED COARSE SAND, SOME PEBBLES AND GRAVEL, TRACE OF SILT, MOIST	SP	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 120-240 CPM
37							
38							
39							
40	33214 1417 10-17	10 12 22	12	DENSE, DARK YELLOWISH BROWN (10YR 4/6) POORLY GRADED FINE SILTY SAND, SOME PEBBLES, SLIGHTLY MOIST	SP	N/A	H_{nu} = 0.0 PPM α = 0 CPM $\beta\gamma$ = 80-140 CPM
41							
42							
43							
44							
45							

NOTES

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: C. COULTER

ASST.: B. JOHNSON

BACKGROUND

H_{nu} = 0.0 PPM

α = 0 CPM

$\beta\gamma$ = 100-220 CPM

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2649	COORDINATES:		DATE: 10-17-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-16-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 10-19-90
DRILLING METHODS: CABLE TOOL			PAGE 4 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	33250 1452 10-17	5 8 19	7	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), WELL GRADED SAND, SOME SILT, TRACE OF PEBBLES, MOIST	SW	N/A	H_{NU} = 0.0 ppm α = 0 cpm $P\gamma$ = 100-140 cpm
46							
47							
48							
49							
50	33251 1530 10-17	7 11 29	6	DENSE, BROWN (10YR 5/3), POORLY GRADED COARSE SAND, TRACE OF SILT, MOIST TO WET	SP	N/A	H_{NU} = 0.0 ppm α = 0 cpm $P\gamma$ = 80-140 cpm
51							
52							
53							
54							
55	33252 1552 10-17	6 7 10	5	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), WELL GRADED SILTY SAND, WET	SW	N/A	H_{NU} = 0.0 ppm α = 0 cpm $P\gamma$ = 80-160 cpm
56							
57							
58							
59							
60							

NOTES

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: C. COULTER

ASST.: B. JOHNSON

BACKGROUND
H_{NU} = 0.0 ppm
α = 0 cpm
$P\gamma$ = 120-240 cpm

001271

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2649	COORDINATES		DATE 10-17-90
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10-16-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 10-19-90
DRILLING METHODS CABLE TOOLS			PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6" / 6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONDITIONS (PSI)	REMARKS
60	33253	3	14	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6), POORLY GRADED SILTY SAND, SOME PEBBLES, WET	SP	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 120-180 cpm
61	1619	6					
	10-17	6					
62							
63							
64							
65	33254	5	13	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), POORLY GRADED FINE SAND, SOME SILT, WET	SP	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 120-200 cpm
66	0840	7					
	10-18-90	11					
67							
68							
69	33255	4	12	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6), POORLY GRADED SILTY SAND, TRACE OF PEBBLES, WET	SP	N/A	Hnu = 0.0 ppm α = 0 cpm βγ = 110-200 cpm
	0925	10					
70	10-18	19					
				DRILLING, SAMPLING ENDED @ 70.0 FT BOTTOM OF BORING: 70.0 FT			
71							

NOTES

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

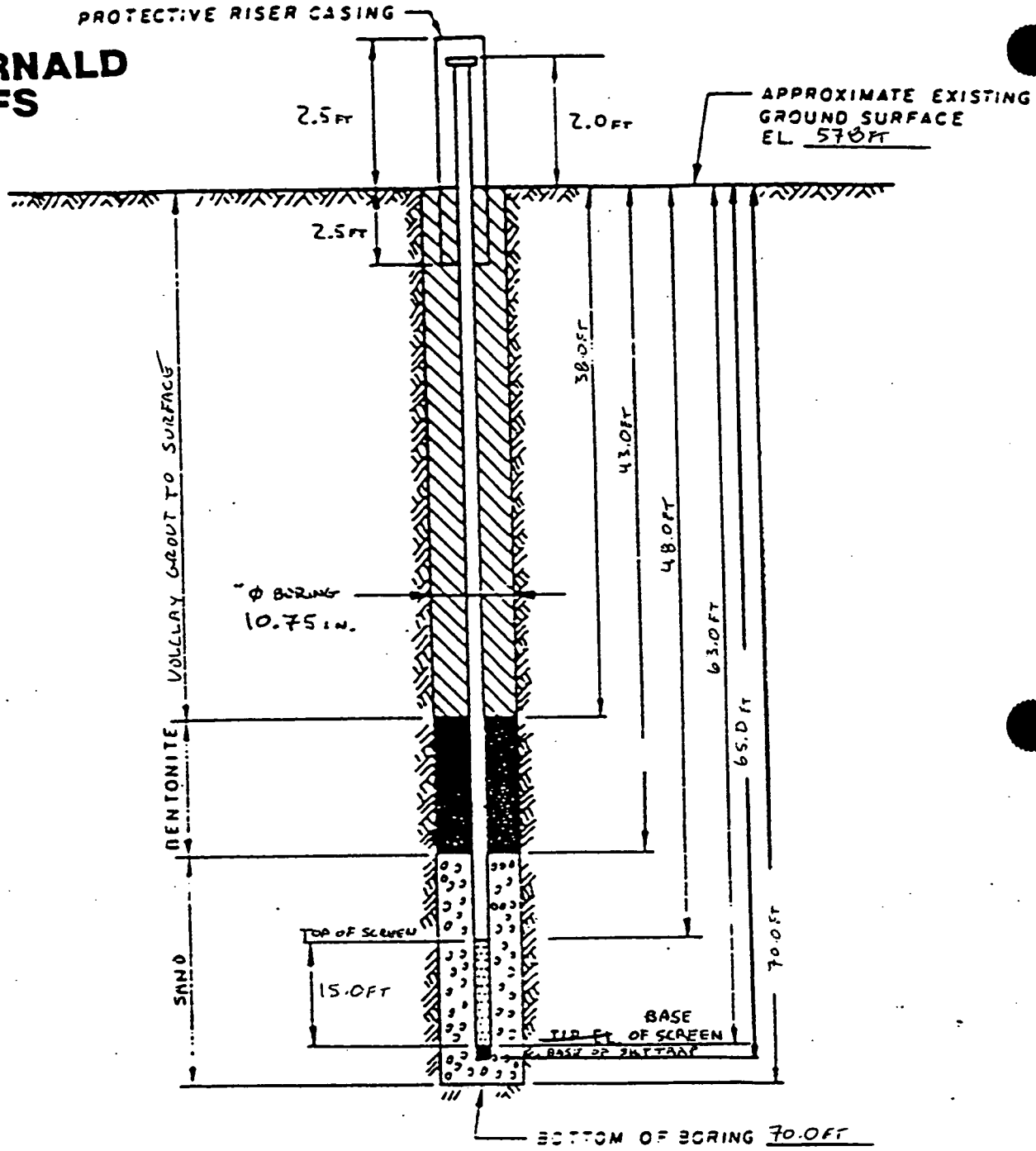
BACKGROUND

Hnu = 0.0 ppm

α = 0 cpm

βγ = 120-220 cpm

FERNALD RI/FS



DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DRAWN BY	10-20-90

NOTES:

1. RISER PIPE IS 4.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS - SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTTRAP)
4. ELEVATION OF WATER LEVEL 51.05 ; 51.28
5. WATER LEVEL READING ON 10-18-90 ; 10-19-90

MATERIALS USED DURING WELL INSTALLATION:

18 80 LB. BAGS OF 10/20 SAND
8 50 LB. BAGS OF VOLCLAY GROUT
9 5 GAL. BUCKETS OF BENTONITE PELLETS
700 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
SS PIPE SECTIONS: 1 15 FT SCREEN w/ 2 FT WELDED SILTTRAP, 5 10 FT RISERS

INSTALLATION DETAILS
MONITORING WELL #2649

PREPARED FOR
FERNALD RI/FS

1/7

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. M. SWANSON DATE 10-18-90
PROJECT NO. 602 3.2.1
CHECKED BY MG DATE 10-23-90
BORING NO. 2649
PIEZOMETER NO. 2649
DATE OF INSTALLATION 10-19-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 70.0 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 FT TO 70.0 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SLOTTED SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN.
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10 FT
JOINING METHOD THREADED - FLUSH JOINTED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION HINGED, LOCKING LID COVER

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0 FT	BOTTOM 38.0 FT	TOP	BOTTOM
BENTONITE	TOP 38.0 FT	BOTTOM 43.0 FT	TOP	BOTTOM
SAND	TOP 43.0 FT	BOTTOM 70.0 FT	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 48.0 FT	BOTTOM 63.0 FT	TOP	BOTTOM
PIEZOMETER TIP	65.0 FT			
BOTTOM OF BOREHOLE	70.0 FT			
GWL AFTER INSTALLATION	51.28 FT BELOW GROUND			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS 2 BUCKETS BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7.	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1674 124B Redrill	COORDINATES:	DATE: 12-16-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-16-90	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-19-90	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				0.0-2.0 is concrete			
1							HNU = ppm α = cpm Bγ = cpm
2	57489 1320 12-16-90	4	6	M Stiff ~~Lean~~ dark yellowish brown (10yr, 4/6) gravelly clay, some silty, med plasticity v. moist.	CL	.75 ~~2.0~~ J.L. 12-16-90	HNU = 8.0 ppm α = 50-100 cpm Bγ = 8000 cpm
	57490 1320 12-16-90	6	6	~~L Stiff~~ ~~Lean~~ dark grayish brown (2.5y, 4/2) gravelly clay, med plasticity, v. moist M Stiff	CL	.75 ~~2.0~~ J.L. 12-16-90	
3	57491 1320 12-16-90	4	6	~~Lean~~ dark yellowish brown to dark grayish brown (10yr, 4/6 to 2.5y, 4/2) Gravelly clay med plast., v. moist	CL	.75	HNU = NA ppm α = NA cpm Bγ = NA cpm
4	57492 1330 12-16-90	5	0	N.R			
	57493 1330 12-16-90	10	0	N.R			
	57494 1330 12-16-90	5	0	N.R			HNU = 20 ppm α = 50 cpm Bγ = 8000 cpm
5	57495 1350 12-16-90	5	6	Soft, dark grayish brown to dark yellowish brown (2.5y, 4/2) to (10yr, 4/6) gravelly clay high plasticity, v. moist	CL	.75	
	57496 1350 12-16-90	7	6	Soft, Gray to dark yellowish brown (10yr, 5/1) to 10yr, 4/4) silty clay. Trace gravel, high plasticity, v. moist	CL	.75	
6	57497 1350 12-16-90	13	6	Soft, Brown (10yr, 4/3) silt, some clay, moist	ML	<.25	HNU = 20 ppm α = 50 cpm Bγ = 8000 cpm
	57498 1500 12-16-90	15	6	v. soft brown, (10yr, 4/3) silty clay. Trace gravel med plasticity, moist to v. moist. M Stiff	CL	<.25	
7	57499 1500 12-16-90	12	6	~~V. Soft~~ olive (5y, 5/3) silty clay, Trace gravel med plasticity, moist	CL	<.75	

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment Auger

Driller: B. Yost

Helper B. Strapazzon

Geo Assistant

HNU Serial # A01345

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 8200 cpm; LEL = NA %; O_2 = NA %

SAA=Same As Above

NR=No Recovery

001275

243B-3-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1674	COORDINATES:	DATE: 12-17-90
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-16-90
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-19-90
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	57500 1500 12-16-90	22	6	V. stiff, very dark gray (2.5Y, 3/1) silty clay, Trace gravel, low plasticity, moist	CL	3.25	HNU = 2.0 unsustain ppm; α = 50 cpm; Bγ = 8000 cpm
8	57501 1500 12-17-90	15	3	Stiff, (2.5Y, 4/1 to 2.5Y, 5/4) dark gray to light olive brown, silty clay Trace gravel, med plasticity moist	CL	1.25	
	57502 1500 12-17-90	14	3	S.A.A	CL	1.25	"
9	57503 1500 12-17-90	13	6	Stiff, (10yr, 5/1 to 7.5yr, 5/6) gray to strong brown, clayey silt Trace gravel low plast. moist.	ML	1.75	HNU = 0 ppm; α = 100 cpm; Bγ = 6000 cpm
	57504 1530 12-17-90	12	3	Soft, gray to brown (10yr, 5/1 to 10yr 5/3) silty clay Trace gravel, med plasticity, moist.	CL	.25	
10	57505 1530 12-17-90	12	6	Stiff, dark gray to strong brown (2.5Y, 4/1 to 7.5Y, 5/6) silty clay, med plasticity, moist	CL	1.0	
	57506 1530 12-17-90	9	3	Soft, strong brown (7.5yr, 4/6) gravelly clay some silt, no plasticity, moist	CL	.5	HNU = 2.0 unsus. ppm; α = 1000 cpm; Bγ = 6000-8000 cpm
11	57507 1600 12-17-90	12	0	N.R.	NA	NA	
	57508 1600 12-17-90	15	6	Soft, yellowish brown, (10yr, 5/4) gravelly clay some sand, High plasticity, very moist	CL	.25	J.L 12-18-90
12	57509 1600 12-17-90	13	6	Stiff, yellowish brown, (10yr, 5/4) gravelly clay, some sand med plasticity, moist.	CL	1.0	HNU = 10.0 unsustained ppm; α = 50-100 cpm; Bγ = 6000-8000 cpm
	57510 1310 12-18-90	2	0	N.R.	NA	NA	
13	57511 1310 12-18-90	3	6	loose, dark yellowish brown (10yr, 5/4) gravelly sand, some clay, wet	SP	NA	
	57512 1310 12-18-90	5	6	loose, dark yellowish brown to very dark grayish brown (10yr, 4/3 to 2.5Y, 3/2) Gravel Sand clay mixture, wet.	GC	NA	HNU = 0 ppm; α = 60-80 cpm; Bγ = 8000 cpm
14	57513 1455 12-18-90	9	6	medium dense, yellowish brown (10yr, 5/4) Gravel sand silt mixture, Trace clay, wet	GM	NA	
15	57514 1455 12-18-90	12	6	medium dense, olive brown (2.5Y, 4/4) Gravel sand silt mixture, Trace clay, wet.	GM	NA	

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: CME 45 Auger

Driller: Bob Yost

Brian Strapazzon

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001276

243B-3-66

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1674	COORDINATES:	DATE: 12-19-90	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-16-90	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 12-19-90	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	57516 1465 12-19-90	25	6	S.A.A.			HNU = <1.0 ppm; α = 80-100 cpm; BY = 7000-8000 cpm
	57516 1510 12-19-90	15	6	Soft, dark gray to yellowish brown (2.5Y 4/1 to 10YR 5/4) clay Trace gravel V. moist med Plasticity	CL	.40	
16	57517 1510 12-19-90	23	6	Soft, dark gray to yellowish brown (2.5Y 4/1 to 10YR 5/4) Gravelly clay, med Plasticity. V. moist.	CL	.40	
	57518 1510 12-19-90	17	6	Dense, yellowish brown (10YR 5/4) Silt some clay, V. moist.	ML	NA	HNU = 0 ppm; α = 50-1000 cpm; BY = 8000 cpm
17	57519 1520 12-19-90	22	6	Very dense, yellowish brown (10YR 5/4) Gravel sand silt mixture, wet.	GM	NA	
	57520 1520 12-19-90	31	6	Very dense, brown (10YR 4/3) Silt Trace clay, V. moist.	ML	NA	
18	57521 1520 12-19-90	32	6	Very dense, gray (2.5Y 5/1) Silt, trace clay, V. moist	ML	NA	HNU = 0 ppm; α = 50-100 cpm; BY = 8000 cpm
	57522 1545 12-19-90	39	6	Very dense, yellowish brown (10YR 5/4) Gravel sand silt mixture trace clay wet.	GM	NA	
19	57523 1545 12-19-90	27	6	SAA	GM	NA	
	57524 1545 12-19-90	33	6	SAA	GM	NA	
20				BOTTOM OF BORING @ 20.0 FT. SAMPLING ENDED @ 20.0 FT.			

NOTES:

Contractor Penn Drilling

Equipment CME 45 Auger

B. Yost

J. Strapazzon

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

243B-3-86

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC, RIFS 602.3.7 FIELD ENG./GEO. J. Lear DATE 12-19-90
PROJECT NO. 602.3.7 CHECKED BY E. Trollinger DATE 1-7-91
BORING NO. 1674
PIEZOMETER NO. 1674 DATE OF INSTALLATION 12-19-90

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT 8 in Hollow Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED: NA
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~	SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 2 in PVC Pipe	RISER PIPE MATERIAL PVC Pipe Sch. 40
DIAMETER OF PERFORATED SECTION 2 5/16	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 5/16 in I.D. 2 in
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10 ft
AVERAGE SIZE OF PERFORATIONS .020 in	JOINING METHOD Threaded Flush Joints
TOTAL PERFORATED AREA 9.6 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ~~NA~~ 8 in J.L. 12-20-90	OTHER PROTECTION ~~NA~~ E.T. FLUSH MOUNT
PROTECTIVE PIPE O.D. ~~NA~~ 4 5/16 in J.L. 12-20-90	PROTECTIVE COVER, EXPANDABLE PLUG FOR PVC.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	~~2.5A~~ E.T. 1-7-91 0.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	.5 ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/cement	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 6.75	TOP	BOTTOM
SAND	TOP 6.75	BOTTOM 20.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 10.0	BOTTOM 19.6	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	7.85			

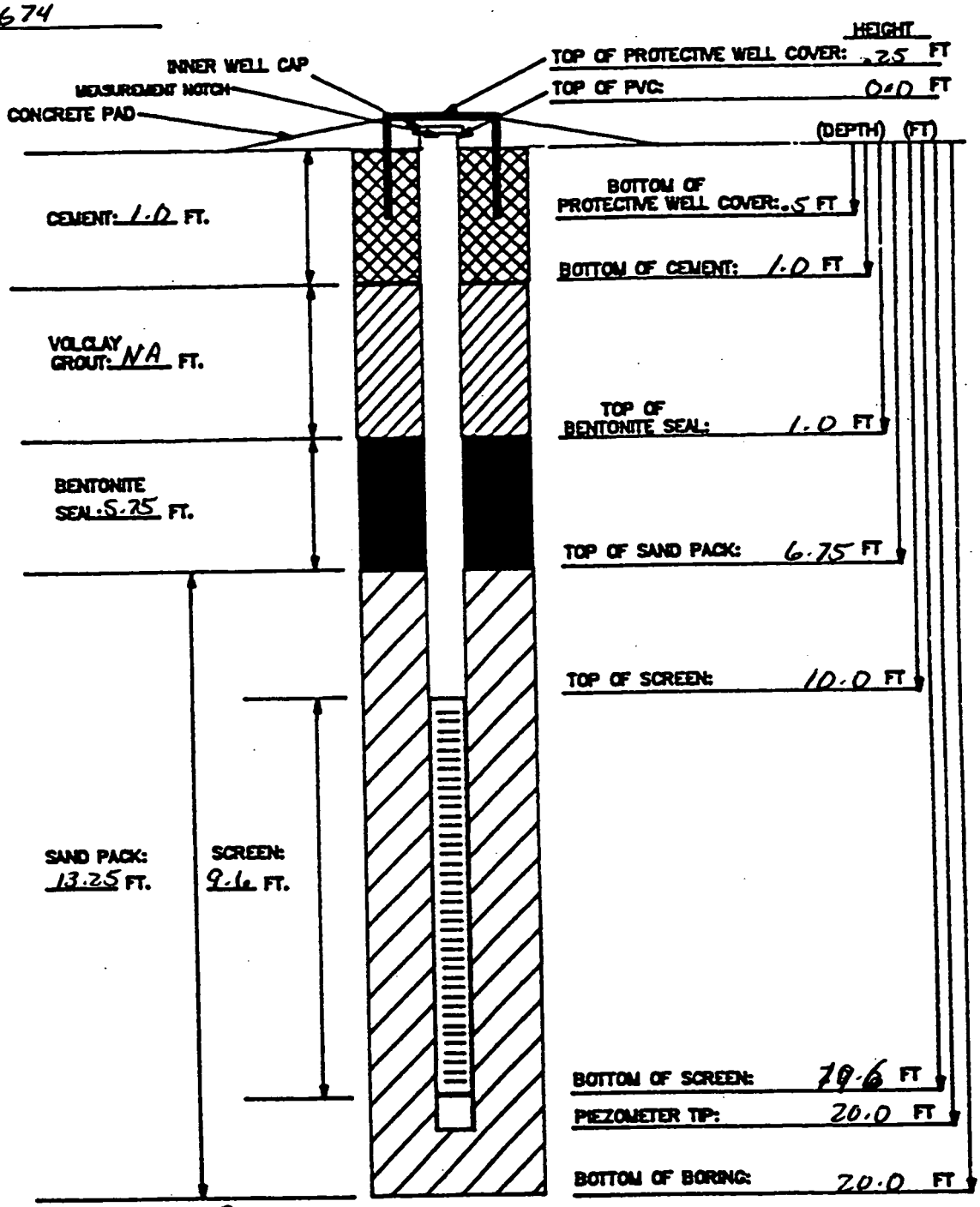
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1674

INSTALLATION DATE: 12-19-90



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 5 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: ~~[illegible]~~ 1/2 BAG
AMOUNT OF WATER USED: 2 gal
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

COAL PILE RUNOFF BASIN

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7.	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1675	COORDINATES: N48/182.80 E238/060.63	DATE: 3-5-91	
ELEVATION: 587.26 Ground	GWL: Depth none encountered Date/Time NA	DATE STARTED: 3-5-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 3-8-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	57489 1600 3-5-91	4	6	Hard, dark yellowish brown to very dark grayish brown (10yr, 4/6 to 10yr, 3/2) silty clay, some gravel low Plast., Sl. moist.	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57490 1600 3-5-91	8	6	Hard, dark yellowish brown to black, (10yr. 4/6 to 2.5y, 2/) silty clay, some coal gravel, low plast., Sl. moist.	CL	>4.0	
	57491 1600 3-5-91	12	6	S.A.A.	CL	>4.0	
2	57492 1630 3-5-91	17	6	Hard, dark gray, (10yr, 4/1) silty clay, some coal gravel, trace sand, low plast. Sl. moist.	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57493 1630 3-5-91	23	6	S.A.A	CL	>4.0	
	57494 1630 3-5-91	30	6	Hard: Yellowish brown, (10yr, 5/8) silty clay, some gravel, trace sand, low plast., Sl. moist.	CL	>4.0	
4	57495 1650 3-5-91	33	6	S.A.A. Plus: gray. (10yr, 5/1)	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57496 1650 3-5-91	27	6	S.A.A. (Plus: gray, (10yr, 5/1)	CL	>4.0	
	57497 1650 3-5-91	27	6	Very stiff, dark gray to dark yellowish brown (10yr, 4/1 to 10yr, 4/4) silty clay, some organics, trace gravel, moist.	CL	>4.0	
5	57498 0915 3-6-91	10	6	Hard Yellowish brown (10yr, 5/6) silty clay some gravel, trace sand, low plast. Sl. moist	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57499 0915 3-6-91	13	6	S.A.A.	CL	>4.0	
	57500 0915 3-6-91	13	4	S.A.A.	CL	>4.0	
6	57501 0925 3-6-91	16	6	S.A.A.	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57502 0925 3-6-91	21	6	S.A.A.	CL	>4.0	
7	57503 0925 3-6-91	26	6	S.A.A.	CL	>4.0	

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment CME 45 Auger

Driller: Bob Yost

Helper Bill Anderson

Geo Assistant NA

HNU Serial # A01345

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 80-150 cpm; LEL = NA %; O_2 = NA %

SAA=Same As Above

NR=No Recovery

001280

REVIEWED BY QA [illegible] DATE 7-22-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7		PROJECT NAME: FMPC RI/FS			
BORING NUMBER: 1675		COORDINATES: See p.1		DATE: 3-6-91	
ELEVATION: See p.1		GWL: Depth See p.1	Date/Time See p.1	DATE STARTED: 3-5-91	
ENGINEER/GEOLOGIST: J. Lear		Depth See p.1	Date/Time See p.1	DATE COMPLETED: 3-8-91	
DRILLING METHODS: HOLLOW STEM AUGER				PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	57504 0930 3-6-91	26	0	N.R.	NA	NA	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57505 0930 3-6-91	28	0	N.R.	NA	NA	
	57506 0930 3-6-91	35	0	N.R.	NA	NA	
9	57507 0920 3-7-91	6	6	Hard, brown to strong brown, (10y.5/3 to 7.5yr.5/8) mottled silty clay, some gravel, low Plasticity, moist.	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57508 0920 3-7-91	28	6	S.A.A.	CL	>4.0	
10	57509 0920 3-7-91	32	6	Hard, gray to dark brown, (10yr, 5/1, to 7.5yr 4/4) silty clay, some gravel, low plast. moist	CL	>4.0	
	57510 1030 3-7-91	7	6	S.A.A.	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
11	57511 1030 3-7-91	10	6	Very stiff, gray (10yr 5/1) ~~clayey gravel~~ moist. clay, some gravel, med Plast. moist. J.L. 3-7-91	CL	2.5	
	57512 1030 3-7-91	14	6	S.A.A.	CL	2.5	
12	57513 1035 3-7-91	14	6	Dense, Yellowish brown, (10yr. 5/4) clayey gravel, V. moist.	GC	NA	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57514 1035 3-7-91	18	6	S.A.A.	GC	NA	
13	57515 1035 3-7-91	21	0	N.R.	NA	NA	
	57516 1330 3-7-91	18	0	N.R.	NA	NA	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
14	57517 1330 3-7-91	29	0	N.R	NA	NA	
	57518 1330 3-7-91	32	6	Very stiff, dark gray (10yr, 4/1) silty clay trace sand, trace gravel, low plast. sl. moist	CL	2.75	

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment CME Auger.

Driller: Bob Yost

Asst Bill Anderson

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001281

2439-3-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1675	COORDINATES: See p.1		DATE: 3-7-91
ELEVATION: See p.1	GWL: Depth See p.1	Date/Time See p.1	DATE STARTED: 3-5-91
ENGINEER/GEOLOGIST: J. Lear	Depth See p.1	Date/Time See p.1	DATE COMPLETED: 3-8-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	57519 1500 3-7-91	6	6	S.A.A. add Trace cobbles	CL	2.5	HNU = 0 ppm α = 0 cpm Bβ = 80-120 cpm
	57520 1500 3-7-91	10	4	S.A.A.	CL	2.5	
16	57521 1500 3-7-91	13	0	N.R	NA	NA	
	57522 1505 3-7-91	6	6	v. stiff, dark gray (10yr. 4/1) silty clay. Trace sand and gravel, med. to low plasticity, moist.	CL	2.5	HNU = 0 ppm α = 0 cpm Bβ = 80-120 cpm
17	57523 1505 3-7-91	12	6	S.A.A.	CL	2.0	
	57524 1505 3-7-91	13	6	S.A.A.	CL	2.75	
18	57525 1510 3-7-91	16	6	S.A.A	CL	2.75	HNU = 0 ppm α = 0 cpm Bβ = 80-120 cpm
	57526 1510 3-7-91	18	6	S.A.A.	CL	2.5	
19	57527 1510 3-7-91	19	6	S.A.A.	CL	2.5	
	57528 1510 3-7-91	21	6	S.A.A	CL	2.5	
20				Sampling and drilling ends at 20.0' HSL samples taken as per work Plan TCLP Sample No. 57529 Total U. Sample No. 57530			

NOTES:

Drilling Contractor: Penn Drillings

Drilling Equipment: CME 95 Auger

Driller: Bob Yost

B.N Anderson

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

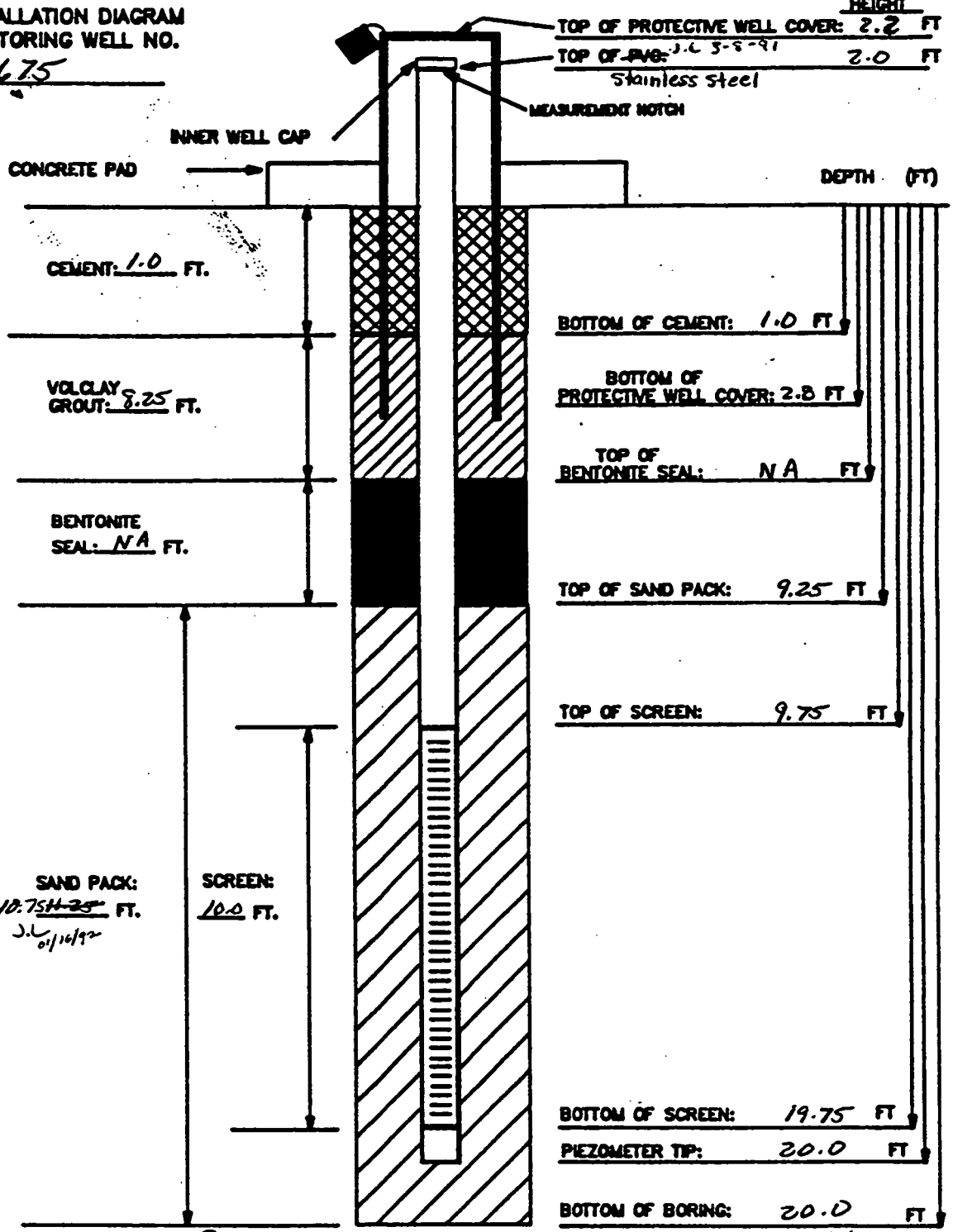
NR=No Recovery

001282

INSTALLATION DATE: 3-8-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1675



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: 20/20, 3-80lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA 1/2 J.L 3-8-91
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: ~~1/2 bag~~ 2 bags J.L 3-8-91
AMOUNT OF WATER USED: 25 gals
OTHER: NA

NOTES: J.L. 3/8/91 stainless steel w/ 010 slots J.L 3-8-91
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA

TASK: 602.3.7 GEOLOGIST/ENGINEER: J. Lear

REVIEWED BY QA [illegible] DATE 7-22-91

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.3.7
BORING NO. 1675
PIEZOMETER NO. 1675

FIELD ENG./GEO. J. Lear DATE 3-8-91
CHECKED BY E. Todlinger DATE 4-1-91
DATE OF INSTALLATION 3-8-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 8 in Hollow Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 2 in Stainless Steel
DIAMETER OF PERFORATED SECTION 2 in
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01
TOTAL PERFORATED AREA 10'

RISER PIPE MATERIAL Stainless steel
RISER PIPE DIAMETERS:
O.D. 2 3/8 in I.D. ~~2 5/8 in~~ 2.0 in. J.L. 3-8-91
LENGTH OF PIPE SECTIONS 2-10ft section 1-2ft sec.
JOINING METHOD Threaded flush Joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'
PROTECTIVE PIPE O.D. 4 3/8 in

OTHER PROTECTION Hinged Cap Locked

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0		589.26	
GROUND SURFACE	0.0		587.26	
BOTTOM OF PROTECTIVE PIPE	2.8		584.46	
BOREHOLE FILL MATERIALS:				
J.L. 3-8-91 ~~GROUT/SLURRY~~ cement	TOP 0.0	BOTTOM 1.0	TOP 587.26	BOTTOM 586.26
J.L. 3-8-91 ~~BENTONITE~~ Grout	TOP 1.0	BOTTOM 9.25	TOP 586.26	BOTTOM 578.01
SAND	TOP 9.25	BOTTOM 20.0	TOP 578.01	BOTTOM 567.26
J.L. 3-8-91 ~~GRAVEL~~	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.75	BOTTOM 19.75	TOP 577.51	BOTTOM 567.51
PIEZOMETER TIP	20.0		567.26	
BOTTOM OF BOREHOLE	20.0		562.26	
GWL AFTER INSTALLATION	N.A		NA/VARIABLE IF water flows in.	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS well constructed as per work plan. no water encountered

~~001284~~

REVIEWED BY QA MB DATE 7-22-91

FERNALD RI/FS

COAL PILE RUNOFF BASIN.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1676	COORDINATES: N481187.51, E1380929.41	DATE: 3-8-91
ELEVATION: 587.04 Ground	GWL: Depth none encountered Date/Time NA	DATE STARTED: 3-8-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 3-11-91
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	57531 1535 3-8-91	7	6	Hard, (10yr, 5/3 to 10yr, 5/1) brown to gray silty clay, some gravel Trace organics, low plasticity, sl. moist	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57532 1535 3-8-91	17	6	Hard, (yellowish brown to dark grayish brown ~~silty clay~~ (10yr, 5/6 to 10yr 4/2) silty clay. Trace coal gravel, low plast. sl moist	CL	>4.0	
1	57533 1535 3-8-91	23	6	Hard, black to dark grayish brown. (2.5y, 3/1 to 10yr, 4/2) gravelly clay, with coal. low plast. sl. moist.	CL	>4.0	
	57534 1600 3-8-91	17	6	Hard, yellowish brown (10yr 5/4) silty clay, some fine coal gravel, low plasticity, sl. moist	CL	>4.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
2	57535 1600 3-8-91	23	6	S.A.A	CL	>4.0	
	57536 1600 3-8-91	26	6	S.A.A except V. Stiff	CL	3.0	
3	57537 1000 3-8-91	15	6	Stiff, brown (10yr, 5/3) silty clay Trace sand & fine gravel, low to med plasticity, moist.	CL	1.25	HNU = 0 ppm; α = 0 cpm; Bγ = 80-150 cpm
	57538 1000 3-8-91	20	6	Hard, yellowish brown (10yr, 5/6) silty clay, Trace sand & gravel, low plasticity, sl. moist	CL	>4.0	
4	57539 1000 3-8-91	25	6	S.A.A. Add gray (10yr, 6/1)	CL	>4.0	
	57540 1050 3-8-91	7	6	Very stiff dark yellowish brown. (10yr, 4/6) silty clay, Trace sand & fine gravel, low plast. sl. moist	CL	3.5	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
5	57541 1050 3-8-91	9	6	S.A.A.	CL	3.5	
	57542 1050 3-8-91	10	6	S.A.A.	CL	3.5	
6	57543 1055 3-8-91	11	6	S.A.A	CL	3.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57544 1055 3-8-91	11	6	Stiff, dark yellowish brown to strong brown, (10yr, 4/6 to 7.5yr 2, 4/6) clayey silt, some sand, low plast., moist.	ML	1.25	
7	57545 1055 3-8-91	12	6	S.A.A	ML	1.25	

NOTES:

Drilling Contractor Penn Drillings

Drilling Equipment CME 45 Auger

Driller: Bob Yost

Helper Bill Anderson

Geo Assistant NA

HNU Serial # AU 1345

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 80-150 cpm; LEL = NA %; O_2 = NA %

SAA=Same As Above

NR=No Recovery

001285

REVIEWED BY QA WB DATE 8-28-91

2435-3-86

FERNALD RI/FS

Date	6-5-91	7-8-91	
Initial	[illegible]	[illegible]	
	1st Ker In	2nd Ker In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1676	COORDINATES: See p.1		DATE: 3-9-91
ELEVATION: See p.1	GWL: Depth See p.1	Date/Time See p.1	DATE STARTED: 3-8-91
ENGINEER/GEOLOGIST: J. Lear	Depth See p.1	Date/Time See p.1	DATE COMPLETED: 3-11-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				J.L. 9-9-91			
8	57546 1100 3-9-91	11	6	very stiff, ~~light~~ dark yellowish brown to strong brown, (10yr. 4/6 to 7.5yr. 4/6) silty clay Trace sand and fine gravel, low plast. moist	CL	3.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57547 1100 3-9-91	12	6	S.A.A.	CL	7.0	
	57548 1100 3-9-91	16	6	S.A.A	CL	3.0	
9	57549 1345 3-9-91	10	6	v. stiff, grayish brown to strong brown. (10yr. 5/2 to 7.5yr. 5/4) silty clay, some cobbles, Trace sand & gravel, low plasticity, ~~sf~~ moist J.L. 9-9-91	CL	2.5	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57550 1345 3-9-91	17	6	S.A.A	CL	2.75	
10	57551 1345 3-9-91	22	6	S.A.A Plus gray (10yr. 5/1)	CL	2.75	
11	57552 1430 3-9-91	10	6	v. stiff, gray. (10yr. 5/1) silty clay, some gravel, med. plast., moist.	CL	2.75	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57553 1430 3-9-91	17	6	S.A.A.	CL	2.5	
	57554 1430 3-9-91	20	4	S.A.A	CL	2.75	
12	57555 1435 3-9-91	16	6	S.A.A	CL	2.5	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57556 1435 3-9-91	17	6	S.A.A	CL	2.25	
13	57557 1435 3-9-91	20	6	S.A.A	CL	2.0	
14	57558 0925 3-10-91	7	6	very stiff, grayish brown. (2.5Y, 5/2) silty clay. Trace gravel, med plast., moist	CL	2.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57559 0925 3-10-91	10	6	S.A.A	CL	2.5	
	57560 0925 3-10-91	15	4	S.A.A	CL	2.0	

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment CME 45 Auger

Driller: Bob Yost

Asst Bill Anderson

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001286

REVIEWED BY 112 DATE 8-28-91

FERNALD RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Date	6-5-92	6-8-92	
Initial	[illegible]	[illegible]	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1676	COORDINATES: See p.1	DATE: 3-10-91	
ELEVATION: See p.1	GWL: Depth See p.1 Date/Time See p.1	DATE STARTED: 3-8-91	
ENGINEER/GEOLOGIST: J. Lear	Depth See p.1 Date/Time See p.1	DATE COMPLETED: 3-11-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	57561 1020 3-10-91	3	6	S.A.A	CL	2.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57562 1020 3-10-91	7	6	S.A.A	CL	2.25	
16	57563 1020 3-10-91	10	6	S.A.A	CL	2.0	
	57564 1025 3-10-91	11	6	S.A.A	CL	2.0	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
17	57565 1025 3-10-91	13	6	S.A.A	CL	2.25	
	57566 1025 3-10-91	15	0	N.R	NA	NA	
18	57567 1030 3-10-91	14	6	Stiff, grayish brown, (2.5Y, 5/2) Silty clay Trace gravel, med Plast., moist	CL	1.5	HNU = 0 ppm; α = 0 cpm; Bγ = 80-120 cpm
	57568 1030 3-10-91	15	6	S.A.A.	CL	1.5	
19	57569 1030 3-10-91	17	6	S.A.A Add Trace Sand	CL	1.25	
	57570 1030 3-10-91	19	0	N.R.	NA	NA	
20				Drilling and sampling stop at 20.0 ft. HSL Samples taken as per work plan TCLP Sample No. 57571 Total U Sample No 57572			

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment CME 45 Auger

Driller: Bob York
Bill Anderson

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001287

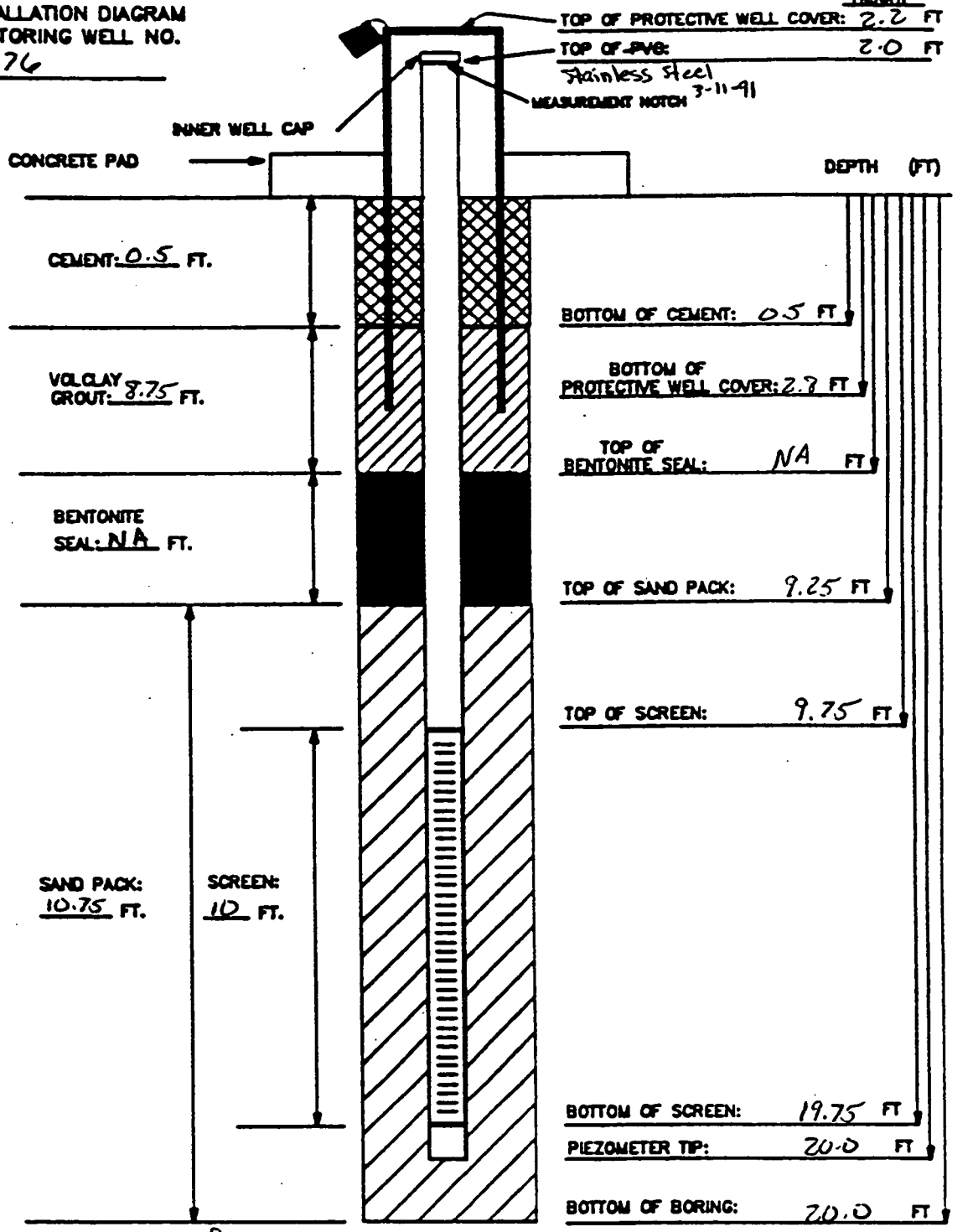
REVIEWED BY QA: MS DATE 8-28-91

4/5 5711

INSTALLATION DATE: 3-11-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1676



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20. 4-80lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: 3
AMOUNT OF CEMENT: 3 bags
AMOUNT OF WATER USED: 15 gals
OTHER: NA

NOTES: J.L. 3-11-91
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 0.01 in. Slots 6 Stainless steel
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. WELDED SUMP.
4) WATER DEPTH/DATE: NA

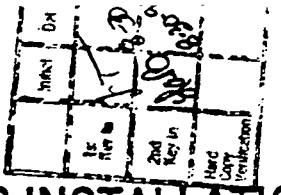
TASK: 602.

GEOLOGIST/ENGINEER: J. Lear

001288

REVIEWED BY QA 113 DATE 8-28-91

FERNALD RI/FS



5/5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 3-11-91
PROJECT NO. 602.37 CHECKED BY E. Trollinger DATE 3-1-91
BORING NO. 1676
PIEZOMETER NO. 1676 DATE OF INSTALLATION 3-11-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID None FROM ____ TO ____
FLUID None FROM ____ TO ____

TYPE OF BIT 8 in Hollow Auger
CASING SIZE (S) USED: NA
SIZE None FROM ____ TO ____
SIZE None FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE 2 in ID Stainless Steel
DIAMETER OF PERFORATED SECTION 2 in
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01
TOTAL PERFORATED AREA 10.0 ft²

RISER PIPE MATERIAL Stainless steel
RISER PIPE DIAMETERS:
O.D. 2 3/8 I.D. 2.0 in
LENGTH OF PIPE SECTIONS 2-10ft sect. 1-2ft sect.
JOINING METHOD Threaded, flush Jointed

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 4 3/8 in

OTHER PROTECTION Stainless steel cap (well cover)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT.)	
TOP OF RISER PIPE	2.0		589.04	
GROUND SURFACE	0.0		587.04	
BOTTOM OF PROTECTIVE PIPE	2.8		584.24	
BOREHOLE FILL MATERIALS: J.L 3-11-91 ~~GROUT/SLURRY~~ cement	TOP 0.0	BOTTOM 0.5	TOP 587.04	BOTTOM 586.54
J.L 3-11-91 ~~BENTONITE~~ Grout	TOP 0.5	BOTTOM 9.25	TOP 586.54	BOTTOM 577.79
SAND J.L 3-11-91 ~~GRAVEL~~	TOP 9.25	BOTTOM 20.0	TOP 577.79	BOTTOM 567.04
	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.75	BOTTOM 19.75	TOP 577.29	BOTTOM 567.29
PIEZOMETER TIP	20.0		567.04	
BOTTOM OF BOREHOLE	20.0		567.04	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS 8 well constructed as per work plan. No water encountered

001289

REVIEWED BY QA 43 DATE 8-28-91

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 602.50.03.11	PROJECT NAME Magnetic Anomolies Trenching		
BORING NUMBER: ~~H004~~ 1677	COORDINATES: N482,718/E1,381,932	DATE 8/22/91	
LOCATION: 08/9/92	GWL: Depth Date/Time	DATE STARTED: 8/22/91	
ENGINEER/GEOLOGIST Michael Worley	Depth 8-22-92 Date/Time	DATE COMPLETED: 8/22/91 8-22-92	
DRILLING METHODS: E110 B Hydraulic Excavator / CAT		PAGE 1 OF 21	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION TRENCH "B" – Mid Point PINE TREES	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	9-22-92			Various pieces of metal debris.			HNU = 0 ppm
2	102878 ~~102877~~	N/A	Track hoe bucket full 18"X36"X24" approx.				βγ = 60 cpm α = 0 cpm SPA3 = 9,000 cpm
3	0900 8/22/92			Hard (2.5Y, 5/6) light olive brown silty clay, with trace gravel No plasticity, dry.	Cl	2.5	NOTE: Some crystalline limestone slabs are ~~inclusions~~ present. 8-22-92
4							
5							
6	102879 ~~102878~~ ~~102880~~ 8-22-91	N/A	Track hoe bucket full 18"X36"X24" approx.				HNU = 0 ppm βγ = 40 cpm α = 0 cpm SPA3 = 9,000 cpm
8	0915 8/22/92			Hard (2.5Y, N4/) dark gray clay trace gravel, trace crystalline limestone & shale slabs, low plasticity, slightly moist.	Cl	4.0	
9							
10							

MW 8-22-92

NOTES:

SAA - SAME AS ABOVE
NA - NOT Applicable

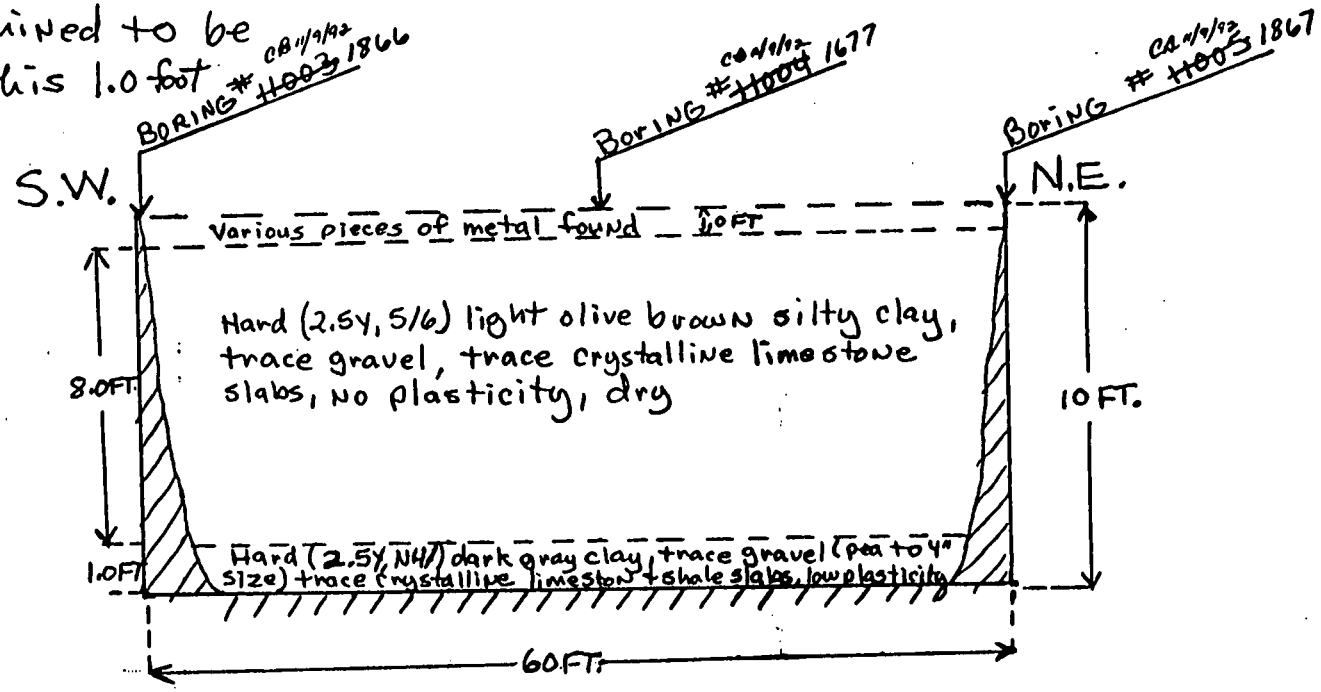
Drilling Contractor Pennsylvania Drilling
Drilling Equipment E110B Hydraulic Excavator/CAT
Driller Dave Newman
Samples collected per ASTM Standard Penetration Test
Colors identified by Munsell Color Chart

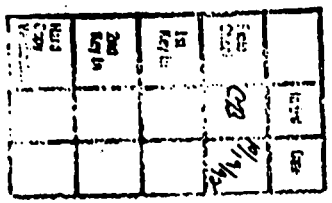
CB 10/9/92
Dow 11-10-92

MAGNETIC ANOMOLIES TRENCHING
TRENCH B PROFILE
NORTH PINE TREES

REVIEWED BY [illegible] DATE 10/22/92

NOTE: Trenching began in the N.E. end of trench and continued at 10 feet the 60 FT. length of the trench. Matallic rubble was encountered in the first 1.0 foot only. Soil was determined to be native till beneath this 1.0 foot zone.





* Soils encountered from surface are silty clays, trace coarse gravel (pea size to 4 in.). Lithology remained constant through the length of trench. Dark gray clay contacted at 9½ Feet. Miscellaneous pieces of metal and construction rubble where encountered in the first 1.0 Foot. None found to be contaminated.

GEOLOGIST:
MICHAEL WORLEY

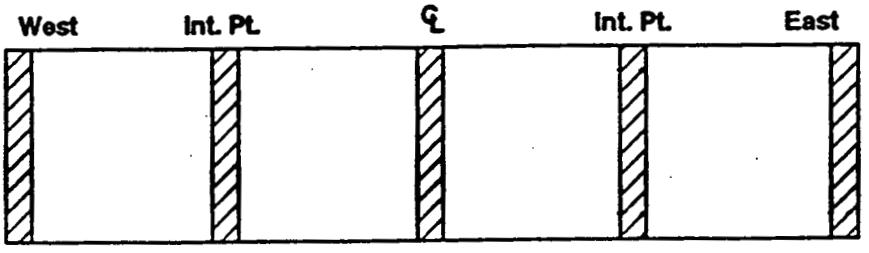
Diminsions:
width = 24 inches
Depth = 10 Feet
Lengt' 60 Feet

001291

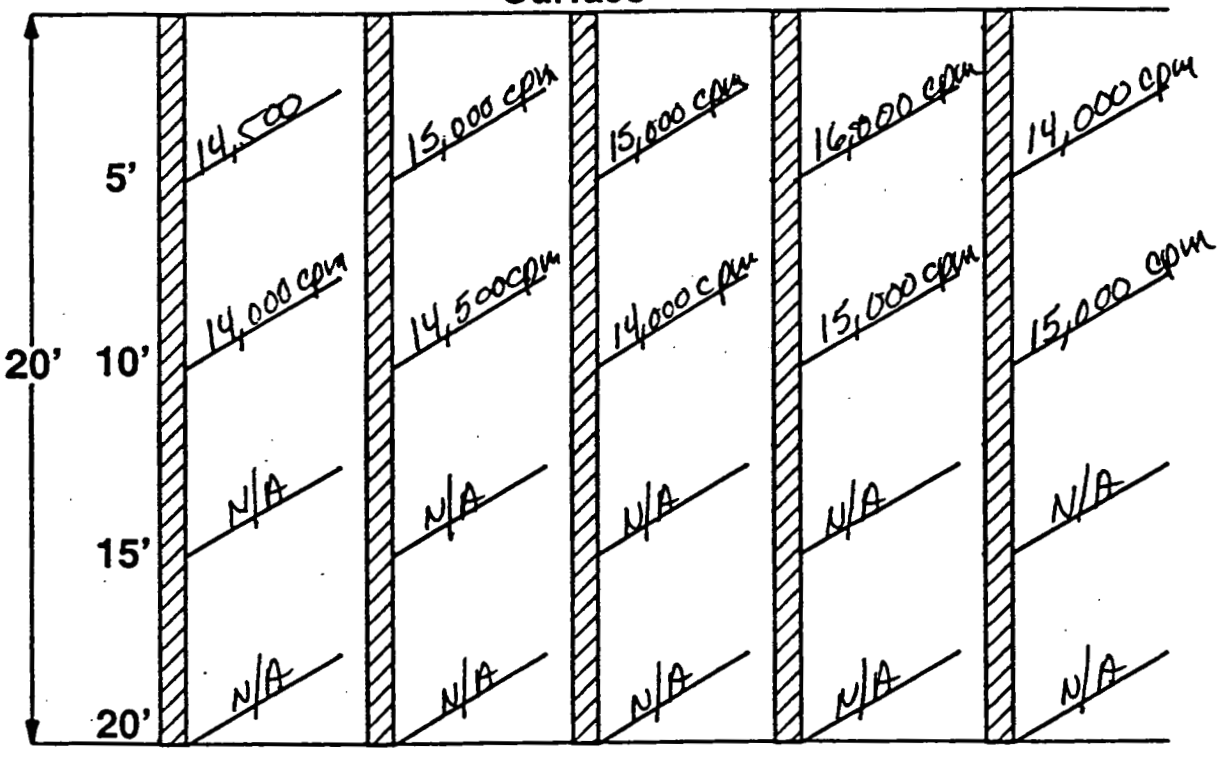
TRENCH "B"
Profiles/SPA 3

Surface Background Reading 14,000 cpm
SPA 3 Serial No. 01302
ESP Serial No. S/N 1302
ESP Cal. Date 1/7/92

Top View



Surface



Profiles taken with SPA 3 at 5 foot intervals at end, middle, and intermediate points of the trench.

	Initial	Date
Field Check	CB	10/9/92
1st Review		
2nd Review		
Hard Copy Transmittal		

REVIEWED BY QA DATE 10/12/92

TABLE 5

OBJECTS FOUND IN TRENCHES
602.50.03.11

Trench F - Nothing identifiable as metal.

Trench G - Nothing identifiable as metal.

Trench B -

1. milk bottle - glass
2. wire fence
3. Large I-bolt
4. Large nuts/bolts
5. small pieces of sheet steel
6. window glass
7. 5 gal. metal bucket lid
8. rebar
9. metal banding straps
10. surveying ribbon
11. channel iron
12. angle iron
13. roll of copper wine
14. miscellaneous pieces of steel sheet metal
15. small pieces of stainless steel

Trench A - same as above

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-27-92
ELEVATION:	GWL: Depth 8.85 ft TOC Date/Time 02/20/92	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth 8.45 ft TOC Date/Time 02/27/92	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 1 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 – 1.1	38030 1357 1-27-92	2 3 9	13	Medium dense olive brown (2.5Y, 4/3) CLAYEY SILT with organic matter, a little sand and very fine gravel, slightly moist	ML	N/A	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm
1.5 – 2.0	38031 1405 1-27-92	3 7 8	6	Stiff olive brown (2.5Y, 4/3) to light olive brown (2.5Y, 5/6) SILTY CLAY with organic matter, medium plasticity, slightly moist	CL	2.0	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm
3.0 – 3.75	38032 1415 1-27-92	7 9 10	9	Stiff light olive brown (2.5Y, 5/6) and some olive brown (2.5Y, 4/3) SILTY CLAY with organic matter, medium plasticity, slightly moist	CL	2.0	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm
4.5 – 5.7	38033 1420 1-27-92	7 9 11	14	Very stiff light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and very fine gravel, non plastic, slightly moist, trace yellowish red (5YR, 5/8) brick fragments	CL	3.5	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm
6.0 – 7.3	38034 1430 1-27-92	11 11 13	16	Very stiff light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and gravel, non plastic, slightly moist, trace yellowish red (5YR, 5/8) brick fragments	CL	4.0	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm

NOTES:
Drilling Company: Pennsylvania Drilling
Driller: Dave Newman
Assistant Driller: Bob Johnson

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell color Chart

Hnu S/N: ~~H85A01345~~ KM-H2792
Bγ S/N: 50760
α S/N: 50768

0.3 ppm, 15 cpm, 0 cpm } Background Levels

TOC = Top of casing
NA = Not Applicable

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-27-92
ELEVATION:	GWL: Depth Seep. 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 2 OF 15

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	38035 1446 1-27-92	15 13 21	18	Hard stiff light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and gravel, non plastic, slightly moist	CL	4.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
9.0	38036 1450 1-27-92	15 13 20	18	Hard light yellowish brown (2.5Y, 6/4) SILTY CLAY with sand and gravel, non plastic, slightly moist mixed with very dark grayish brown (2.5Y, 3/2) CLAY, high plasticity, slightly moist	CL	>4.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
10.5	38037 1550 1-27-92	1 7 11	13	Hard light olive brown (2.5Y, 6/4) SILTY CLAY with sand and gravel, and a little yellowish brown (10YR, 5/8) weathering, moist, non plastic 11.25 ft	CL	4.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
11.25 / 11.6				Medium dense light olive brown (2.5Y, 6/4) CLAYEY SAND, wet	SC	N/A	
12.0	38038 1600 1-27-92	16 20 28	18	Hard light olive brown (2.5Y, 6/4) SILTY CLAY with sand and gravel, non plastic, slightly moist	CL	>4.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
13.5	38039 1617 1-27-92	6 17 21	7	Very stiff gray (2.5Y, 5/6) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	2.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
14.1							
15.0							

NOTES:

Seep. 1

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-27-92
ELEVATION:	GWL: Depth see p 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 3 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	38040 1638 1-27-92	5 8 10	10	Very stiff gray (2.5Y, 5/6) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	2.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
16.5	38041 1706 1-27-92	3 7 9	11	Same As Above	CL	2.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
18.5	38042 1710 1-27-92	5 7 13	6	Same As Above	CL	2.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
19.5 19.8	38043 0908 1-28-92	11 32 50	4	Very dense light gray (5Y, 6/1) CLAYEY SILT, non plastic, moist	ML	N/A	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
21.0 21.75	38044 0921 1-28-92	8 9 10	9	Medium dense light gray (5Y, 6/1) SILT with trace CLAY, moist	ML	N/A	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
22.5							

NOTES

See p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	1-28-92
BORING NUMBER: 3678	COORDINATES:	DATE: ~~2-6-92~~ KM. 2-6-92
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 4 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5 23.0	38045 0930 1-28-92	5 7 9	6	Medium dense light gray (5Y, 6/1) fine SAND with silt and clay, moist	SM	N/A	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
24.0 24.8	38046 0940 1-28-92	8 9 13	10	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and fine gravel, moist, low plasticity	CL	3.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
25.5 26.6	38047 0950 1-28-92	5 11 21	13	Very stiff olive gray (5Y, 5/2) CLAYEY SILT with sand and gravel, moist, low plasticity	ML	3.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
27.0 27.8	38048 1030 1-28-92	10 9 9	10	Medium dense light gray (5Y, 6/1) CLAYEY SILT with fine sand, moist	ML	N/A	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
28.5 30.0	1044 1-28-92	1 5 3	0	No Recovery	N/A	N/A	N/A

NOTES

See p. 1

RI/FS

VISUAL CLASSIFICATION OF SOILS

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PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE 1-28-92
ELEVATION:	GWL: Depth see p 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 5 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	1052 1-28-92	11 9 11	0	No Recovery	N/A	N/A	N/A
31.5	38049 1107 1-28-92	6 9 11	16	Very Stiff olive (5Y, 5/2) SILTY CLAY with sand and gravel, low plasticity, moist	CL	2.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
32.8 33.0	38050 1324 1-28-92	3 5 5	13	Stiff olive (5Y, 5/2) SILTY CLAY with sand and gravel, low plasticity, moist	CL	1.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
34.1 34.5 35.3	38051 1336 1-28-92	38 28 16	10	Medium stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, low plasticity, moist	CL	1.0	Hnu = 0.3 Br = 15 cpm α = 0 cpm
36 37.2 37.5	38052 1350 1-28-92	8 13 31	14	Very Stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, low plasticity, slightly moist	CL	3.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm

NOTES

Sec p. 1

402-11-66

:RNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602.3.23	PROJECT NAME. FEMP RI/FS		
ING NUMBER: 3678	COORDINATES:	DATE. 1-28-92	
VATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 1-27-92	
INEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92	
LLING METHODS: Cable Tool 10" drill bit		PAGE 6 OF 15	

Ht.	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	38053 1440 1-28-92	13 25 31	10	Hard olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, trace wood fragments, non plastic, slightly moist	CL	>4.5	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
0	38054 1456 1-28-92	13 11 15	11	Hard olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, non plastic, slightly moist	CL	4.25	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
5	38055 1525 1-28-92	9 11 13	15	Very stiff olive gray (5Y, 4/2) SILTY CLAY with sand and gravel, low plasticity, slightly moist mixed with some dark brown (10YR, 3/3) CLAYEY SILT	CL/ML	2.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
5 0	38056 1530 1-28-92	9 15 21	9	Very stiff ~~olive gray (5Y, 4/2)~~ dark brown (10YR, 3/3) CLAYEY SILT with sand and gravel mixed with some olive gray (5Y, 4/2) SILTY CLAY, low plasticity, slightly moist	ML/CL	2.0	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm
5 0	38057 1543 1-28-92	10 11 15	18	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, trace wood fragments and fossils, low plasticity, slightly moist	CL	2.25	Hnu = 0.3 ppm Br = 15 cpm α = 0 cpm

7:S

See p. 1

ERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER: 602-3-23	PROJECT NAME. FEMP RI/FS	
RING NUMBER: 3678	COORDINATES:	DATE. 1-28-92
EVATION:	GWL: Depth See p 1 Date/Time	DATE STARTED: 1-27-92
GINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
ILLING METHODS: Cable Tool 10" drill bit		PAGE 7 OF 15

Depth (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	38058 1617 1-28-92	5 9 12	18	Very stiff olive gray (5Y, 5/2) SILTY CLAY with sand and gravel, low plasticity, slightly moist 46.5 FT	CL	2.0	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm *Bottom of glacial till at 46.5 FT
5	38059 1630 1-28-92	15 33 19	13	Very dense grayish brown (2.5Y, 5/2) GRAVELLY SAND, dry	SW	N/A	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm Aquifer
10	38060 1642 1-28-92	13 18 18	11	Dense grayish brown (2.5Y, 5/2) SAND with trace gravel, dry	SW	N/A	Hnu = 0.3 ppm Bγ = 15 cpm α = 0 cpm
15				Split Spoon samples will be taken at 5 ft. intervals			
20							

TIS

See p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-29-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 8 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
55.0							
55.9 56.5	38061 0920 1-29-92	48 50	11	Very dense grayish brown (2.5Y, 5/2) poorly graded Gravelly SAND, dry	SP ~~GP~~ 3/25/92	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
60.0							
61.0 61.5	38062 1040 1-29-92	10 50	12	Same As Above	SP ~~GP~~ 3/25/92	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
65.0							
66.0 66.5	38063 1340 1-29-92	31 50	12	Very dense grayish brown (2.5Y, 5/2) poorly graded medium SAND, dry	SP ~~SW~~ 3/25/92	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
70.0							

NOTES:

See p. 1

Hnu S/N: Ad336 — 0 ppm
Br S/N: 50760 — 15 cpm
α S/N: 50768 — 0 cpm
} Background Level

001301

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-29-92
ELEVATION:	GWL: Depth See p. 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 9 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
70.0	38064 1415 1-29-92	5 11 32	18	Dense grayish brown (2.5Y, 5/2) poorly graded medium SAND, dry	SP	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
71.5							
75.0	38065 1532 1-29-92	32 50	12	Very Dense grayish brown (2.5Y, 5/2) poorly graded medium SAND with a little coarse sand and gravel, wet	SP	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
76.0							
76.5							
85 ft ground surface							
80.0	38066 1640 1-29-92	8 15 13	18	Medium dense olive gray (5Y, 5/2) well graded SANDY GRAVEL, wet	GW	N/A	Hnu = 0 ppm Br = 15 cpm α = 0 cpm
81.5							* W.L. = 80.85 ft. 02/20/92
85.0							

NOTES:

See p. 1

* W.L. = Water Level taken ~~Below Ground Surface~~ 3/2/92 at top of casing

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-30-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 10 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
85.0	38067 0940 1-30-92	8 33 36	13	Very dense olive gray (5Y, 5/2) well graded SANDY GRAVEL	GW ~~SW~~ Wshkd	N/A	Hnu: .3 ppm Bγ: 15 cpm α: 0 cpm
86.5							
90.0	38068 1000 1-30-92	8 12 16	18	Medium dense olive gray (5Y, 5/2) medium SAND, trace fine gravel, wet	SP	N/A	Hnu = .3 ppm Bγ = 15 cpm α = 0 cpm
91.5							
95.0	38069 1105 1-30-92	21 33 39	18	Very dense olive gray (5Y, 5/2) well graded SAND, trace gravel, wet	SW	N/A	Hnu = .3 ppm Bγ = 15 cpm α = 0 cpm
96.5							
100							

NOTES

See. p. 1

1-30-92

001303

Hnu S/N: A0336 | .3 ppm
Bγ S/N: 50760 | 15 cpm
α S/N: 50768 | 0 cpm
} Background Level

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 1-30-92
ELEVATION:	GWL: Depth see p1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 11 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
100.0	38070 1400 1-30-92	7 13 23	11	Dense olive gray (5Y, 5/2) poorly graded coarse SAND with a little fine gravel, wet	SP	N/A	Hnu = .3 ppm Br = 15 cpm α = 0 cpm
101.5							
105.5	38071 1640 1-30-92	8 22 33	15	Medium dense olive gray (5Y, 5/2) well graded SAND, wet 105.5 FT Very stiff Olive (5Y, 4/3) and Gray (2.5Y, 5/0) clay, low plasticity, slightly moist	SW CL	N/A N/A	Hnu = .3 ppm Br = 15 cpm α = 0 cpm
106.25 106.5							
110.0	38072 1040 1-31-92	5 5 8	18	Very stiff gray (2.5Y, 5/0) SANDY CLAY with gravel, high plasticity, moist	CL	2.25	Hnu = .2 ppm Br = 15 cpm α = 0 cpm
111.5							
115.0							

NOTES

See p. 1

1-31-92

Hnu = .2 ppm
Br = 15 cpm
α = 0 cpm
} Background Levels

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 2-3-92
ELEVATION:	GWL: Depth see p. 1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 12 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
115.0	38073 1044 2-3-92	12 33 50	10	Hard olive (5Y, 5/4) CLAY with trace fossils including bryozoans, non plastic, slightly moist	CL	>4.5	Hnu = .2 ppm Br = 15 cpm α = 0 cpm
116.5							
120.0	38074 1415 2-3-92	5 7 9	5	Medium dense light yellowish brown (2.5Y, 6/4) CLAYEY SAND with gravel, slightly moist	SC	N/A	Hnu = .2 ppm Br = 15 cpm α = 0 cpm
121.5							
125.0	38075 1715 2-3-92	10 5 3	0	No Recovery	N/A	N/A	N/A
126.5							
130.0							

NOTES:

See p. 1

001305

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.323	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3678	COORDINATES:	DATE: 2-4-92
ELEVATION:	GWL: Depth See p.1 Date/Time	DATE STARTED: 1-27-92
ENGINEER/GEOLOGIST: Ken Marion	Depth Date/Time	DATE COMPLETED: 2-19-92
DRILLING METHODS: Cable Tool 10" drill bit		PAGE 13 OF 15

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
130.0	38076 0915 2-4-92	33 50/.2	5	Very dense light yellowish brown (2.5Y, 6/4) Fine gravel, slightly moist	GP	N/A	Hnu = 0.2 ppm Bq = 15 cpm α = 0 cpm
				Gray (2.5Y, 5/0) Shale (weathered)	130.2 ft SH	N/A	
131.5				Drilled through this zone			
132.0	38077 1040 2-4-92	50/.3	4	Gray (2.5Y, 5/0) Shale (Bedrock)	SH	N/A	Hnu = 0.2 ppm Bq = 15 cpm α = 0 cpm
133.5				Bottom of Bore Hole = 132 ft. Bottom of split spoon sampling = 132.3 ft.			

NOTES

SH (USGS SYMBOL) = Shale Bedrock

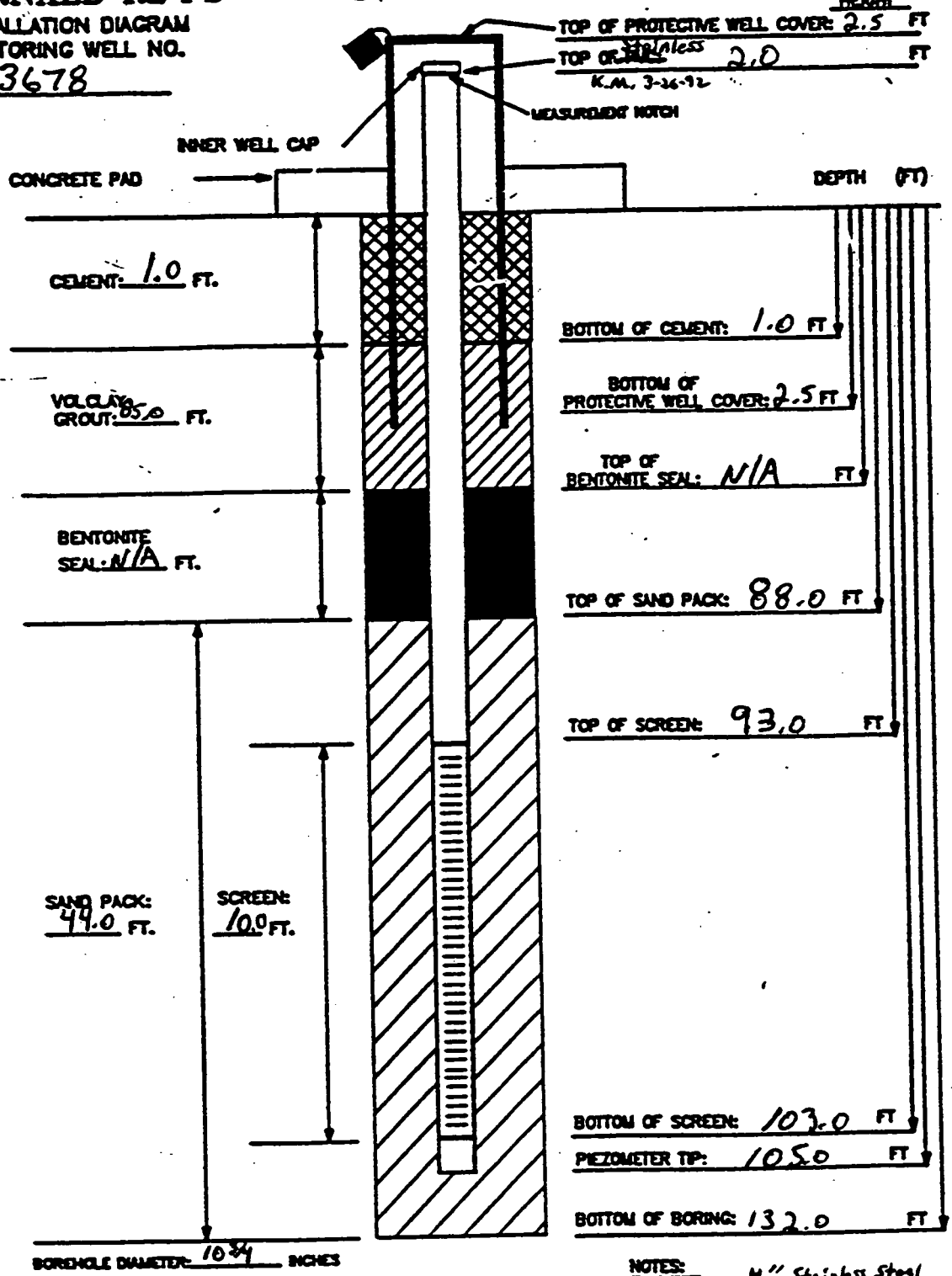
See p. 1

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 3678

Stickups

INSTALLATION DATE: 2-19-92



BOREHOLE DIAMETER: 10 3/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 430 SAND, 26 Bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: 19
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 800 gallons
OTHER:

NOTES:
1) RISER PIPE IS ~~3-INCH SCHEDULE 40~~ 4" Stainless Steel PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~3-INCH I.D. SCHEDULE 40~~ 4.0 in. I.D. PVC PIPE WITH ~~0.020-INCH~~ .010 in. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 80.85/2-20-92 TOC

TASK: 602, 3.23

GEOLOGIST/ENGINEER: Ken Marion

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 602.3.23
BORING NO. 3678
PIEZOMETER NO. N/A

FIELD ENG./GEO. Ken Marion DATE 2-20-92
CHECKED BY C. Gruber DATE 3/2/92
DATE OF INSTALLATION 2-19-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 132.0
FLUID N/A FROM N/A TO N/A

TYPE OF BIT 10" Churn Bit
CASING SIZE (S) USED:
SIZE 10 3/4 FROM 0 TO 132.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in.
TOTAL PERFORATED AREA 10 ~~15~~ ft. CH 3/6/92

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 10.0 FT, 5.0 FT
JOINING METHOD Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Steel Well Cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	Top: 0.0	Bottom 1.0		
CEMENT: GROUT/SLURRY	TOP 3.0	BOTTOM 88.0	TOP	BOTTOM
BENTONITE pellets (Hydrated)	TOP 1.0	BOTTOM 3.0 KM 2/20/92	TOP	BOTTOM
SAND	TOP 88.0	BOTTOM 132.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 93.0	BOTTOM 103.0	TOP	BOTTOM
PIEZOMETER TIP	105.0			
BOTTOM OF BOREHOLE	132.0			
GWL AFTER INSTALLATION	80.85 to top of Casing 2/20/92			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS The Temporary casing was removed during the installation of the well

ES-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: Fcmp RI/FS	
BORING NUMBER: 1679	COORDINATES:	DATE 1-23-92
ELEVATION:	GWL: Depth Dry Date/Time 1-28-92, 0945	DATE STARTED: 1-23-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-27-92
DRILLING METHODS: Cable tool		PAGE 1 OF 7

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	100400 100401 1530 1-23-92	3 7 8	7	Stiff, dark brown (10yr. 3/3) silty clay, some organics, [illegible], low plasticity	CL	1.25	Hnu - 0 ppm Bg - 40 cpm
2	100400 1535 1-23-92	7 8 10	12	Stiff yellowish brown, (10yr. 5/8) silty clay, some gravel, med. plasticity v. moist.	CL	1.25	Hnu - 0 - ppm Bg - 40 cpm
3 4	100400 1540 1-23-92	8 10 10	12	S.A.A.	CL	1.5	Hnu - 0 ppm Bg - 40 cpm
5 6	100402 1600 1-23-92	Shelby Attempt Recovery Not Ample to use	16 Shelby	yellowish brown, (10yr. 5/8) clay silt sand gravel, mix, ↓ 5.75 N R	GC	NA	Hnu - 0 ppm Bg - 40 cpm
7	1600	for Sample Recovery is Archived	Posted 2.7ft	↑ J.L. ↓ N.R	NA	NA	Hnu - 0 ppm Bg - 50 cpm

NOTES
Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 45
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A - Same As Above

N.R. - No Recovery

Background
Hnu - 0 ppm
Bg - 50 cpm

001309

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 1679	COORDINATES:	DATE 1-23-92
ELEVATION:	GWL: Depth see pg1 Date/Time	DATE STARTED: 1-23-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-27-92
DRILLING METHODS: cable tool		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	100403 100404	9	12	S.A.A	GC	NA	Hnu - 0 ppm
	100405 100406 1625	10		S.A. 1-27-92 ~~S.A.A~~ S.A.A	GC	NA	Bg - 50 cpm
9	1-23-92	10		N.R.			
	100407 1630	12 13	8	V. stiff, brown to gray, (10yr. 5/3) to (10yr. 5/1) silty clay, trace gravel, moist. low plasticity.	CL	3.5	Hnu - 0 ppm Bg - 50 cpm
10	1-23-92	21					
11	100407 1635	10 12	6	Hard, gray. (10yr, 5/1) silty clay, trace gravel, sl. moist. low plasticity	CL	4.0	Hnu - 0 ppm Bg - 50 cpm
12	1-23-92	18					
	100407 1640	12 16	8	V. stiff, gray to brown, (10yr. 5/1) to (10yr. 5/3) silty clay, some gravel, moist.	CL	3.5	Hnu - 0 ppm Bg - 50 cpm
13	1-27-92	25					
14	100407 6900	12 15	0	N.R	NA	NA	Hnu Bg NA
15	1-24-92	19					

NOTES: See Page 1

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 602.3.22	COORDINATES:	DATE 1-24-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-23-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-27-92
DRILLING METHODS: cable tool		PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	See 24 Above	21	0	N.R.	NA	NA	See Above
16	100408 100409	5	6	Stiff, gray, (10yr, 5/1) silty clay, some gravel, low to med plasticity, moist to very moist.	CL	3.5	Hnu - 0 ppm
	100410 100411 0905	3 3	3	S.A.A	CL	2.5	
17		50/3	0	NR	NA	NA	Bd - 50 cpm
	1-24-92	NR	0	J.L. 1-24-92 NR	NA	NA	
18	100412 0910	9 10 11	2	Stiff, gray to grayish brown, (10yr, 5/1) to (2.5y, 5/2) silty gravelly clay, low to med plast. moist. to v. moist.	CL	J.L. 1-27-92 2.0	Hnu - 0 ppm Bd - 40 cpm
19	1-24-92 100413 0915	4 7	9	Stiff, grayish brown, (2.5y, 5/2) silty clay, some gravel, low to med plast. moist.	CL	1.5	Hnu - 0 ppm Bd - 40 cpm
20	1-24-92	10					
21	100414 100415 0930	5 7	8	S. A. A.	CL	1.5	Hnu - 0 ppm Bd - 50 cpm
22	1-24-92	16					
				cont. page 4			

NOTES:
See page 1

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 1679	COORDINATES:	DATE 1-24-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-23-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-27-92
DRILLING METHODS: Cable Tool		PAGE ~~3~~ 4 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22	100414	5		Stiff, gray, (10yr, 5/1) silty clay, some gravel, low plasticity, sl. moist. 22.4'	CL	1.5	Hnu - 0 ppm
23	0940 1-24-92	12 16	8	med dense, sandy, clayey, well graded gravel, sl. moist.	GC	NA	BG - 40 cpm
24	1015 1-24-92	8 12 20	0	N.R.	NA	NA	Hnu - 0 ppm BG - 40 cpm
25	1020 1-24-92	10 15 19	0	N.R.	NA	NA	Hnu - NA BG - NA
27	1040 1-24-92	8 12 12	0	N.R.	NA	NA	Hnu - NA BG - NA
28 29	~~100416~~ 100416 1050 1-24-92	2 8 12	15	med stiff, dark grayish brown, (2.5y, 4/2) silty clay, some sand, some gravel, med plasticity, moist.	CL	.75	Hnu - 0 ppm BG - 40 cpm

NOTES: See page 1

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 1679	COORDINATES:	DATE 1-24-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-23-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-24-92 1-27-92
DRILLING METHODS: Cable tool		PAGE 5 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	100417 100418 ~~100419~~ 10419 JL 1-26-92	No blows on shelby tube	Pushed 30 ft Recovery 34 in	Stiff, olive brown, (2.5Y, 4/3) silty clay, some gravel, trace sand, mod plasticity, moist	CL	1.5	Hnu - 0 ppm
31	1100						
32	1-24-92						Bb - 40cpm
33	~~100419~~ ~~100420~~ JL 1-26-92 100420 100421 1110	5 6	5 0	mod stiff, olive brown (2.5Y, 4/3) sandy silty clay low to mod plast. moist to v. moist. NR.	CL	.75	Hnu - 0 ppm
34	1-24-92	10 15	0 0	NR. N.R			Bb - 40cpm
35				Sampling ends a ~~34.5 ft~~ 34.5 ft J.L 1-24-92 Drilling ends at 35.0 ft.			

NOTES See page 1
100422 - Full HSL
100423 - Trip Blank
100424 - Total U Wenco
100425 - Total U Th. It

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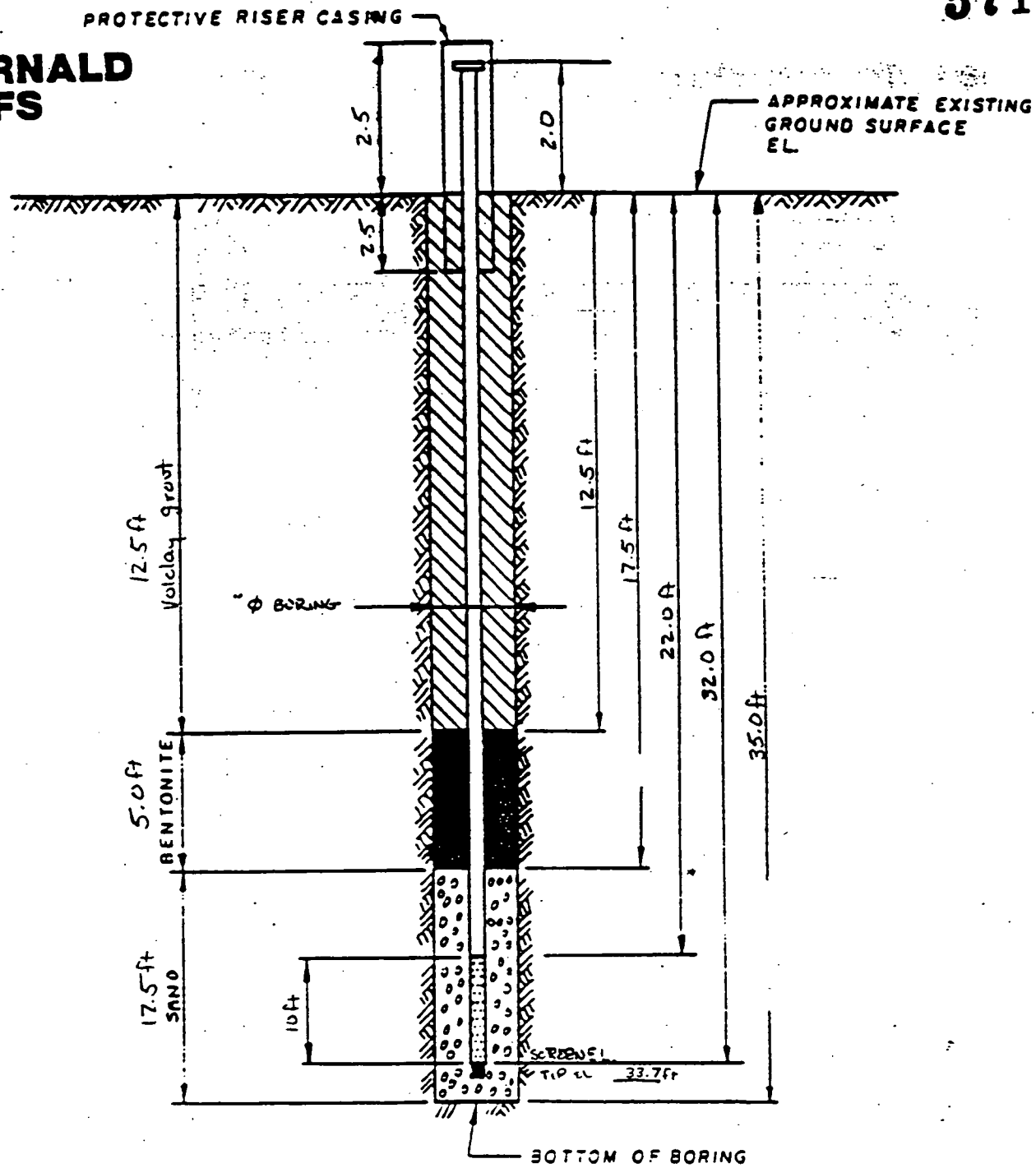
FERNALD RI/FS



DRAWN BY	J. Leo	CHECKED BY	
	1-28-92	APPROVED BY	

DRAWING NUMBER

NOTES:

1. RISER PIPE IS 4.0 IN I.D. 316 Stainless Steel ~~SCHEDULE~~ PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL No water encountered
5. WATER LEVEL READING ON NA (Dry well)

6 bags of 10x 20 sand

4 buckets (5 gal) bentonite

2 bags Volclay grout

300 gals H_2O used while Drilling

INSTALLATION DETAILS
MONITORING WELL
1679
PREPARED FOR
Fernald RI/FS

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS Misc Wells		
BORING NUMBER: 2679	COORDINATES:	DATE	1-13-92
ELEVATION:	GWL: Depth 6'8" Date/Time 1-21-92, 0900	DATE STARTED:	1-13-92
ENGINEER/GEOLOGIST: J. Leap	Depth 66.8 TOW Date/Time 1-22-92, 1500	DATE COMPLETED	1-22-92
DRILLING METHODS: Cable Tool		PAGE 1	OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	SL 1-15-92 38266	3		m. dense, dark brown (10yr 3/3) clayey silt, some organics, moist.			Hnu 0 ppm
1	1500	6	14		ML	NA	Bd 50cpm
	1-12-92	8					α 0cpm
	38267	3		~~m. dense~~ stiff, yellowish brown, 10yr, 5/6 silty clay, trace gravel, low plasticity, moist.			Hnu - 0 ppm
2	1505	6	15		CL	1.75	Bd - 50cpm
3	1-13-92	8					α - 0 cpm
	38268	8					Hnu - 0 ppm
4	1510	15	15	S.A.A. med plasticity.	CL	1.75	Bd - 50cpm
	1-13-92	18					α - 0
	38269	13		v. stiff, brown, (10yr, 5/3) ~~silty~~ clayey silt, some gravel, low plasticity, moist (Bd 2/26/92)			Hnu - 0 ppm
5	1515	14	14		ML	NA	Bd. - 50cpm
6	1-13-92	12					α - 0 cpm
	38270	9					Hnu - 0 ppm
7	1530	12	14	S.A.A	ML	NA	Bd - 50cpm
	1-13-92	14					α - 0 cpm

NOTES
Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 43
Driller - Craig Coulter.
Asst. - Gary Dye

S.A.A. - Same As Above
NA - Not Applicable
N.R. No Recovery

Background
Hnu - 0 ppm
Bd - 40 cpm
α - 0 cpm

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.22	PROJECT NAME FEMP RI/FS Misc Wells		
BORING NUMBER: 2767 2679	COORDINATES:	DATE 1-13-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92	
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92	
DRILLING METHODS Cable Tool		PAGE 2	OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	38271 1535 1-13-92	22 44 50	0	N.R	NA	NA	Hnv Bd α NA
9 10	38272 1550 1-13-92	12 23 31	16	Hard, brown to grayish brown (10yr, 5/3 to 10yr, 5/2) silty clay. Some gravel, Some mottling, sl. moist, low plasticity	CL	>4.5	Hnv - 0 ppm Bd - 50cpm α - 0cpm
11 12	38273 1555 1-13-92	26 31 36	12	V. stiff, gray, (10yr, 5/1) silty clay, Some gravel, some mottling, low plast. moist.	CL	2.0	Hnv - 0 ppm Bd - 50cpm α - 0cpm
13	38274 1600 1-13-92	13 23 23	0	N.R.	NA	NA	Hnv Bd α NA
14 15	38275 J.L. 1-13-92 1605 1-13-92	14 22 24	15	Stiff, gray, (10yr, 5/1) silty clay. trace gravel, low plast., moist.	CL	1.0	Hnv - 0 ppm Bd - 40cpm α - 0cpm

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS Misc Wells		
BORING NUMBER: 2679	COORDINATES:	DATE 1-13-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-22-92	
DRILLING METHODS: Cable Tool		PAGE 8	OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	38276 1650 1-13-92	3 8 11	16	Stiff, olive gray, ~~10yr~~ (5Y, 5/2) silty clay, trace gravel, low plast., moist	CL	1.75	Hnu - 0 ppm Bf - 40 cpm α - 0 cpm
17	38277 1700 1-13-92	50/2	1	Stiff, olive gray, (5Y, 5/2) silty clay. Some gravel, low to mid plasticity, moist.	CL	1.25	Hnu - 0 ppm Bf - 50 cpm α - 40 cpm
18 19	38278 1715 1-13-92	13 24 34	0	N.R.	NA	NA	Hnu Bf α N.R.
20	38279 1720 1-13-92	18 23 28	10	Stiff, olive gray to gray, (5Y, 5/2) to (10Yr, 5/1) silty clay, trace gravel, low to mid plasticity, moist.	CL	1.5	Hnu 0 ppm Bf. 40 cpm α 0 cpm
21 22	38280 1000 1-14-92	18 25 38	12	v. Stiff, olive gray, (2.5Y, 5/2) silty clay, some gravel moist.	CL	2.5	Hnu 0 ppm Bf 50 cpm α 0 cpm

NOTES see page 1.

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS Misc Wells	
BORING NUMBER: 2679	COORDINATES:	DATE 1-14-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS: Cable tool		PAGE 4 OF 18

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
23	38281 1045 1-14-92	12 24 31	13	S.A.A.	CL	2.5	Hnu - 0 ppm; Bs - 50cpm; α - 0 cpm
24 25	38282 1055 1-14-92	17 42 50/4	14	Hard, dark gray, (5Y, 4/1) silty clay, some gravel, low plasticity, moist.	CL	4.25	Hnu - 0 ppm; Bs - 40 cpm; α - 0cpm
26 27	38283 1105 1-14-92	50/3	2	Hard, Dark gray, (5Y, 4/1) silty clay some large gravel inhibiting recovery, low Plast., moist.	CL	4.25	Hnu - 0 ppm; Bs - 50cpm; α - 0 cpm
28	38284 1115 1-14-92	10 11 9	10	U. stiff, gray to Dark gray (10YR, 5/1 to 2.5Y, 5/2) silty clay, laminar gravel (Poorly graded mud) 1.5 in, some sand, moist.	CL	2.25	Hnu - 0 ppm; Bs - 50cpm; α - 0cpm
29 30	38285 1120 1-14-92	10 5 7	0	N.R.	NA	NA	Hnu - ; Bs - ; α - } NA

NOTES see page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.23	PROJECT NAME FEMP 121/FS Misc. Wells	
BORING NUMBER 2679	COORDINATES:	DATE 1-14-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-91
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS Cable tool		PAGE 5 OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	38286 1415 1-14-92	3 6 6	0	N.R.	NA	NA	Hnu - Bb - α - NA
32	38287 1425 1-14-92	5 5 8	8	Stiff, olive ~~brown~~ gray (5Y. 4/2) silty clay, some sand, trace gravel, low plast. moist.	CL	1.75	Hnu - 0 ppm Bb - 50cpm α - 0cpm
33 34	38288 1430 1-14-92	5 7 8	10	Soft, olive gray (5Y. 4/2) sandy silty clay, trace gravel, low plasticity, moist	CL	.6	Hnu - 0 ppm Bb - 50cpm α - 0cpm
35	38289 1435 J.L. 1-14-92	2 3 4	8	S.A.A. except some sand	CL	.6	Hnu - 0 ppm Bb - 50cpm α - 0cpm J.L 1-14-92
36							
37	38290 J.L. 1-14-92 1445 1-14-92	5 6 14	12	S.A.A. 36.75 Silty med dense, olive gray (5Y. 4/2) clayey sand (poorly graded, fine) moist.	CL SP/SM	.75 NA	Hnu - 0 ppm Bb - 50cpm α - 0cpm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.23	PROJECT NAME FEMP RI/FS	
BORING NUMBER: 2679	COORDINATES:	DATE 1-14-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS Cable Tool		PAGE 4 6 OF 13

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
38	38291	9		S.A.A	1-21-92 SP/SM	NA	Hnu - 0 ppm
	1500	10	11	38.25 med dense, olive gray, (5Y 5/2) poorly graded fine sand, some clay, some silt, moist.	SP	NA	Gr - 50 cpm
39	1-14-92	12					α - 0 cpm
40				Sand And Gravel Aquifer met at 38.75' (@ 1-22-92) samples will be taken every five feet beginning at 45.0ft			
41							
42							
43							
44							
45							

NOTES See pg 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS Misc Wells	
BORING NUMBER: 2679	COORDINATES:	DATE 1-14-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS: Cable Tools		PAGE 7 OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
45	38292	4		med dense, olive (2.5Y, 4/3) poorly graded sand, trace gravel, moist.	SP	NA	Bnu - 0 ppm
	1540	4	12				Bd - 50 cpm
46	1-14-91	8					α - 0 cpm
47							
48							
49							
50	38293	4		med dense, grayish brown (2.5Y, 5/2) slaney silt to silty clay, No to med to high plasticity, moist to saturated	mc/cl	NA / 1.0	Wnu - 0 ppm
	1610	6	16				Bd - 50 cpm
51	1-14-91	6					α - 0 cpm
52							

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.5.23	PROJECT NAME: Femp RI/FS	
BORING NUMBER: 2679	COORDINATES:	DATE 1-14-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS: Cable tool		PAGE 8 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
53							
54							
55	38294	7		Stiff, gray, (10yr. 5/1) clayey silt to silty clay. Low to high plasticity, 1in. laminar sand at 56.25, moist.	ML/CL	NA/1.25	Hnu - 0 ppm
	1625	14	16				Bg - 50 cpm
56	1-14-92	22					α - 0 cpm
57							
58							
59							
60							

NOTES see page 1

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS Misc Wells		
BORING NUMBER: 2679	COORDINATES:	DATE: 1-15-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-22-92	
DRILLING METHODS: Cable Tool		PAGE 9 OF 13	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in. INCREMENT	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60				V.			
	38295	22	13	Dense, dark gray, (2.5Y, 4/1) silt, some sand, moist.	ML	NA	Hnu - 0 ppm
	0945	44		60.75			BB - 50 cpm
61				V. Dense, gray. (10YR, 6/1) poorly graded fine sand, some silt, sl. moist.	SP	NA	α - 0 cpm
	1-15-92	50/4					
62							
63							
64							
65	38296	4	13	V. Dense, dark grayish brown, poorly graded sand, trace gravel, V. moist. (2.5Y, 4/2)	SP	NA	Hnu - 0 ppm
	1000	6					BB - 50 cpm
66	1-15-92	42					α - 0 cpm
67							

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.23	PROJECT NAME Sump RI/FS	
BORING NUMBER 2679	COORDINATES:	DATE 1-15-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 1-22-92
DRILLING METHODS Cable tools		PAGE 10 OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
68							
69							
70	38297	16		V. Dense, olive gray, (5Y 4/2) poorly graded sand, some gravel, trace silt, saturated	SP	NA	Hnu - 0 ppm
	1120	31	14				Bd - 50 cpm
71	1-15-92	30					α - 0 cpm
72							
73							
74							
75							

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- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 2679	COORDINATES:	DATE 1-15-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-13-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-22-92
DRILLING METHODS: Cable Tool		PAGE 11 OF 13

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75				JL 1-15-92			
	38298	14		~~med~~ dense, olive gray, (5Y, 4/2) poorly graded fine sand, some silt, wet.	SP	NA	H_{no} - 0 ppm
	1440	15	14				Bd - 50 cpm
76							α - 0 cpm
	1-15-92	22					
77							
78							
79							
80	38299	13		Dense, olive gray (5Y, 5/2) poorly graded sand, some silt to silty sand, trace gravel, wet.	SP	NA	H_{no} - 0 ppm
	1500	15	15				Bd - 50 cpm
81							α - 0 cpm
	1-15-92	21					
				Drilling ends at 80.0 ft Sampling ends at 81.5 ft			
82							

NOTES

38300 - Total U. ~~Total Thorium~~, WEMCO J.L. 1-24-92

38301 - Total U. Total Thorium - IT

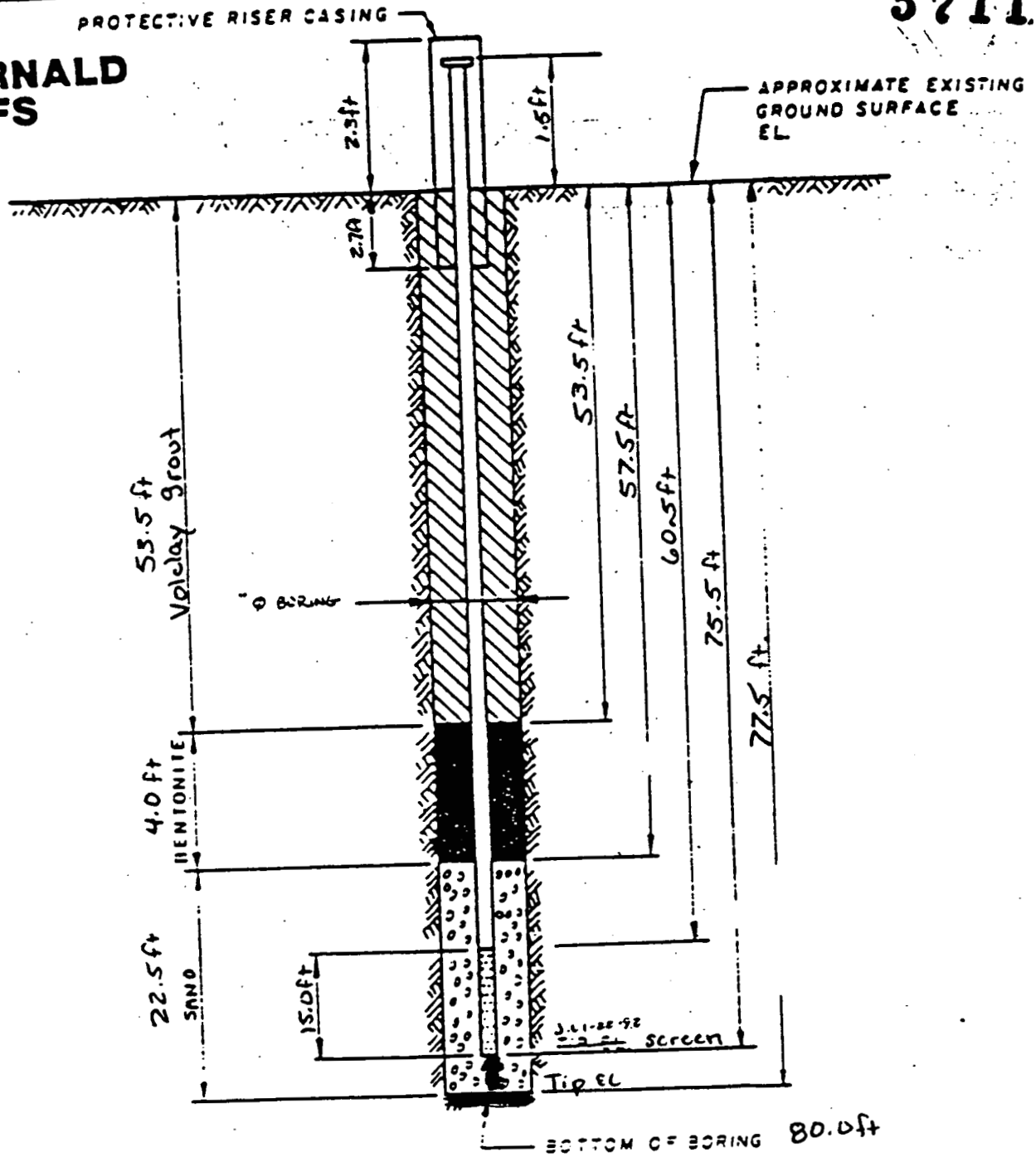
See p. 1

402-11-86

12/13

5711

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

J. Lear 1-22-92

DRAWN BY

NOTES:

1. RISER PIPE IS 4 DIA I.D ~~SCHEDULE~~ 316 stainless steel J.L 1-22-92 PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 DIA I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 66.80
5. WATER LEVEL READING ON 1-22-92, 1500

500 gals H_2O use in drilling
6 bags 10x20 Sand used (80 lbs)
3.5 buckets bentonite pellets used. (5 gal)
8 bags Volclay grout used (50 lbs)

INSTALLATION DETAILS
MONITORING WELL
2679
PREPARED FOR
Fernald RI/FS

FERNALD RI/FS

13/13

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. J. Lear DATE 1-22-92
PROJECT NO. 602.3.23 CHECKED BY C Anulu DATE 3/25/92
BORING NO. 2679
PIEZOMETER NO. 2679 DATE OF INSTALLATION 1-21; 1-22-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 TO 80.0
FLUID NA FROM ~~TO~~

TYPE OF BIT Cable Tool
CASING SIZE (S) USED:
SIZE 8 in FROM 0 ft TO 80 ft
SIZE NA FROM ~~TO~~

PIEZOMETER DESCRIPTION

TYPE Stainless monitoring well
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ slotted SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 15 ft

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/16 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 2 ft, 5 ft, 10 ft
JOINING METHOD Threaded flush joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION Protective Riser with Locked Hinged Cap, well cap, vented

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	1.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.7			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 53.0	TOP	BOTTOM
BENTONITE	TOP 53.05	BOTTOM 57.5	TOP	BOTTOM
SAND	TOP 57.5 ~~80.0~~	BOTTOM 80.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 60.5	BOTTOM 75.5	TOP	BOTTOM
PIEZOMETER TIP	77.5			
BOTTOM OF BOREHOLE	80.0			
GWL AFTER INSTALLATION	66.80 TOW			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 2-3-92
ELEVATION:	GWL: Depth 64.95 Date/Time 2-3-92	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth 66.95 Date/Time 2-5-92	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable Tool		PAGE 1 OF 9

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	See B#s 1679 & 2679			Sample description can be cross referenced from boring nos. 1679 & 2679 up to 85.0ft			See B#s 1679 & 2679
35							
85							

NOTES

Drilling Contractor - Penn Drilling
Drilling equipment - Cyclone 43
Driller - Craig Coulter
Asst - Gary Dye

S.A.A. = Same as above
NA = Not Applicable

Backgrounds
H_{av} - 0 ppm
Bb - 30-60 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-30-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable tool		PAGE 2 OF 89

JL 2-4-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
85	38400	5		mod stiff - stiff, (10yr. 5/1 to 2.5y. 4/2) gray to dark grayish brown, silt and clay laminated throughout, high plasticity, wet.	ml/cl	.5-1.5	Hnu - 0 ppm
86	0915	6	16				Bg - 50 cpm
	1-30-92	7					
87							
88							
89							
90	38401	27		v. dense, grayish brown, (2.5y. 5/2) silt, some clay, laminated well graded sand and gravel at 90.50', wet to v. moist	ml	NA	Hnu - 0 ppm
91	0930	150	18				Bg - 60 cpm
	1-30-92	18					
92							

NOTES:
Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 43
Driller - Craig Coulter
Asst. - Gary Dye

S.A.A - Same As Above

NA = Not Applicable

Backgrounds
Hnu - 0 ppm
Bg - 30-60 cpm

001329

402-11-88

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-30-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable Tool		PAGE 23 OF 89

J.L 2-4-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
93							
94							
95	38402	4	12	Stiff, dark grayish brown, (2.5Y, 4/2) clayey silt, low plasticity, wet to V. moist.	mL	1-30-92 1.0 - 1.5	Hnu - 0 ppm
	1030	6		-95.5- med dense, grayish brown, (2.5Y, 4/2) well graded sand, some gravel, wet.	SW	NA	Bd - 50cpm
96	1-30-92	15					
97							
98							
99							

NOTES
See page 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-30-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable Tool		PAGE 84 OF 89

J.L 2-4-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
100	38403	10		V. dense (2.5Y. 4/2) well graded gravelly sand, wet.	SW	NA	Hnu - 0 ppm
	1100	18	10	V. stiff. (2.5Y. 4/2) silty clay, laminar sand and gravel at 100.80', low plastic., V. moist to wet	CL	2.5	Bb - 50 cpm
101	1-30-92	35					
102							
103							
104							
105	38404	15		V. Dense, (5Y. 3/2) dark olive gray, clayey silt, some well graded gravel, moist to wet.	ML	NA	Hnu - 0 ppm
	1720	34	8				Bb - 30 cpm
106	1-30-92	50					
107							

NOTES
See pg 1

4C2-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-30-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable Tool		PAGE 4 5 OF 89

J.L 2-5-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
108							
109							
110	38405	8		m. Dense, dark gray (10YR4/1) silt, trace clay, moist to wet.	ML	NA	Hnu - 0 ppm
	1750	9	9				
111	1-30-92	18					Bz - 40cpm
112							

NOTES
See pg 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-31-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-92
DRILLING METHODS: Cable Tool		PAGE 5 6 OF 9

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY J.L 2-4-92	REMARKS
115	38406 0930 1-31-92	8 9 19	13	med dense, dark gray, (5Y. 4/1.) silt, trace clay, wet.	ML	NA	Hnu - 0 ppm Bb - 30cpm
116							
117							
118							
119							
120	38407 1000 1-31-92	12 15 18	18	J.L 1-31-92 V. stiff, dark gray (5Y. 4/1.) silty clay, grading to dense dark gray, clayey silt, med plasticity, V. moist to wet.	CL/ML	J.L 1-31-92 ~~1.0~~	Hnu - 0 ppm Bb - 40cpm
121							
122	38408 1015 1-31-92	5 8	18	med dense, dark gray, (5Y. 4/1) clayey silt to silt, some clay, wet.	ML	NA	Hnu - 0ppm

NOTES: see page 1

001333

402-11-85

FERNALD
RI/FS

5711

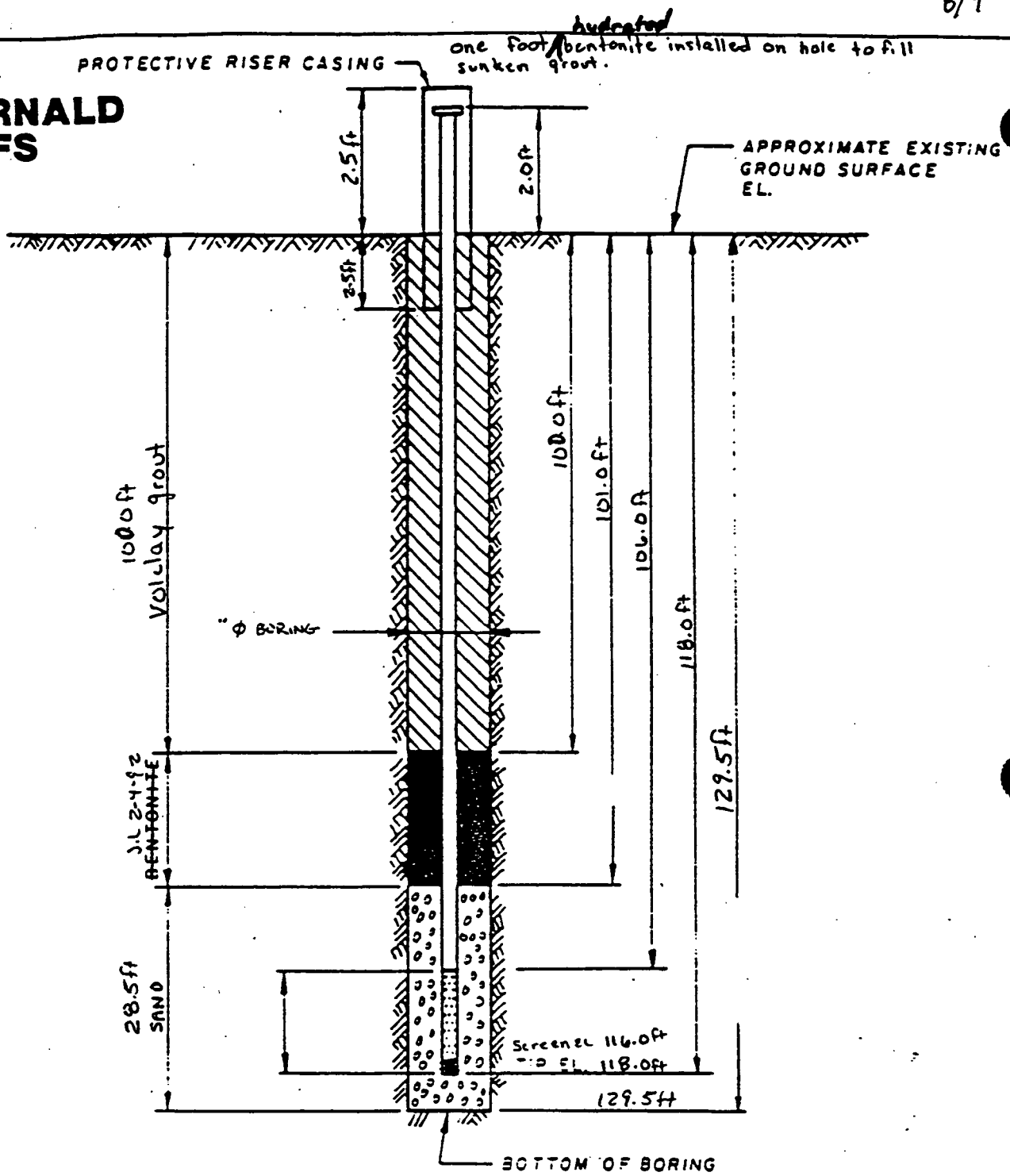
VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.23	PROJECT NAME: FEMP RI/FS	
BORING NUMBER: 3679	COORDINATES:	DATE 1-31-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-30-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 2-5-12
DRILLING METHODS: Cable Tool		PAGE 6 7 OF 8 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (J.L 2-4-92)
123	38408 cont.	15	see Above	~~Contod~~ continued from Above J.L 1-31-92			BG - 30 cpm
	J.L 1-31-92						
124							
125							
126							
126 J.L 1-31-92							
127							
127 J.L 1-31-92							
128	38409	8					Hnu - 0 ppm
128 J.L 1-31-92	1-31-92	10	15	S.A.A	ML	NA	
129	1100	15					BG - 40cpm
				Bottom of sampling 129.5 FT			
				Bottom of Drilling 129.5 FT			
130				*No Blue Clay encountered			

NOTES: See page 1

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4.0 IN I.D. ~~SCHEDULE~~ 316 Stainless steel J.L 2-3-92 PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 66.95ft
5. WATER LEVEL READING ON 2-5-92

900 gals H_2O used
8 bags 10x20 sand
20 bags volclay grout used
No bentonite plug installed
2 buckets bentonite used on top of hole

INSTALLATION DETAILS
MONITORING WELL
3679
PREPARED FOR
Fernald RI/FS

DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
J. Lear 2-4-92	
DRAWN BY	

001335

RECORD OF BORING NO. PWT-5

1685 5711

Client: NLO

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Recovery (in.)
573.3	0						
		Gray to brown silty clay, slightly moist; soft to stiff	1	0.0-1.5	SS	4-8-9	18
		(Grades to a mottled brown gray at 2.5')	2	2.5-4.0	SS	9-11-12	13
		(0.2' of silt at 6.2-6.4', very moist)	3	5.0-6.5	SS	5-7-15	18
		(Grades to a tan to brown clayey silt, very moist at 8.0')	4	7.5-9.0	SS	8-11-14	16
		(Grades to a brown silty fine sand at 8.6')					
563.0	10.3						
		Brown clayey silt; moist, stiff	5	10.0-11.5	SS	10-14-23	15
562.5	10.8						
		Brown fine sand with gravel; very moist to wet, medium dense					
		(Wet zone at 10.8')					
559.7	13.6						
		Gray silty clay; moist, medium stiff to stiff	6	12.5-14.0	SS	7-12-11	14
		(Gravel present at 15.0')	7	15.0-16.5	SS	3-11-20	16
555.8	17.5						
		Boring terminated at 17.5'					
		2.0" PVC casing set to 17.5', screened between 7.0-17.0'					

Dates Drilled: 7/3/85

Driller: W. Moore

Water Depth: Initial: _____

1 Days after Completion: 11.87'

_____ Days after Completion: _____

Drilling Method: Hollow Stem Augers

Boring Location: S. 4180
E. 3970

001336

SOIL & MATERIAL ENGINEERS, INC.
Cincinnati, Ohio

RECORD OF BORING NO. PWT-4

1684

Client: NLO

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Recovery (in.)
572.69	0						
		Mottled brown silty clay; moist, soft to medium stiff	1	0.0-1.5	SS	3-7-8	18
		(Silt seam at 3.25-3.35')	2	2.5-4.0	SS	9-11-12	18
		(Becomes less silty with depth)					
		(Grades to a light brown to tan with thin silty lenses, small gravel present at 5.0')	3	5.0-6.5	SS	10-12-15	18
		(Grades to a tan to gray, no gravel at 7.5')	4	7.5-9.0	SS	7-8-9	17
		(Fine sand seams at 10.0')	5	10.0-11.5	SS	3-6-12	17
		(Grades to a light brown clayey silt; wet, stiff at 11.4')					
		(Wet zone at 11.4')					
		(Grades to a gray silty clay with small gravel at 13.0')	6	12.5-14.0	SS	10-12-15	12
		(0.2' of brown sandy silt at 13.5-13.7')					
558.99	13.7						
		Gray to brown silty, sandy gravel; wet, medium dense					
557.09	15.6						
		Gray sandy silty clay with some small gravel; moist, soft to medium stiff	7 8	15.0-16.5 17.5-19.0	SS SS	3-5-5 6-15-16	9 18
		(Becomes slightly moist with depth)					
553.69	19.0						
		Boring terminated at 19.0'					

Dates Drilled: 7/3/85

Driller: W. Moore

Water Depth: Initial: _____

2 Days after Completion: 8.74'

_____ Days after Completion: _____

Drilling Method: Hollow Stem Auger

Boring Location: S. 4414
E. 3865

001337

SOIL & MATERIAL ENGINEERS, INC.
Cincinnati, Ohio

RECORD OF BORING NO. PWT-4 1684 (cont.) 5711

Client: NLO

Project: Soil Profile for Holding Basin

Project No.: 021-84-129

Elev. (ft.)	Depth (ft.)	Description	Sample No.	Sample Depth (ft.)	Sample Type	Blows per 6"	Recovery (in.)
		2.0" PVC casing set to 18.0', screened between 13.0-18.0'					

Dates Drilled: 7/3/85

Driller: W. Moore

Water Depth: Initial: _____

2 Days after Completion: 8.74'

_____ Days after Completion: _____

Drilling Method: Hollow Stem Augers

Boring Location: S. 4414
E. 3865

001338

SOIL & MATERIAL ENGINEERS, INC.
Cincinnati, Ohio

2686

LOCATION MAP

ERM–MIDWEST WELL LOG

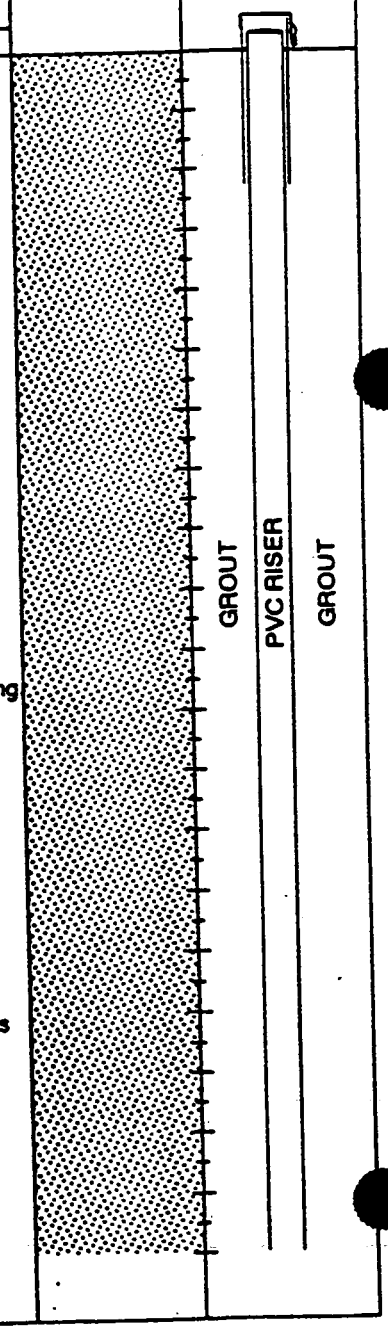
BORE NUMBER ▸ PZ-12	LOCATION ▸ PRRS, Fernald, Ohio
DATE ▸ 10/01/91	WEATHER ▸ Sunny, 80sF
LOGGED BY ▸ D. Jakim	DRILLED BY ▸ Mathes & Associates
DRILLING METHOD ▸ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▸ Cuttings
ELEVATION ▸ Ground 520.05 FT. T.O.C. 521.99 FT.	GRAVEL PACK ▸ #7 43-26 FT. / SEAL ▸ Bentonite 26-24 FT.

CASING ▸ TYPE PVC DIAMETER 2 IN. LENGTH 30 FT. | WATER LEVEL INITIAL 20 FT. ■ B.G.S. □ B.M.P. | HOLE DIA. 8 IN.

SCREEN ▸ TYPE PVC SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 15 FT. | WATER LEVEL AT COMPLETION 20 FT. M.M.P. | TOTAL DEPTH 45 FT.

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
1	Moist	Compact		0–5			Dark brown fine SAND with clay, organics, SAND fine well sorted.
2	Moist	Compact		5–10			Brown fine SAND with clay, some organic matter, SAND well sorted.
3	Damp to Moist	Compact		10–15			Brown fine SAND, well sorted, becoming SAND with gravel and pebbles, gravel and pebbles well rounded.
4	Damp to Moist	Compact		15–20			Brown fine SAND, with pebbles and gravel, rare cobble, gravel and pebbles well rounded.

GRAPHIC LOG / WELL COMPLETION



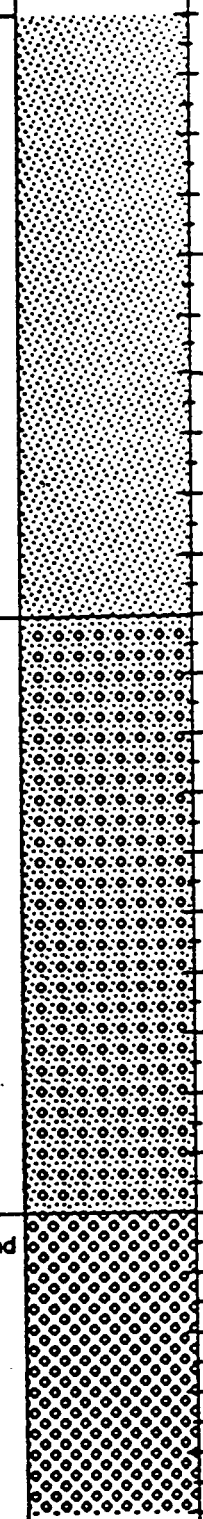
PROJECT\539-13\53913PT2.DRW

WELL NUMBER ▸ PZ-12

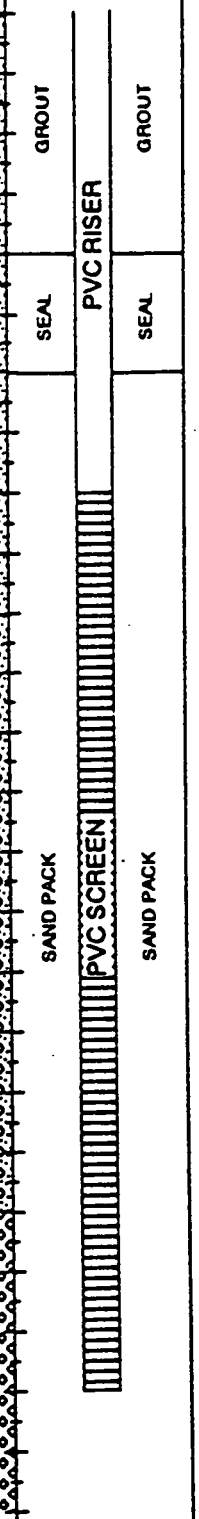
ERM–MIDWEST WELL LOG

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
5	Wet	Compact		20–25			Fine SAND and gravel with pebbles rare cobble, brown well sorted and rounded.
6	Wet	Compact		25–30			Fine SAND and gravel with pebbles rare cobble, brown well sorted and rounded.
7	Wet	Compact		30–35			Fine SAND and GRAVEL with few pebbles, rare cobbles, brown, well sorted and rounded.
8	Wet	Compact		35–40			Fine SAND and GRAVEL with few pebbles, rare cobbles, brown, well sorted and rounded.
9	Wet	Compact		40–45			GRAVEL and COBBLES with fine sand and pebbles.

GRAPHIC LOG



WELL COMPLETION



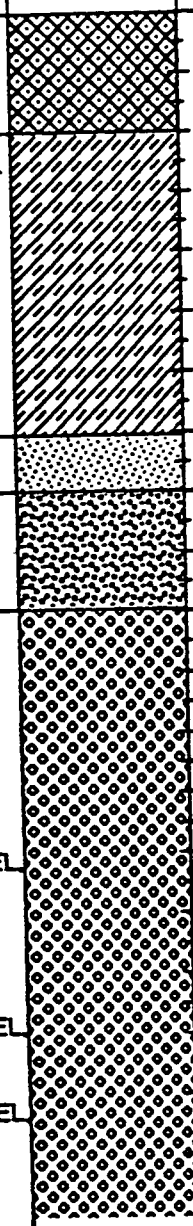
LOCATION MAP

ERM–MIDWEST WELL LOG

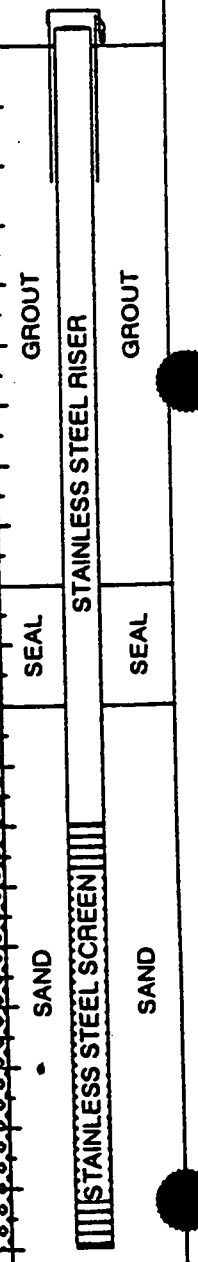
BORE NUMBER ▸ MW-42S	LOCATION ▸ PRRS, Fernald, Ohio
DATE ▸ 10/01/91-10/02/91	WEATHER ▸ Clear, Dry, Warm
LOGGED BY ▸ P. Gephard	DRILLED BY ▸ Mathes & Associates
DRILLING METHOD ▸ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▸ Split Spoon
ELEVATION ▸ Ground 511.82 FT. T.O.C. 514.04 FT.	GRAVEL PACK ▸ #7 30-11 FT. / SEAL ▸ Bentonite 11-8.5 FT.
CASING ▸ TYPE 306 S.S. DIAMETER 2 IN. LENGTH 13 FT.	WATER LEVEL INITIAL 18.5 FT. ■ B.G.S. □ B.M.P. / HOLE DIA. 8 IN.
SCREEN ▸ TYPE 306 S.S. SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 15 FT.	WATER LEVEL AT COMPLETION 18.5 FT. H.M.P. / TOTAL DEPTH 30 FT.

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
1	Moist	Loose	0	0–1	0.9'	4, 5, 5, 6	TOPSOIL, dark brown-black, silty clay in rootlets.
2	Moist	Soft	0	2–3	1.0'	4, 4, 4, 6	Dark brown, CLAYEY SILT, poor sorting.
3	Moist	Very Soft	0	4–5	0.9'	5, 3, 3, 4	Dark brown CLAYEY SILT.
4	Moist	Very Soft	0	6–7	1.2'	4, 4, 3, 6	Dark brown CLAYEY SILT.
							Brown MEDIUM SAND, minor silt.
5	Moist	Loose	0	8–9	1.0'	5, 4, 5, 9	Brown medium to COARSE SAND, minor clayey silt (<0.5 IN.) minor fine gravel.
6	Moist	Medium Dense	0	10–11	0.1'	12, 10, 8, 7	Brown medium to fine GRAVEL with minor sand and silt.
7	Moist	Dense	0	12–13	1.3'	6, 10, 18, 18	Tan to light brown, medium to coarse GRAVEL, minor medium sand, minor clay.
8	Moist	Dense	0	14–15	1.5'	7, 18, 18, 24	Tan to light gray, coarse to fine GRAVEL minor medium sand.
9	Moist	Dense	0	16–17	1.4'	6, 15, 18, 28	Tan to light gray, coarse to fine GRAVEL minor medium to fine sand
10	Wet	Medium Dense	0	18–19	1.0'	7, 12, 7, 18	▼ Tan to light gray, coarse to fine GRAVEL minor medium to fine sand.

GRAPHIC LOG



WELL COMPLETION

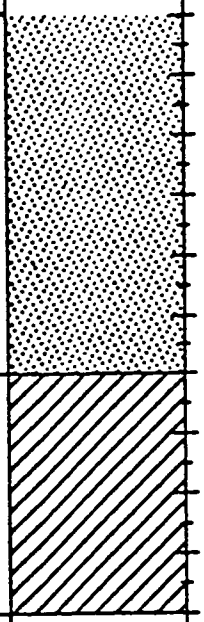


WELL NUMBER ▶ MW-42S

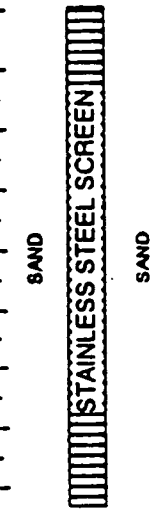
ERM—MIDWEST WELL LOG

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
				20			
11	Wet	Medium Dense	0	21	1.1'	5, 12, 13, 13	Tan to gray, medium to coarse GRAVEL, 25% coarse to fine sand.
				22			
12	Wet	Medium Dense	0	23	1.1'	6, 9, 12, 24	Tan to gray, medium to coarse GRAVEL, 25% fine to coarse sand.
				24			
13	Wet	Very Compact	0	25	0.5'	+50, -, -, -	Tan to gray, medium to fine GRAVEL, minor medium sand, sanstone refuasl at 24.5 FT. bored to 26. FT.
				26			
14	Wet	Dense	2	27	0.8'	8, 18, 20, 26	Greenish gray CLAY, mottled.
				28			
15	Wet	Dense	2	29	1.5'	20, 13, 14, 26	Greenish gray CLAY, mottled.
				30			Total Depth 30.0 FT.
				31			
				32			
				33			
				34			
				35			
				36			
				37			
				38			
				39			
				40			
				41			
				42			
				43			
				44			
				45			

GRAPHIC LOG



WELL COMPLETION



WELL LOG AND DRILLING REPORT

3688
25

ORIGINAL

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 198165

County Hamilton Township Crosby Section of Township

Owner Nease Chemical Co. Address Paddy's Run Rd. & Harrison New Haven Road, Fernald, Ohio

Location of property Corner of Paddy's Run Rd. and New Haven Rd.

CONSTRUCTION DETAILS

Casing diameter 10" Length of casing 78 ft.

Type of screen Cook WW Length of screen 16' 3"

Type of pump SUMO Submersible

Capacity of pump 175 GPM

Depth of pump setting 84 ft.

Date of completion Feb. 16, 1959

BAILING OR PUMPING TEST

Pumping rate 250 G.P.M. Duration of test 0 hrs.

Drawdown 12 ft. Date 2/16/59

Developed capacity 350 GPM

Static level—depth to water 8 ft.

Pump installed by Jos. Koehne Sons

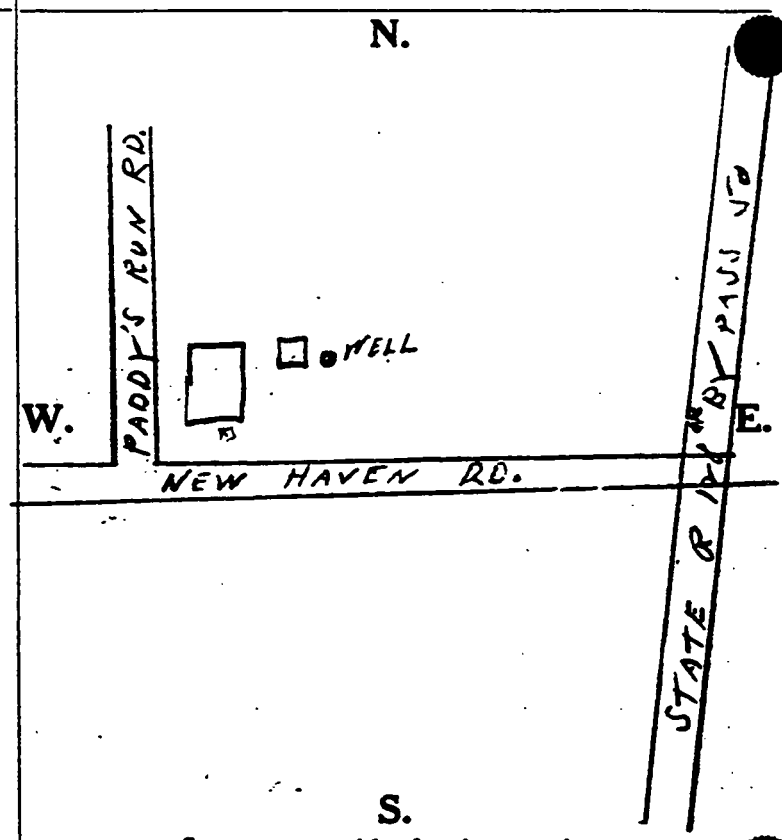
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Soil	0 Feet	4 Ft.
Yellow Gravel	4	20
Yellow Sand & Gravel	20	53
Fine Gray Sand	53	60
Gray Sand & Small Gravel	60	93
Gravel & Clay	93	96

Static Water Level 8'

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm Jos. Koehne Sons Date Feb. 20, 1959

Address 1826 Sherman Ave., Norwood, Ohio Signed Jos. B. Koehne

001343

126

North well #3 #3689 5711

No 358263

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

PLEASE USE PENCIL OR TYPEWRITER

DO NOT USE INK

RECEIVED JAN 12 1979 SOIL CHEM. CO.

County _____ Township _____ Section of Township _____

Owner _____ Address _____

Location of property _____

CONSTRUCTION DETAILS

Casing diameter _____ Length of casing _____

Type of screen _____ Length of screen _____

Type of pump _____

Capacity of pump _____

Depth of pump setting _____

Date of completion _____

BAILING OR PUMPING TEST

Pumping Rate _____ G.P.M. Duration of test _____ hrs.

Drawdown _____ ft. Date _____

Static level-depth to water _____ ft.

Quality (clear, cloudy, taste, odor) _____

Pump installed by _____

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top soil	0 Feet	7 Ft.
Dry yellow muddy sand	7	18
Yellow sand + gravel	18	47
Grey fine sand	47	52
Grey sand & gravel	52	83

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

W. E.

S.

See reverse side for instructions

Drilling Firm _____ Date _____

Address _____ Signed _____

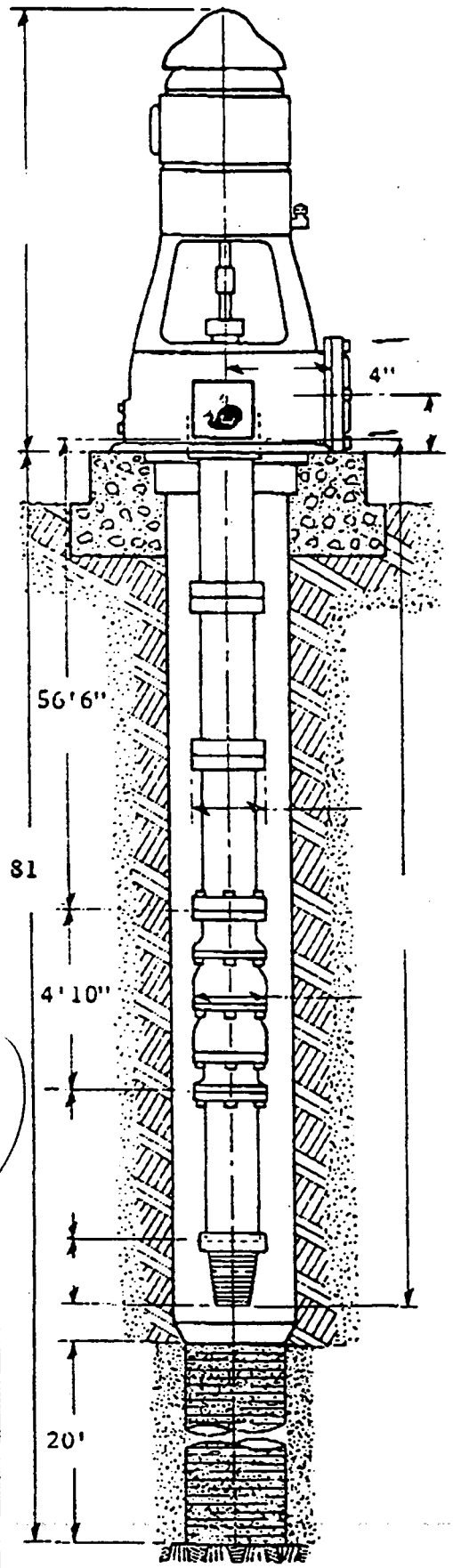
*If additional space is needed to complete well log, use next consecutive numbered form.

001344

North well

MOODY'S OF DAYTON, INC.
VANDALIA, OHIO

RECEIVED
SEP 19 1979
MOBIL CHEM. CO.
FERNALD, OHIO



TURBINE PUMP INSTALLATION FOR: Mobil Chemical , Paddy's Run Rd.

WELL DESIGNATION NO. 3

VTP10795 SERIAL NUMBER
225 GALLONS PER MINUTE
240 TOTAL HEAD IN FEET
10L22 4 STAGES Worthington
1760 MOTOR SPEED
56'6" FEET OF SETTING
5 SIZE COLUMN
no OIL TUBE
s.s. LINE SHAFT
SUCTION PIPE
20 H.P. 220 VOLT. CURRENT 3 ph.
water LUBRICATION
56 FEET OF AIRLINE
2-25-64 DATE INSTALLED

12" I.D. OF WELL
81 FEET DEEP FROM FOUNDATION
FEET DEEP FROM GRADE
20' STRAINER LENGTH — SLOT Top 12'-90# Bottom 7' - 45
14' STATIC LEVEL — DATE 2-25-64
" " — "
" " — "
" " — "
DATE DRILLED

PUMP REPAIRED — DATE
" " — "
" " — "

WELL ACID TREATED — DATE
" " " — "

COMMENTS —
7-67 Casing dropped 4" while surging

81-20'
61'

001345

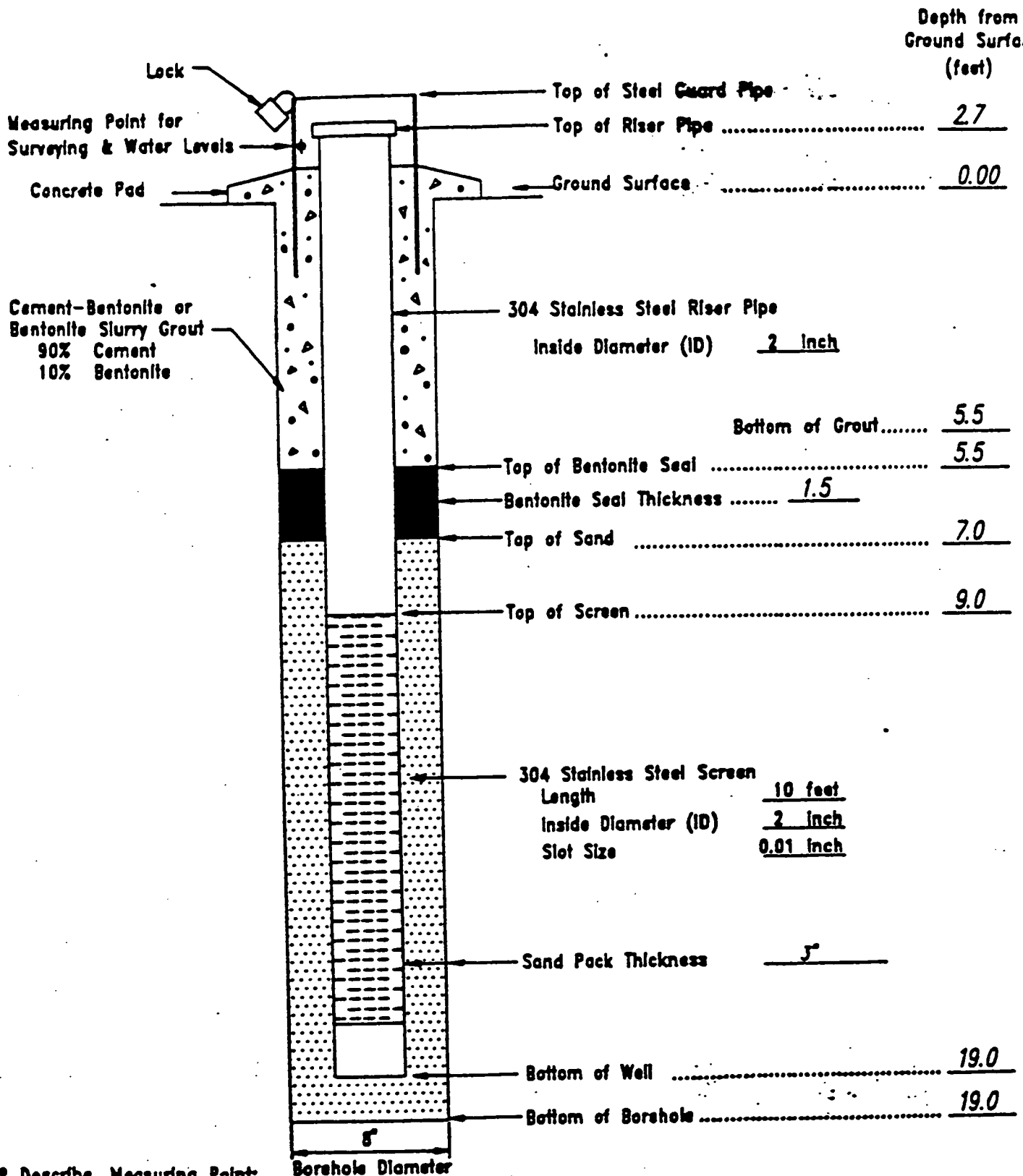
FORM TPI-762 LITHO IN U.S.A.

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

571

Well Identification: MW-03S 2690
Well Location: A & W
Date Of Installation: 3/19/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 530.53
Geologist/Engineer: B.E.M.
Project Number: 4700-018



• Describe. Measuring Point: Mark on Top of Riser Pipe

2690

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-34 Sh 1 of
Date Started 3/19/90 Completed 3/19/90 Ground Elev. 528.0
Total Depth 15.5 Ft Location A & W/Mobil Logged by M.Ferliin
Remarks SB-34 completed as monitoring well MW-03S

Depth Feet	Sample: Split Spoon #	Blows Per 6"	Depth Range	Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	2 4 2 4	0-2		Concrete	
2	02	1 2 5 3	2-4	.2	Soft, brown to orange clay, trace of silt	0 Units no odor no visual
4	03	1 2 5 3	4-6	1.4		0 Units no odor no visual
6	04	125, 77 54	6.0-7.5	1.5	Very dense brown medium to coarse sand and gravels with trace of clay	0 Units no odor no visual
8	05	NR	7.5-9.0	1.2		0 Units no odor no visual
10	06 (a)	100/3"	9.0-9.3	0.2		
12	07	40 110/4 ?	12-14	1.8		0 Units no odors no visual
14	08	13 44 98/3	14 - 15.5	1.5		0.2 Units no odors no visual
16						
18					Ground Water encountered at approximately 11 feet.	
20					(a) Could not advance split spoon drilled to 12 feet	

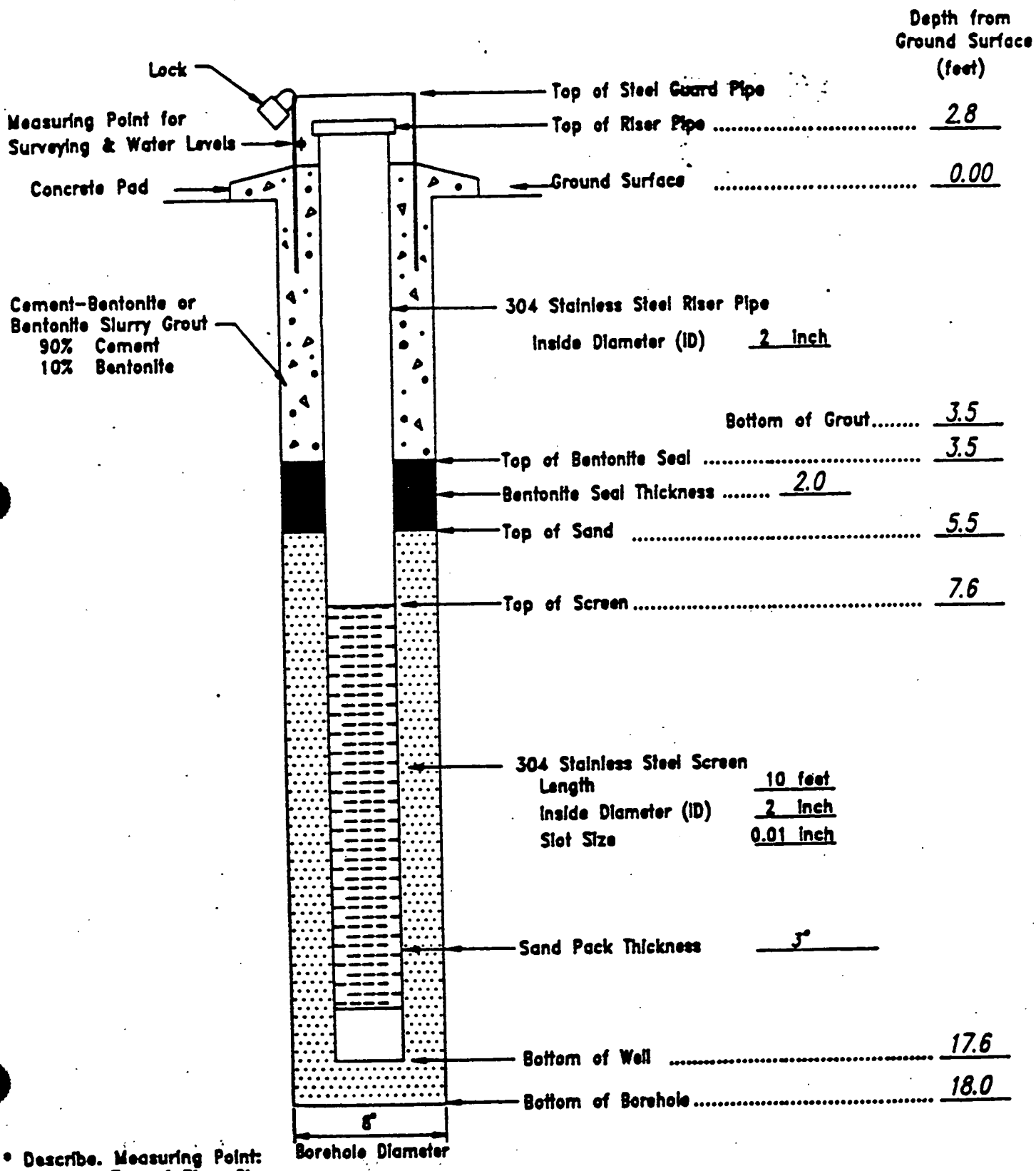
ENSR

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-07S 2691
Well Location: A & W
Date Of Installation: 2/27/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 531.29
Geologist/Engineer: W.R.B.
Project Number: 4700-018



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING SB-07 Sh 1 of 1
Date Started 2/27/90 Completed 2/28/90 Ground Elev. 528.0
Total Depth 18.0 Ft Location A & W/Mobil Logged by B. Berg
Remarks SB-07 completed as monitoring well MW-07S

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6"	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
	01	4 5 22 39	0-2	0	Asphalt and subgrade	
2	02	22 46 53 18	2-4	1	Very stiff, brown, clau. Some sand at 6 to 8 feet.	0 Units no odor no visual
4	03	10 12 15 78	4-6	2		0 Units no odor no visual
6	04	29 30 47 68	6-8	2		0 Units no odor no visual
8	05	50 119 114 75	8-10	1.5	Very dense, tan, fine to medium gravels with coarse sand and clay	0 Units no odor no visual
10	06	44 44 44 87	10-12	1.5		0 Units no odor no visual
12	07	51 58 106 2	12-14	1.5		2 Units slight odor Gray staining 13.5-14 ft.
14	08	52 61 70 60	14-16	1.5		1 Unit slight odor no visual
16	09		16-18	1.5		
18					Ground Water encountered at 12.0 ft.	
20						

ENSR

DRAFT

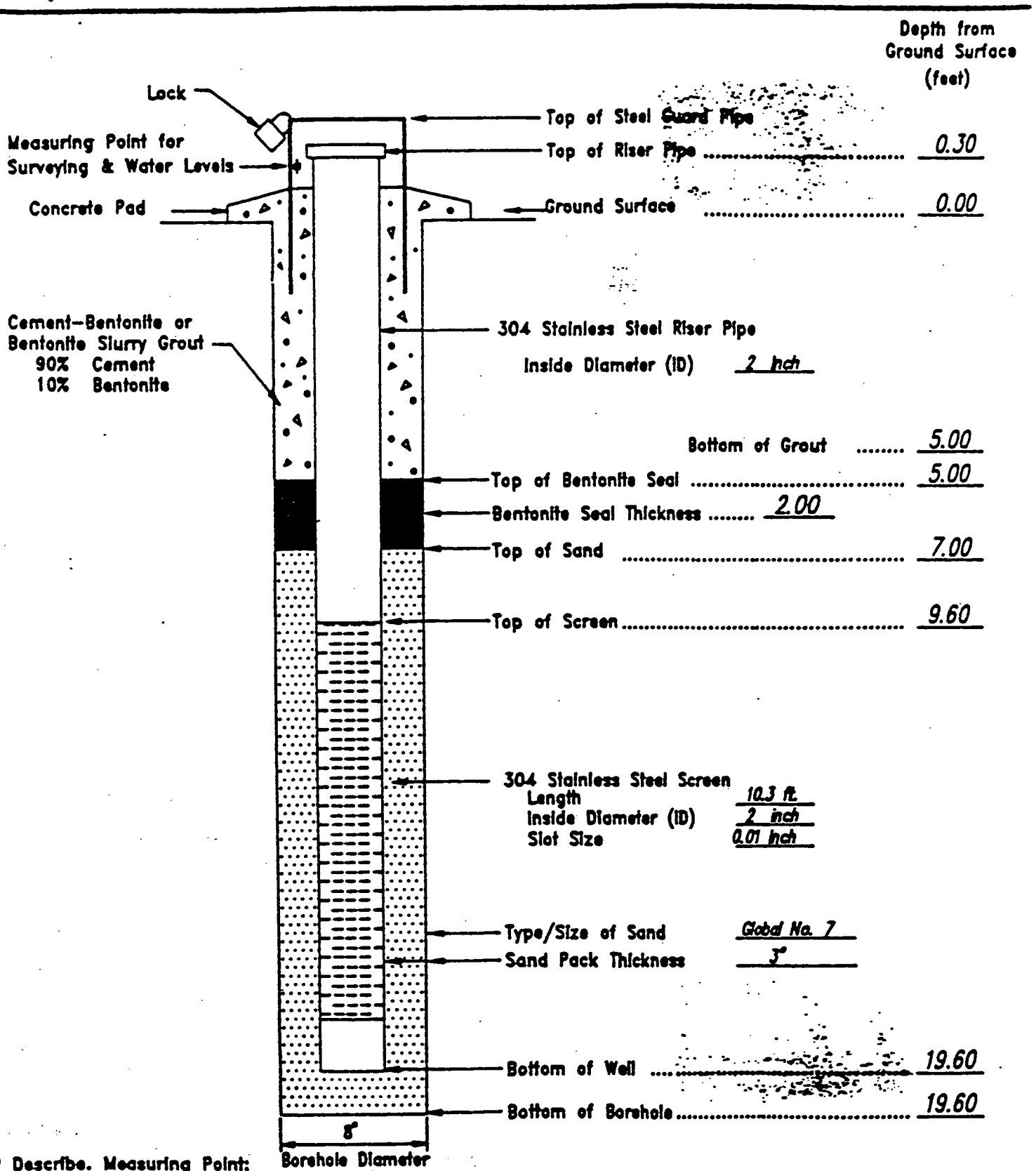
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-04S 2692
Well Location: A & W
Date Of Installation: 12/14/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Auger Rig
Top Of Casing Elev.(MSL): 528.35
Geologist/Engineer: B.E.M.
Project Number: 4700-082



• Describe. Measuring Point: Ground Surface

2672

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-04S Sh 1 of 1
Date Started 12/14/90 Completed 12/14/90 Ground Elev. 527.50
Total Depth 20 Feet Location Off-Site Logged by BEM
Remarks See Soil Boring Log SB-31 for 0-6 Foot Interval

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
6	1	210/ 0.8	6-8	0.8	Very dense, medium to coarse sand and coarse gravels and boulders	0 Units no odor
8	2	226/ 0	8-10	0		no recovery
10	3	254 0.1	10-12	0.1		0 Units no odor
12	4	270/ 0.1	12-14	0		no recovery
14	5	186/ 0.5	14-16	0		no recovery
16	6	190/ 1.0	16-18	0.8	Light brown, very dense medium sand and coarse gravels, wet	0 Units no odor
18	7	-	18-20	-		drilled interval to install well
20					Ground water encountered at 10.7 ft.	

ENSR

DRAFT

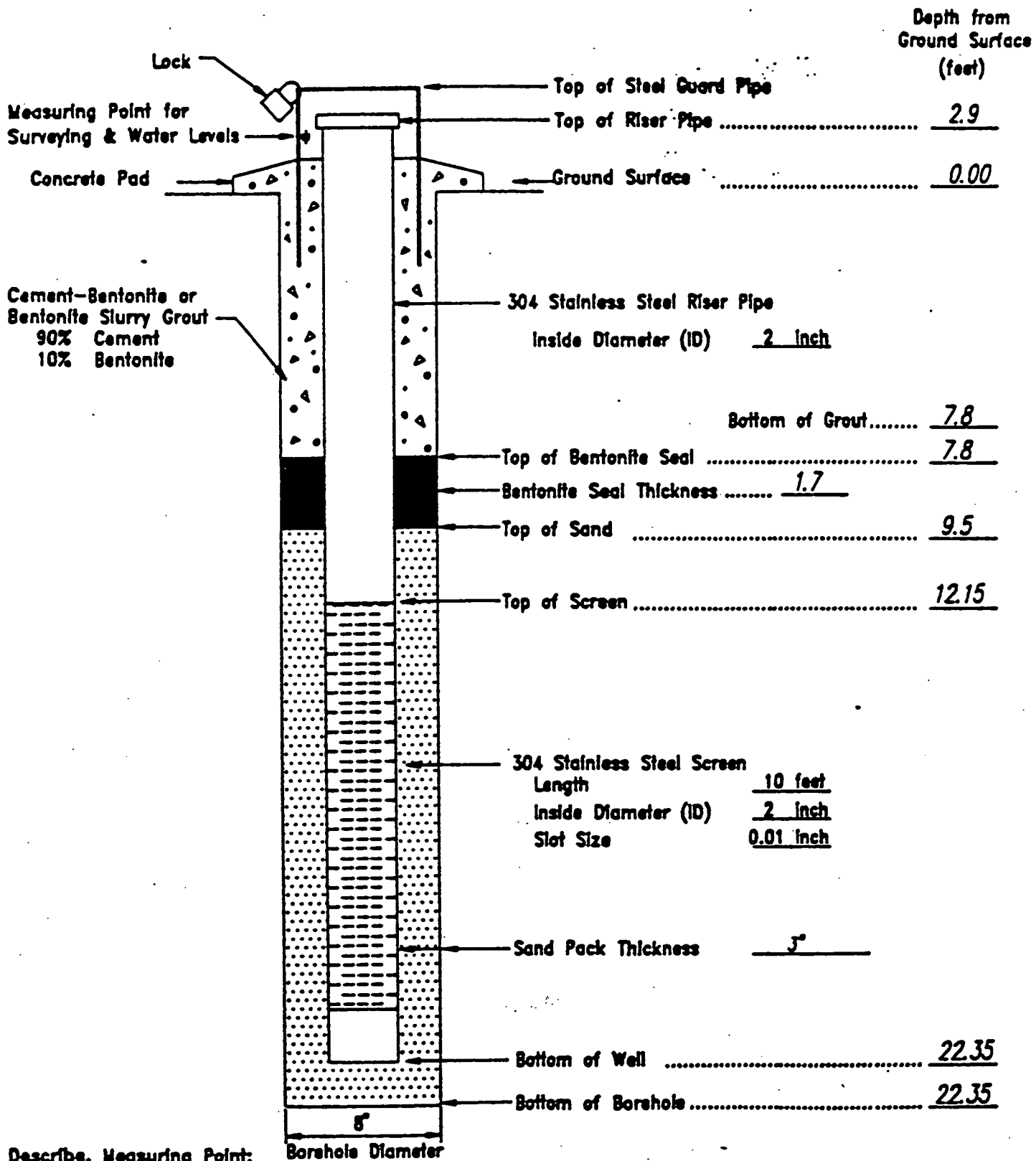
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-23S 2693'
Well Location: Off Site
Date Of Installation: 8/14/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 526.15
Geologist/Engineer: M.A.F.
Project Number: 4700-016



* Describe. Measuring Point: Mark on Top of Riser Pipe

001352

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-23S Sh 1 of 1
Date Started 2/26/90 Completed 2/26/90 Ground Elev. _____
Total Depth 6.0 Ft Location Off-site Logged by M.Ferlin
Remarks _____

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	4 7 7 20	0-2	1.1	Medium, stiff, brown, silt and clay	0 Units No odor
4	02	4 5 5 5	2-4	1.3		0 Units No odor no visual
6	03	4 4 4 5	4-6	2	Medium stiff, tan, silt and fine sand, moist Loose, tan, fine sand with some silt, moist	0.2 Units No odor no visual
8	04	31 20 14 21	6-8	2		0.4 Units No odor no visual
10	05	7 4 21 26	8-10			3.2 Units Natural Gas Odor no visual
12	06	6 36 65 25/1"	10-12	1.5	Very dense, gray, medium, to coarse sand and gravel, moist to wet	7.0 Units No odor no visual
14	07	28 38 78/6"	12-14	1.1		0.6 Units No odor no visual
16	08	18 17 26 76	14-16	1.3		1.6 Units No odor no visual
18	09	16 54 102/6"	16-18	1.5		6.4 Units No odor no visual
20	10	43 26 16 12	18-20	1.2		3.0 Units No odor no visual
22	11		20-22	2	Very dense, brown, medium, to coarse sand with trace of gravel, wet	0.8 Units No odor no visual

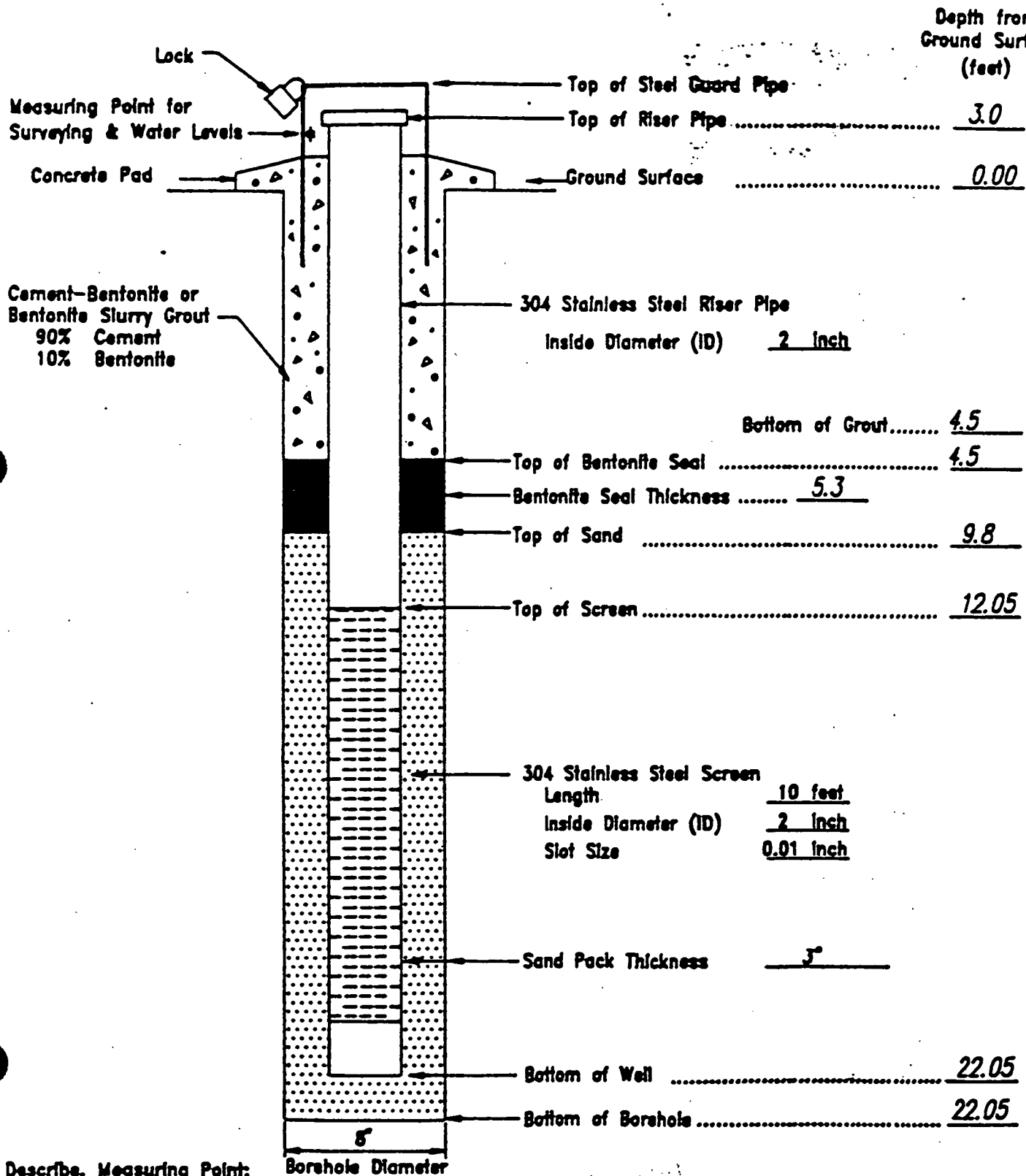
Ground Water encountered at approximately 15 feet.

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-24S 2694
Well Location: Off Site
Date Of Installation: 6/13/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Hollow Stem Auger
Top Of Casing Elev.(MSL): 524.28
Geologist/Engineer: M.A.F.
Project Number: 4700-018



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDY'S RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-016 Site PRRS BORING MW-24S Sh 1 of 1
Date Started 6/13/90 Completed 6/13/90 Ground Elev.
Total Depth 22.0 Ft Location Off-site Logged by M.Ferlin
Remarks

Depth Feet	Sample: Split Spoon #	Sample: Blows Per 6	Sample: Depth Range	Sample: Rec. (Ft)	Lithologic Description	OVA Readings (in Units) & Remarks
2	01	4 6 4 5	0-2	0.8	Soft, brown, silt and clay	0 Units No odor no visual
4	02	3 3 3 4	2-4	2	Soft, tan, silt with some fine sand	0 Units No odor no visual
6	03	3 3 7 20	4-6	2		0.2 Units Natural Gas Odor no visual
8	04	15 26 45 62	6-8	1		1.0 Units Natural Gas Odor no visual
10	05	26 62 68/2"	8-10	0.8	Very dense, gray to tan, medium to coarse sand with some fine gravel, wet	0.8 Units Natural Gas Odor no visual
12	06	45 47 60/6"	10-12	1.1		2.2 Units Natural Gas Odor no visual
14	07	12 24 12 78	12-14	1.4	Dense, gray, medium to coarse sand and fine gravel, wet	0.6 Units Natural Gas Odor no visual
16	08	24 35 41 31	14-16	0.9		42 Units Natural Gas Odor no visual
18	09	13 14 17 20	16-18	1.0		78 Units Natural Gas Odor no visual
20	10	31 14 17 20	18-20	1.1		28 Units Natural Gas Odor no visual
22	11		20-22	2		42 Units Natural Gas Odor no visual

Ground Water encountered at approximately 14.6 feet.

LOCATION MAP

36A

ERM–MIDWEST WELL LOG

571

BORE NUMBER ▶ MW-24D		LOCATION ▶ PRRS - Fernald, Ohio	
DATE ▶ 10/21/91		WEATHER ▶ Clear, Cool	
LOGGED BY ▶ P.L.G.		DRILLED BY ▶ Mathes & Associates	
DRILLING METHOD ▶ 4 1/4" Hollow Stem Auger		SAMPLING METHOD ▶ Drill Cuttings	
ELEVATION ▶ T.O.C. 523.46 FT. Ground 521.58 FT.	GRAVEL PACK ▶ #7 80-68 FT.	SEAL ▶ Bentonite Slurry 68-4.5 FT.	
CASING ▶ TYPE 306 S.S.	DIAMETER 2 IN. LENGTH 70 FT.	WATER LEVEL INITIAL 25.0 FT. ■ B.G.S. □ B.M.P.	HOLE DIA. 8 IN.
SCREEN ▶ TYPE 306 S.S.	SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 10 FT.	WATER LEVEL AT COMPLETION 25.0 FT. H.M.P.	TOTAL DEPTH 80 FT.

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS	GRAPHIC LOG	WELL COMPLETION
						0			0-50 FT IS DESCRIBED IN SOIL BORINGS MW-24S AND MW-24I		GROUT; STAINLESS STEEL RISER; GROUT; BENTONITE SLURRY; BENTONITE SLURRY
						1					
						2					
						3					
						4					
						5					
						6					
						7					
						8					
						9					
						10					
						11					
						12					
						13					
						14					
						15					
						16					
						17					
						18					
						19					
						20					

PROJECT\539-13\5391324D.DWG

WELL NUMBER ▶ MW-24D

ERM–MIDWEST WELL LOG

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS	GRAPHIC LOG	WELL COMPLETION
						20					
						21					
						22					
						23					
						24					
						25					
						26					
						27					
						28					
						29					
						30					BENTONITE SLURRY
						31					
						32					STAINLESS STEEL RISER
						33					
						34					BENTONITE SLURRY
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					
						45					

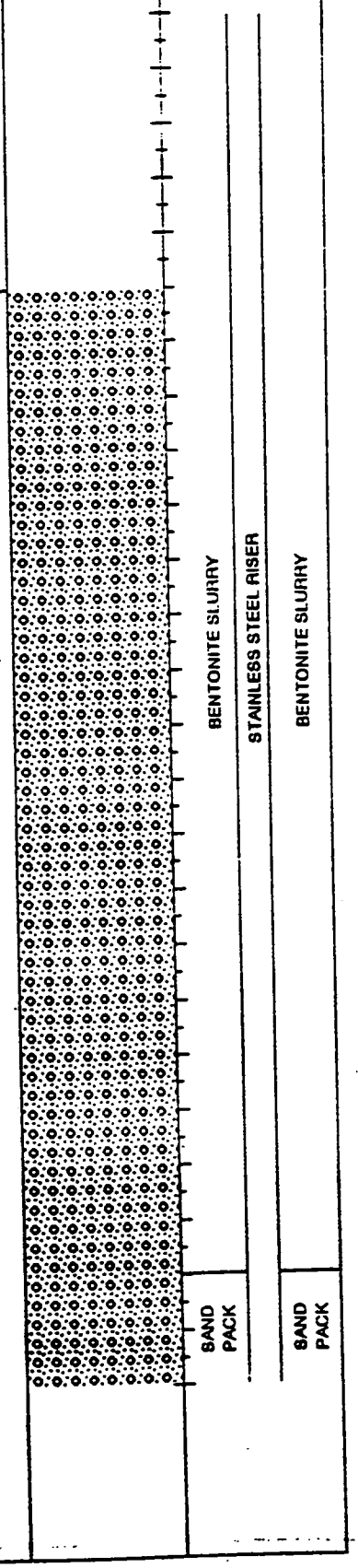
PROJECT\539-13\5391324D.DWG

WELL NUMBER ▶ MW-24D

ERM—MIDWEST WELL LOG

5711

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS	GRAPHIC LOG	WELL COMPLETION
						45					
						46					
						47					
						48					
						49					
						50			Because of heaving sands no split spoon samples could be collected. Therefore, the lithology was described from the cuttings. SAND and GRAVEL.		
						51					
						52					
						53					
						54					
						55					
						56					
						57					
						58					
						59					
						60					
						61					
						62					
						63					
						64					
						65					
						66					
						67					
						68					
						69					
						70					



PROJECT\539-13\5391324D.DWG

WELL NUMBER ▶ MW-24D

ERM–MIDWEST WELL LOG

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS	GRAPHIC LOG	WELL COMPLETION
						70			SAND and GRAVEL		SAND PACK / STAINLESS STEEL SCREEN / SAND PACK
						71					
						72					
						73					
						74					
						75					
						76					
						77					
						78					
						79					
						80			End of Boring 80 FT.		
						81					
						82					
						83					
						84					
						85					
						86					
						87					
						88					
						89					
						90					
						91					
						92					
						93					
						94					
						95					

PROJECT\539-13\5391324D.DWG

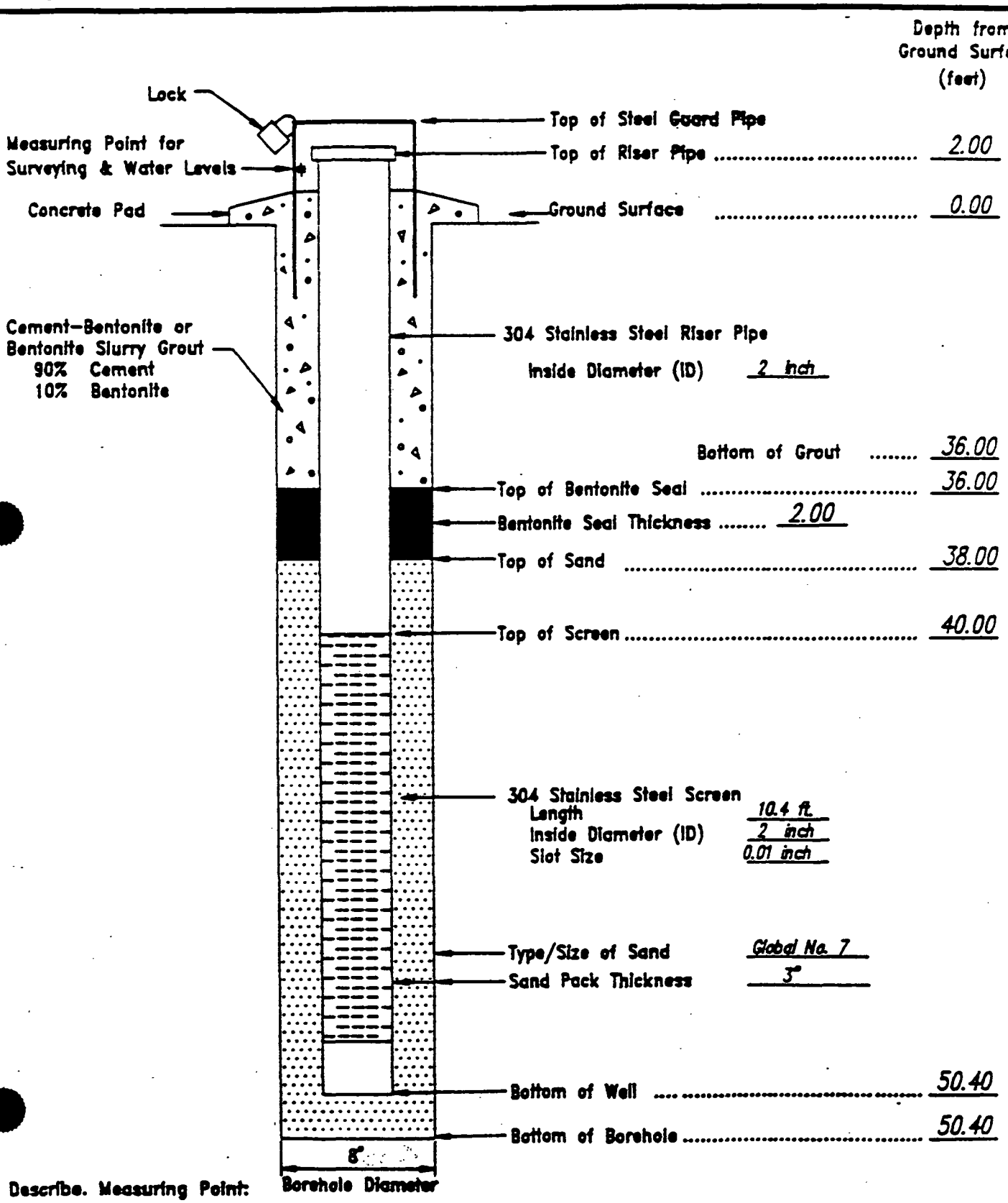
MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

6694

5711

Well Identification: MW-241
Well Location: Off-Site
Date Of Installation: 12/11/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 523.38
Geologist/Engineer: B.E.M.
Project Number: 4700-062

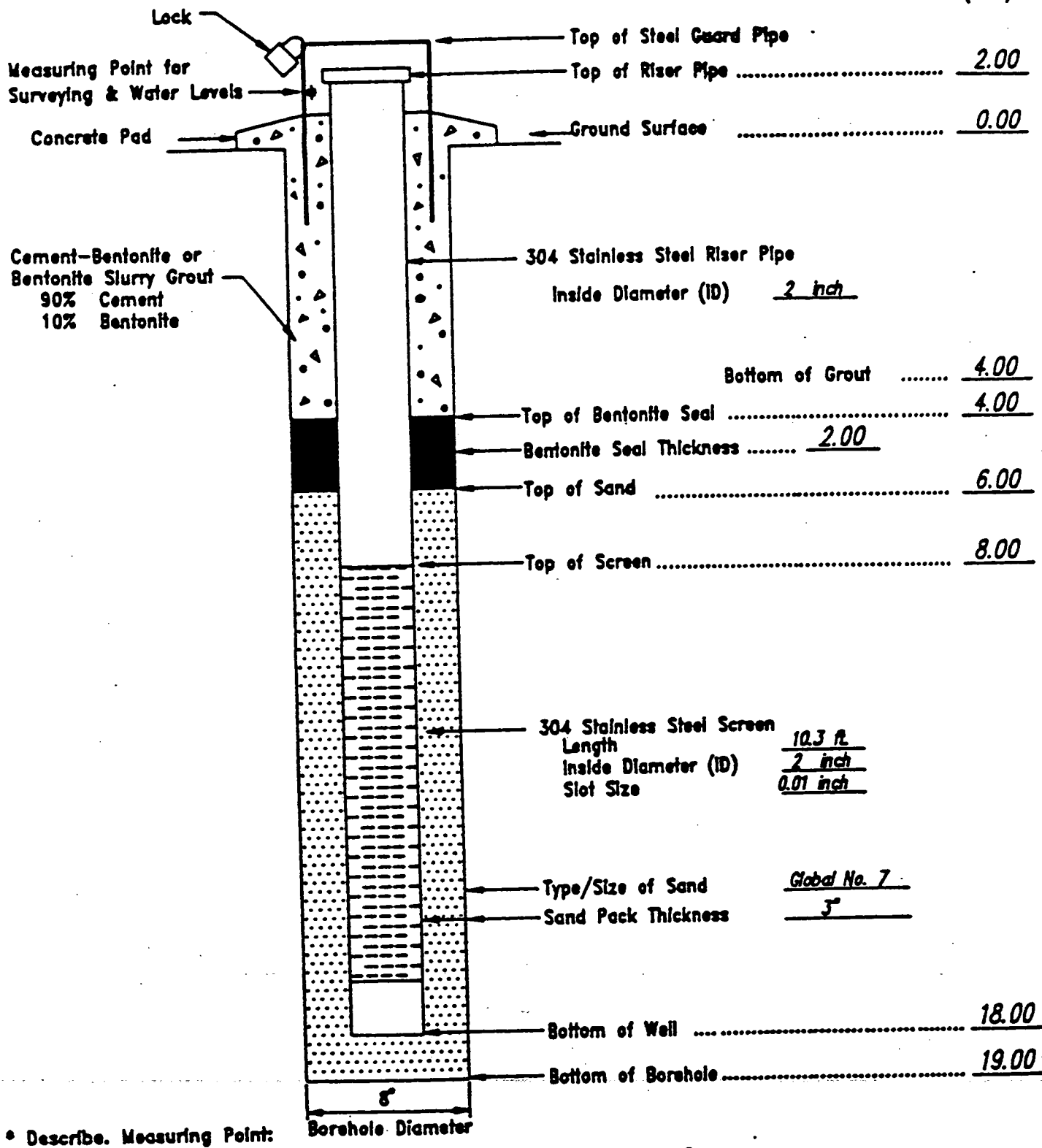


• Describe. Measuring Point:

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-25S 2695
Well Location: Off-Site
Date Of Installation: 12/12/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 518.44
Geologist/Engineer: B.E.M.
Project Number: 4700-062



* Describe. Measuring Point:

2695

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

5711

Project 4700-062 Site PRRS BORING MW-25S Sh 1 of 1
Date Started 12/12/90 Completed 12/12/90 Ground Elev. 516.58
Total Depth 18 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2Ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
2	1	4	0-2	1.3	Brown, soft, silt with trace to some sand, moist	0 Units
4	2	7	2-4	1.5		0 Units
6	3	4	4-6	2.0	Brown, loose, sand, with some silt, moist Grading into sand and gravel	0 Units
8	4	13	6-8	1.7	Brown, medium dense, fine to coarse sand and fine to medium gravels, moist to wet	0 Units
10	5	18	8-10	1.5		0 Units
12	6	18	10-12	1.3		0 Units
14	7	14	12-14	1.5		0 Units
16	8	22	14-16	1.7		3 Units slight organic odor
18	9	19	16-18	1.3		20 Units moderate organic odor
					Groundwater encountered at 9.8 Feet.	

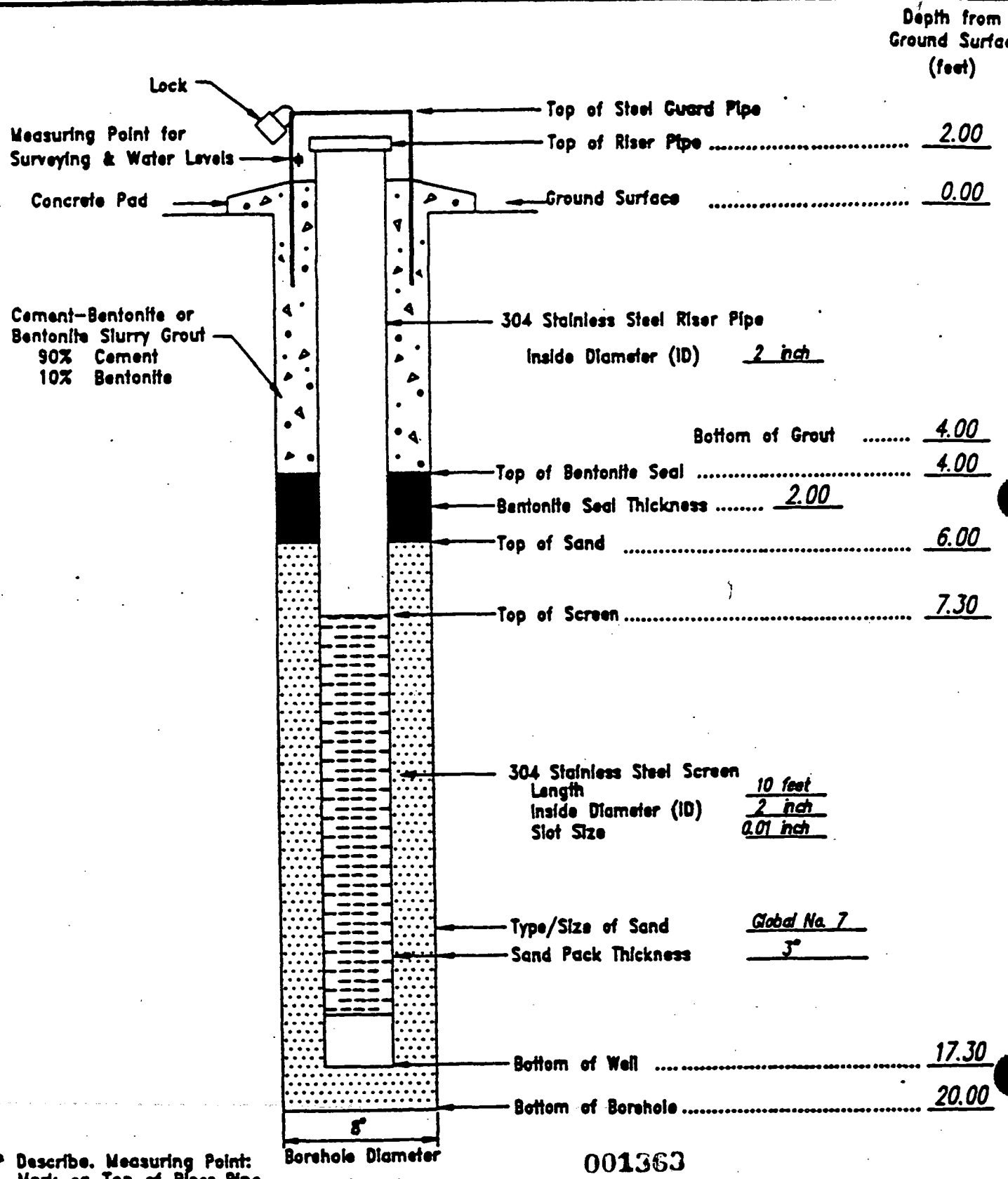
ENSR

DRAFT

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-26S 2696
Well Location: Off-Site
Date Of Installation: 12/5/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 516.49
Geologist/Engineer: B.E.M.
Project Number: 4700-062



• Describe. Measuring Point: Mark on Top of Riser Pipe

001363

2676

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

571 1

Project 4700-062 Site PRRS BORING MW-26S Sh 2 of 2
Date Started 12/04/90 Completed 12/04/90 Ground Elev. 514.47
Total Depth 22.0 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	2	0-2	-	Brown, soft, silt, with trace to some fine sand	0 Units
2	2	2	2-4	1.5		0 Units
4	3	2	4-6	1.2		0 Units
6					Brown, very loose, fine sand, with some silt, damp	
	4	5	6-8	1.5		0 Units
8	5	5	8-10	1.5		0 Units
10	6	8	10-12	1.3	Brown, medium dense, medium sand and fine gravel, some medium gravel, damp to wet	0 Units
12	7	10	12-14	1.3		0 Units
14	8	25	14-16	1.7		0 Units
16	9	20	16-18	1.6		0 Units
18	10	21	18-20	1.5		0 Units
20						

ENSR

DRAFT

2696

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-26S Sh 1 of 2
Date Started 12/14/90 Completed 12/14/90 Ground Elev. 514.47
Total Depth 22.0 Feet Location Off-Site Logged by BEM
Remarks

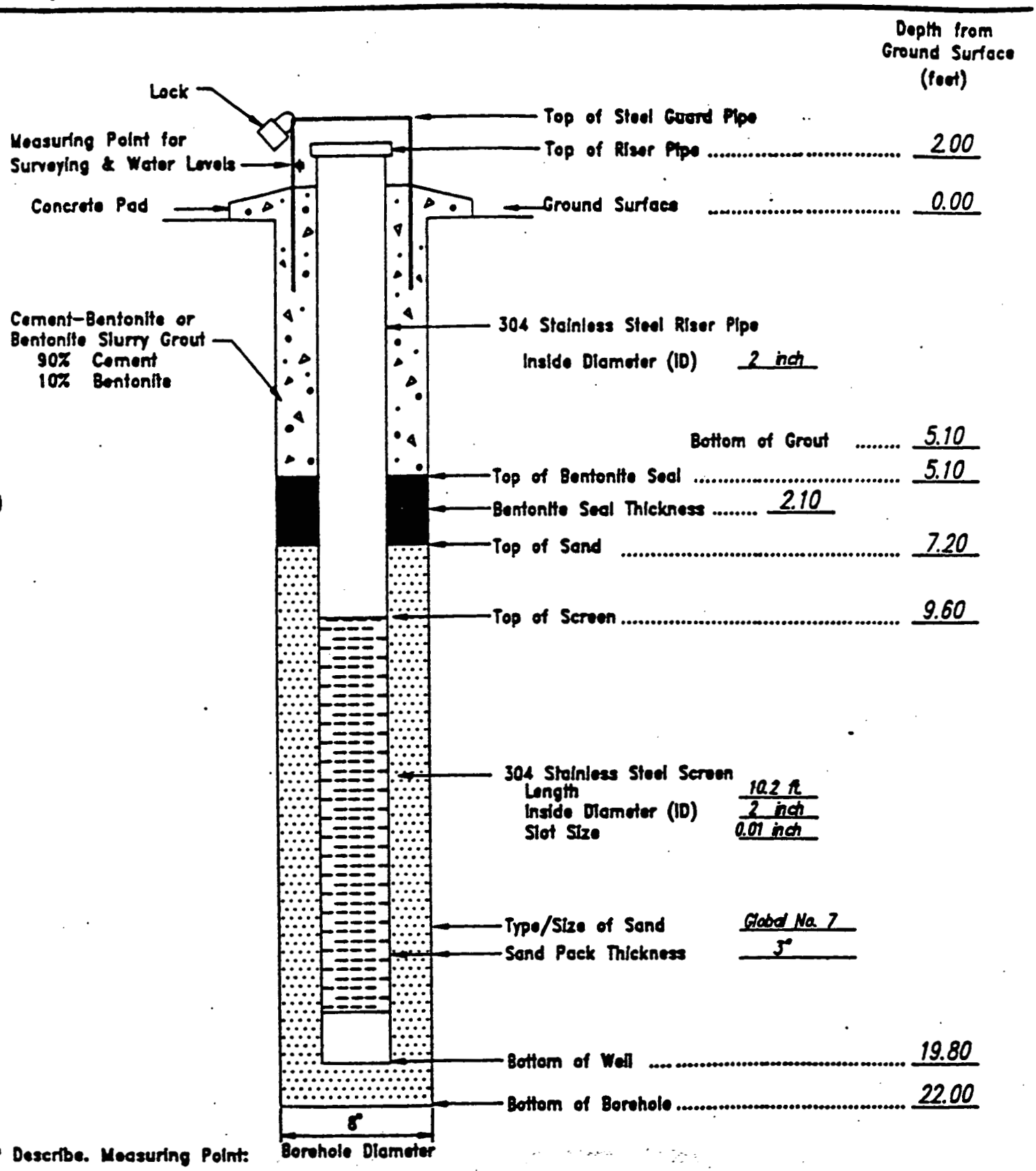
Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	11	21	20-22	1.5		0 Units
22					Ground water encountered at approximately 12 feet.	

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-27S 2697
Well Location: Off-Site
Date Of Installation: 12/5/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 518.84
Geologist/Engineer: M.A.F.
Project Number: 4700-062



* Describe. Measuring Point:

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-27S Sh 1 of 2
Date Started 12/04/90 Completed 12/04/90 Ground Elev. 516.88
Total Depth 22.0 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2Ft	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	14	0-2	1.0	Tan, medium dense, medium sand and silt, with some fine gravels, moist	0 Units
2	2	26	2-4	1.0	Brown, soft, clay, with some silt, moist	0 Units
4	3	14	4-6	0.9		0.1 Units
6	4	11	6-8	1.1	Brown, medium stiff silt and medium to coarse sand and fine gravels, moist	3.2 Units "natural gas odor"
8	5	20	8-10	1.1	Lite gray, medium dense, fine to coarse sand and fine gravels, with some silt and clay, moist to wet Coarse gravels from 12-14 feet	0.8 Units "natural gas odor"
10	6	45	10-12	1.0		6.4 Units no odor
12	7	18	12-14	1.2		10.0 Units "natural gas odor"
14	8	18	14-16	0.7		1.3 Units no odors
16	9	16	16-18	1.7	Brown, loose, medium sand, trace of silt, wet	0.4 Units no odors
18	10	10	18-20	2.0		30 Units " natural gas odor"
20						

2697

571 1

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-27S Sh 2 of 2
Date Started 12/04/90 Completed 12/04/90 Ground Elev. 516.88
Total Depth 22 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	20	20-22	2.0	Brown, loose, medium to coarse sand and fine gravels, wet	20 Units "natural gas odor"
					Ground water encountered at approximately 16 feet	

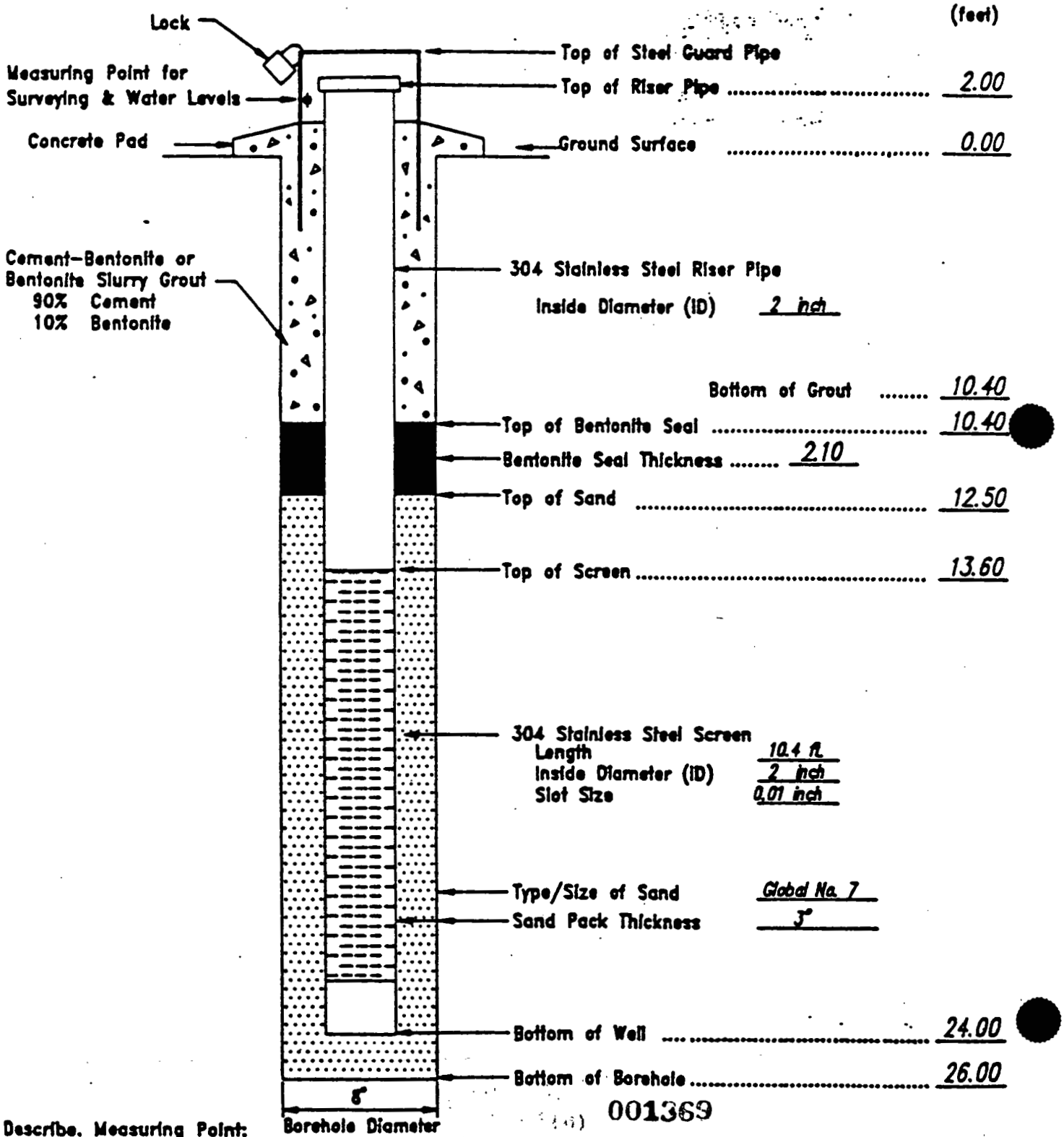
ENSR

DRAFT

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-28S 2698
Well Location: Off-Site
Date Of Installation: 12/6/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 524.17
Geologist/Engineer: M.A.F.
Project Number: 4700-062



001369

* Describe. Measuring Point:

2698

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

571

Project 4700-062 Site PRRS BORING MW-28S Sh 1 of 2
Date Started 12/05/90 Completed 12/05/90 Ground Elev. 522.22
Total Depth 26 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	-	0-2	1.1	Brown, silt and clay moist	0 Units no odors
2	2	-	2-4	0.5	Gray, loose, medium to coarse sand and fine gravels trace of silt, moist	2.6 Units no odors
4	3	15	4-6	1.6	Tan, medium dense, fine to medium sand, trace of silt, moist	6.6 Units no odors
6	4	43	6-8	2.0		0.7 Units no odors
8	5	23	8-10	1.4	Gray, medium dense, Medium to coarse sand and fine to coarse gravels, moist	2.4 Units no odors
10	6	27	10-12	1.3	Gray, medium dense, medium to coarse sand and fine to coarse gravels, moist	1.6 Units no odors
12	7	40	12-14	1.2	Cobbles from approximately 11.5 to 16 feet.	0.2 Units no odors
14	8	20	14-16	0.9		0.6 Units no odors
16	9	-	16-18	1.2	Gray, medium dense, medium to coarse sand and fine to coarse gravels moist to wet	1.2 Units no odors
18	10	-	18-20	0.9		10 Units "natural gas odor"
20						

ENSR

2698

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-28S Sh 2 of 2
Date Started 12/05/90 Completed 12/05/90 Ground Elev. 522.22
Total Depth 26 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	-	20-22	0.6		40 Units "natural gas odor"
24	12	16	22-24	1.2	Brown, medium dense, medium to coarse sand and fine gravels, trace of silt, wet	0.1 Units no odor
26	13	17	24-46	0.8		0.1 Units no odor
					Ground water encountered at approximately 19 feet.	

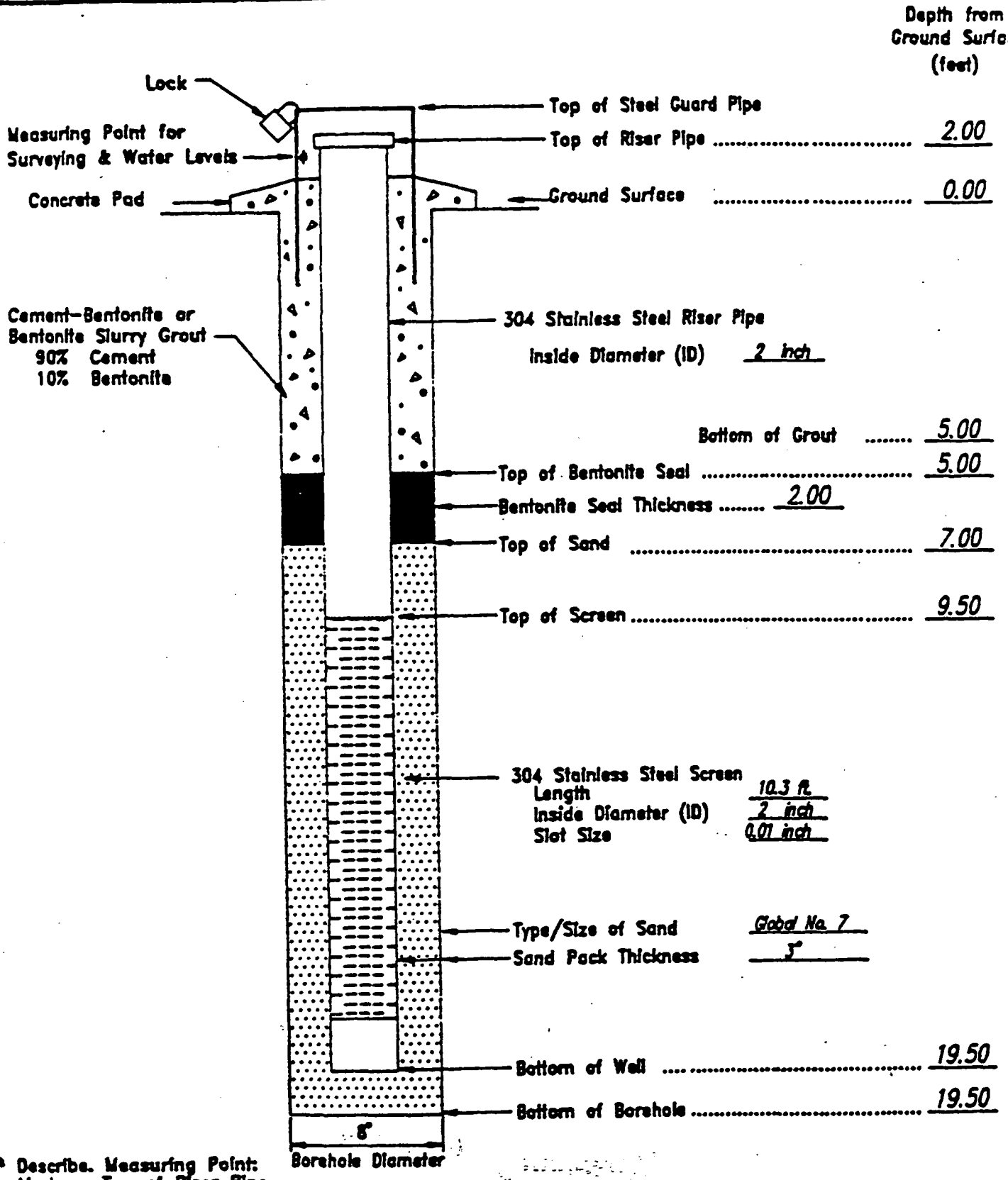
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-29S 2699
Well Location: Off-Site
Date Of Installation: 12/6/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 515.61
Geologist/Engineer: B.E.M.
Project Number: 4700-062



• Describe. Measuring Point: Mark on Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-29S Sh 1 of 1
Date Started 12/05/90 Completed 12/05/90 Ground Elev. 513.54
Total Depth 18 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	1	2	0-2	1.4		0 Units
2	2	4	2-4	1.3	Brown, soft, clayey silt, moist to damp	0 Units
4	3	2	4-6	1.3		0 Units
6	4	5	6-8	1.3		0 Units
8	5	18	8-10	1.5		0 Units
10	6	18	10-12	2.0		0 Units
12	7	18	12-14	1.0	Brown, medium dense medium sand and fine gravel, damp to wet	0 Units
14	8	20	14-16	2.0	Cherty limestone encountered at approximately 14.5 -16 feet	0 Units
16	9	30	16-18	1.7	Very dense, sand, gravel, and fractured rock	0 Units
18					Ground water encountered at approximately 12 feet.	

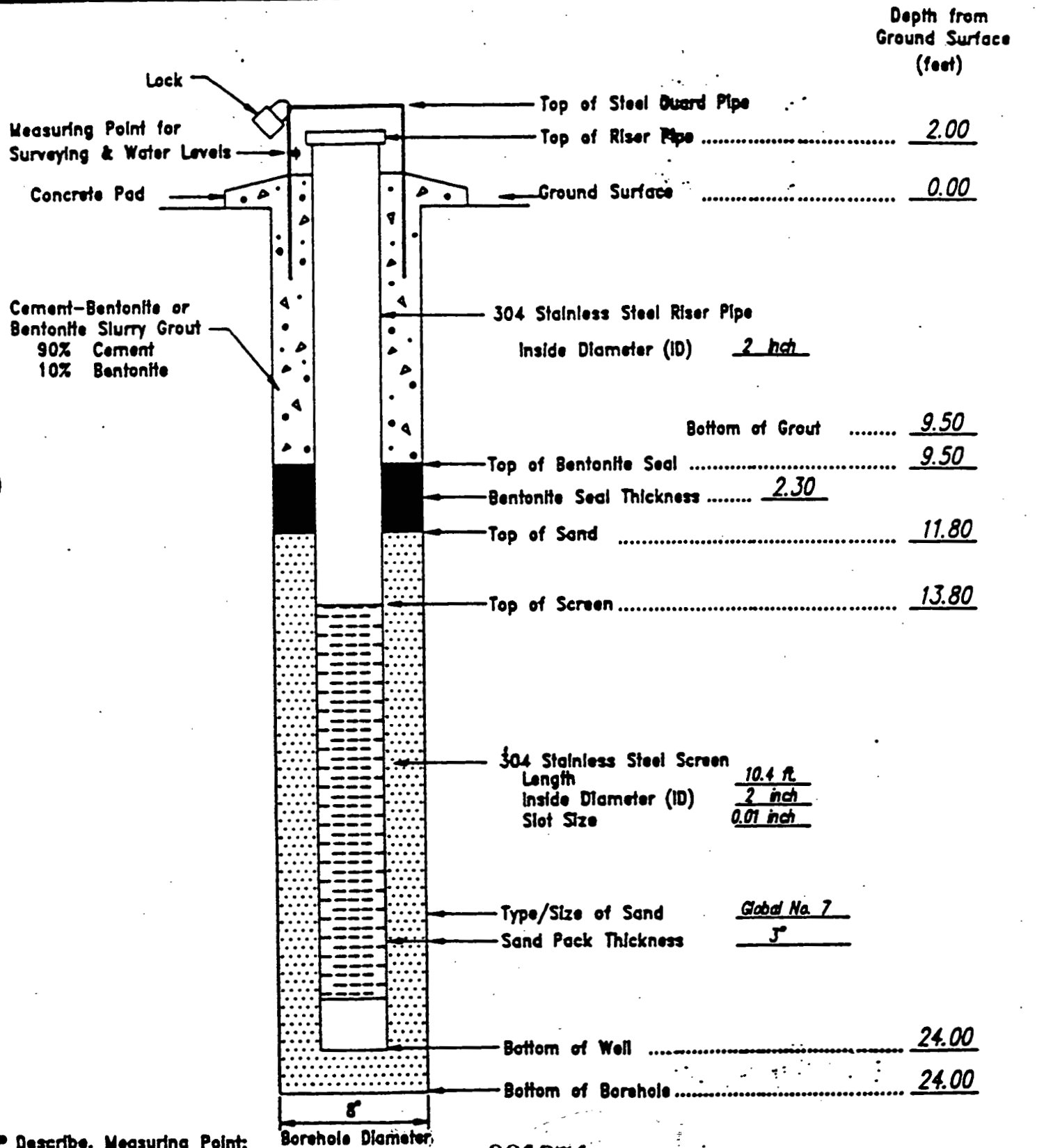
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-30S 2700
Well Location: Off-Site
Date Of Installation: 12/7/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 533.13
Geologist/Engineer: M.A.F.
Project Number: 4700-062



• Describe. Measuring Point:

001374

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-30S Sh 1 of 2
ate Started 12/06/90 Completed 12/06/90 Ground Elev. 531.18
Total Depth 24 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	9	0-2	0.4	Brown, soft, silt, cobble in tip	0 Units no odor
2	2	17	2-4	1.3	Gray, very dense, medium to coarse sand and fine to coarse gravels, with some silt and clay, moist Cobbles from 6 to 22 feet	0.9 Units no odor
4	3	48	4-6	1.6		100 Units no odor
6	4	38	6-8	1.7		1.4 Units "natural gas odor"
8	5	42	8-10	1.3		0.6 Units no odor
10	6	18	10-12	1.6	Dark gray, dense to very dense, medium to coarse sand and fine to coarse gravels, with some silt, moist to wet	0.8 Units "natural gas odor"
12	7	18	12-14	1.2		35 Units "natural gas odor"
14	8	20	14-16	1.0		14 Units "natural gas odor"
16	9	39	16-18	0.9		4 Units "natural gas odor"
18	10	45	18-20	1.2		25 Units "natural gas odor"
20						

2700

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

5711

Project 4700-062 Site PRRS BORING MW-30S Sh 2 of 2
Date Started 12/06/90 Completed 12/06/90 Ground Elev. 531.18
Total Depth 24 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	11	27	20-22	0.9	Silt content increasing	14 Units "natural gas odor"
22	12	26	22-24	1.0	Brown to light orange, dense, medium to coarse sand and fine gravels, wet	5 Units "natural gas odor"
24					Ground water encountered at approximately 17 feet.	

ENSR

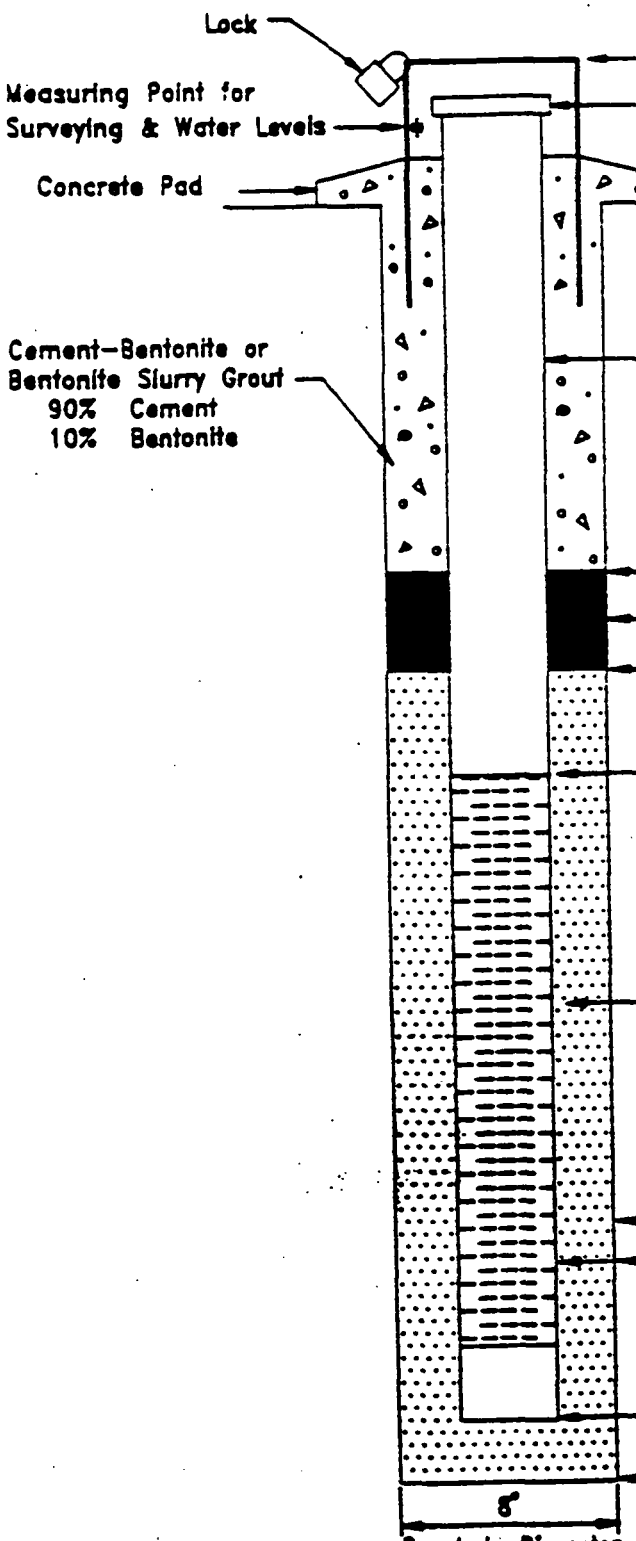
DRAFT

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

6700

Well Identification: MW-30
Well Location: Off-Site
Date Of Installation: 1/8/91
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 533.42
Geologist/Engineer: B.E.M.
Project Number: 4700-062



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.00
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	34.70
Top of Bentonite Seal	34.70
Bentonite Seal Thickness 3.30	
Top of Sand	38.00
Top of Screen	40.00
304 Stainless Steel Screen — Length 10.0 ft; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Type/Size of Sand: Global No. 7	
Sand Pack Thickness: 3"	
Bottom of Well	50.00
Bottom of Borehole	50.00

* Describe. Measuring Point:

001377

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

5711

Project 4700-062 Site PRRS BORING MW-30I Sh 1 of 2
Date Started 1/07/91 Completed 1/08/91 Ground Elev. 531.61
Total Depth 50 Feet Location Off-Site Logged by BEM
Remarks See Soil Boring Log MW-30S for 0-24 Foot Interval

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
26	1	24	24-26	1.4	Brown, medium dense, medium to coarse sand and fine to medium gravel, trace to some silt, wet	1.0 Units
28	2	30	26-28	1.4	Cobbles from 24-26 feet	1.0 Units
30	3	28	28-30	1.5		1.0 Units
32	4	28	30-32	1.8		2.0 Units
34	5	18	32-34	1.0	Brown, medium dense, medium sand, wet	0.5 Units
36	6	65	34-36	1.1	Brown, medium dense, very fine to fine sand, wet	0 Units
38	7	13	36-38	1.1		0 Units
40	8	21	38-40	1.5		0 Units
42	9	20	40-42	1.6		0 Units
43	10	17	42-44	1.7		0 Units

ENSR

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-30I Sh 2 of 2
ate Started 1/07/91 Completed 1/08/91 Ground Elev. 531.61
otal Depth 50 Feet Location Off-Site Logged by BEM
Remarks See Soil Boring Log MW-30S for 0-24 Foot Interval

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	11	31	44-46	1.8	Brown, medium dense, medium to coarse sand and medium gravel, wet	0 Units
46						
	12	19	46-48	1.7		0 Units
48						
	13	18	48-50	1.7		0 Units
50					Ground water encountered at 17.2 feet	

ENSR

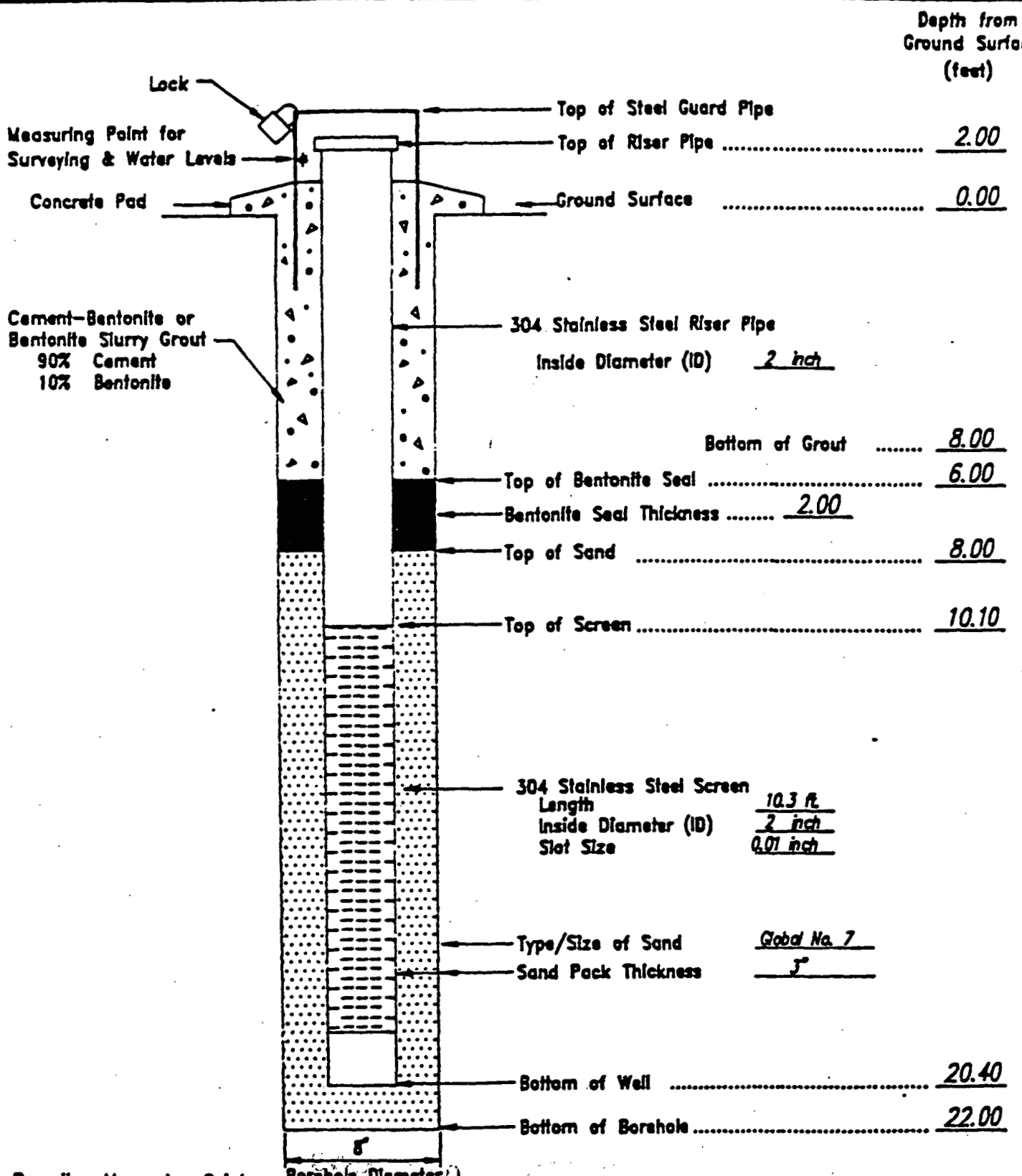
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-31S 2701
Well Location: Off-Site
Date Of Installation: 12/7/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 528.20
Geologist/Engineer: B.E.M.
Project Number: 4700-082



* Describe. Measuring Point: Mark at Top of Riser

001380

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-31S Sh 1 of 2
ate Started 12/06/90 Completed 12/06/90 Ground Elev. 526.20
Total Depth 22 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	1	9	0-2	1.7	Brown, soft, silt with some clay, damp	0 Units
2	2	9	2-4	1.7		0 Units
4	3	9	4-6	1.3	Brown, loose, silty, fine to medium sand, moist to wet	0 Units
6	4	10	6-8	1.7		0 Units
8	5	18	8-10	1.3		0 Units
10	6	38	10-12	1.3		2 Units odor
12	7	42	12-14	2.0		10 Units organic odor
14	8	42	14-16	1.3		900 Units strong organic odor
16	9	60	16-18	1.3	Gray to Black, dense, fine to medium sand and fine to medium gravels, some silt from 11-14 feet, damp to wet	100 Units strong organic odor
18	10	23	18-20	1.7		80 Units strong organic odor
20						

2701

5711

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-31S Sh 2 of 2
Date Started 12/06/90 Completed 12/06/90 Ground Elev. 526.20
Total Depth 22 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	11	22	20-22	1.5	Brown, medium dense, medium sand, trace of fine gravel	30 moderate organic odor
22						
					Ground water encountered at 12.8 feet	

ENSR

LOCATION MAP

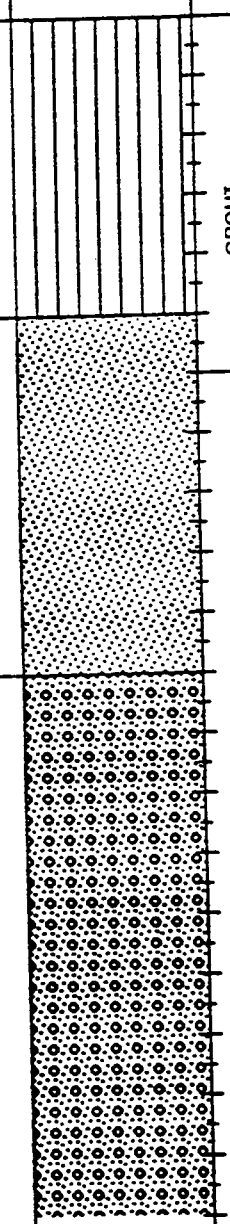
6701

ERM–MIDWEST WELL LOG

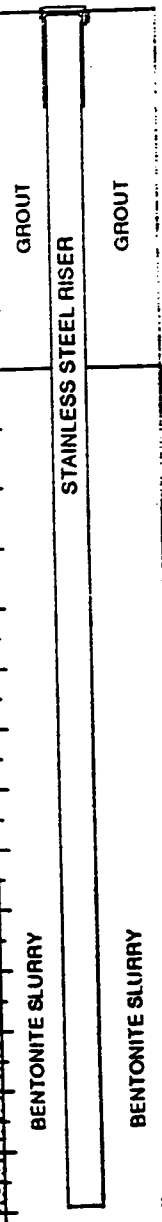
BORE NUMBER ▸ MW-31I	LOCATION ▸ PRRS Site; Fernald, Ohio
DATE ▸ 04/18/91	WEATHER ▸ Sunny, 50F
LOGGED BY ▸ JDK	DRILLED BY ▸ Bowser Morner
DRILLING METHOD ▸ 4 1/4 IN. Hollow Stem Auger	SAMPLING METHOD ▸ 300 lb. Hammer 3 IN. Split Spoon
ELEVATION ▸ Ground 525.78 FT. Top of Casing 527.76 FT.	GRAVEL PACK ▸ #7 Sand 49.5-36.5 FT. / SEAL ▸ Bentonite 36.5-6.0 FT.
CASING ▸ TYPE S.S. 306 DIAMETER 2 IN. LENGTH 39.5 FT.	WATER LEVEL INITIAL ▼ 12.80 FT. ■ B.G.S. □ B.M.P. / HOLE DIA. 8 IN.
SCREEN ▸ TYPE S.S. 306 SLOT 0.01 IN. DIAMETER 2 IN. LENGTH 10 FT.	WATER LEVEL AT COMPLETION ▽ 10.55 FT. B.M.P. / TOTAL DEPTH 50 FT.

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
						0–4			*Brown, soft, SILT with some clay.*
						5–10			*Brown, loose, silty, fine to medium SAND.*
						11–20			*Gray-black, dense, fine to medium SAND and fine to medium GRAVELS, some silt from 11-14 feet. damp to wet.*

GRAPHIC LOG



WELL COMPLETION



NOTE:
All descriptions in italics are taken from ENSR Well Log, MW-31S.

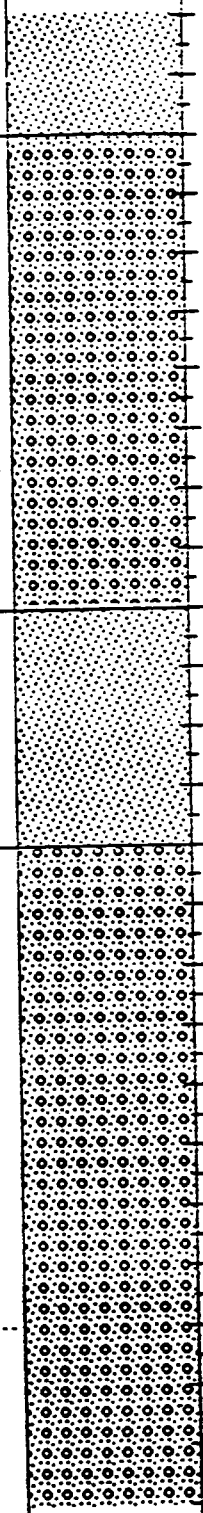
PROJECT1539-12-08\12063\1LDRW 9108171730

WELL NUMBER ▶ MW-31I

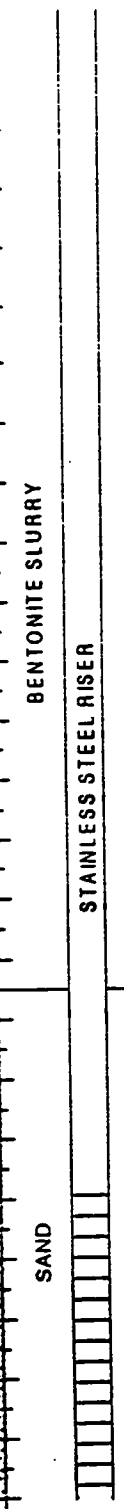
ERM—MIDWEST WELL LOG

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
						20, 21			*Brown, medium dense, medium SAND, trace of fine gravel.* *NOTE: All descriptions in italics are taken from ENSR Well Log, MW-31S.*
Wet	Poor	Hard	Non	1	72	22, 23	2.0'	45, 57, 42, 67	Very poorly sorted, gray SAND and GRAVELS, fine to cobble size. No sheen visible or discoloration.
Wet	Mod.	Stiff	Non	2	25	24, 25, 26	1.0'	12, 15, 25, 22	Gray SAND, fine to coarse grained with some GRAVELS. Mean grain size finer than 22-24 IN. No sheen or discoloration.
Wet	Mod. to Poor	Stiff	Non	3	2.0	27	1.2'	13, 21, 27, 36	Same as 24-26 FT. Bottom 3 IN. color is light to medium brown.
Wet	Mod.	Hard	Non	4	2.0	28, 29	1.0'	15, 35, 35, 47	Gray SAND with GRAVEL, fine to coarse grain, bottom 1 IN. brown SAND.
Wet	Mod.	Stiff	Non	5	9.0	30, 31	0.7'	8, 13, 21, 24	Brown and gray SAND, fine to coarse grain, not as many gravels.
Wet	Poor	Stiff	Non	6	2.0	32, 33	0.7'	10, 12, 10, 12	Brown SAND, fine to coarse grain.
Wet	Poor	Stiff	Non	7	1.0	34, 35	0.7'	19, 14, 14, 21	Brown SAND, fine to coarse grained, with GRAVELS.
Wet	Poor	Stiff	Non	8	1.0	36, 37	0.7'	14, 17, 18, 20	Same, bottom 1 IN. dry.
Wet	Poor	Hard	Non	9	1.0	38, 39	0.4'	57, 37, 37, 37	Same as above.
Wet	Mod.	Soft	Non	10	0.0	40, 41	1.0'	4, 5, 6, 9	Gray SAND, silt to very coarse grain, some pebbles at bottom of spoon.
						42, 43, 44, 45			Because of heaving sands filling the augers, augered borehole to 50 FT.

GRAPHIC LOG



WELL COMPLETION



WELL NUMBER ▶ MW-311

ERM–MIDWEST WELL LOG

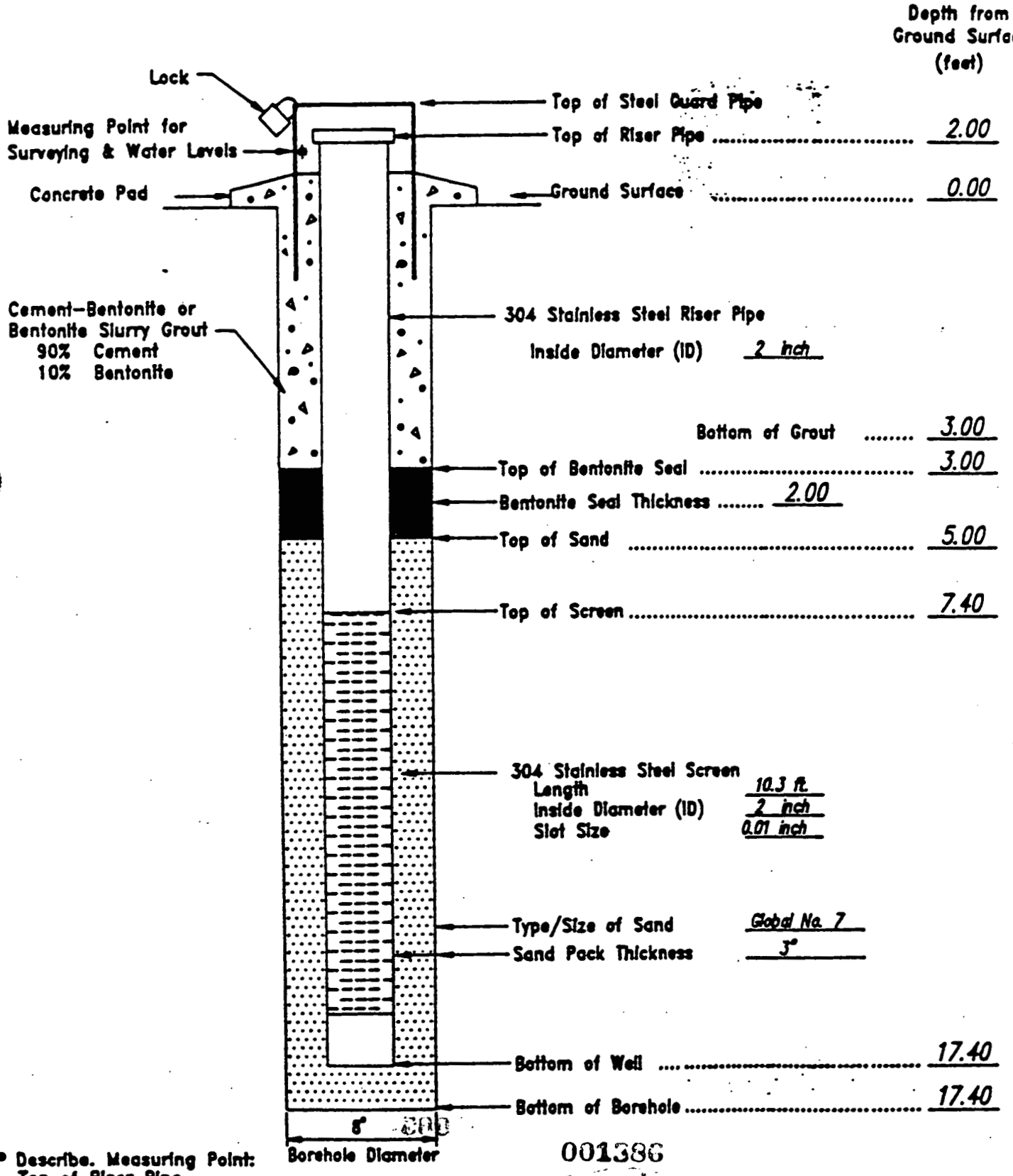
MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS	GRAPHIC LOG	WELL COMPLETION
						45			Cuttings gray SAND with some pebbles.		SAND
						46					
						47					
						48					S.S. SCREEN
						49					
						50			End of Boring 50 FT.		SAND
						51					
						52					
						53					
						54					
						55					
						56					
						57					
						58					
						59					
						60					
						61					
						62					
						63					
						64					
						65					
						66					
						67					
						68					
						69					
						70					

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-32S 27042
Well Location: Off-Site
Date Of Installation: 12/11/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 527.98
Geologist/Engineer: B.E.M.
Project Number: 4700-062



001386

• Describe. Measuring Point: Top of Riser Pipe

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-32S Sh 1 of 1
Date Started 12/11/90 Completed 12/11/90 Ground Elev. 526.16
Total Depth 18 Feet Location Off-Site Logged by
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	17	0-2	1.7	Yellow-brown, stiff clay and silt, moist	0 Units
2	2	35	2-4	1.3		0 Units
4	3	-	4-6	1.5	Light brown, fine to coarse sand, dry	0 Units
6	4	18	6-8	1.5		0.5 Units
8	5	25	8-10	1.3	Light brown to yellow, medium dense, fine to medium sand and fine to medium gravels, dry to wet	0.3 Units
10	6	95	10-12	1.5		5 Units
12	7	18	12-14	1.0		5 Units
14	8	49	14-16	1.3		1 Unit
16	9	44	16-18	1.3	Fine to coarse gravels	0 Units
18					Ground water encountered at approximately 10 feet	

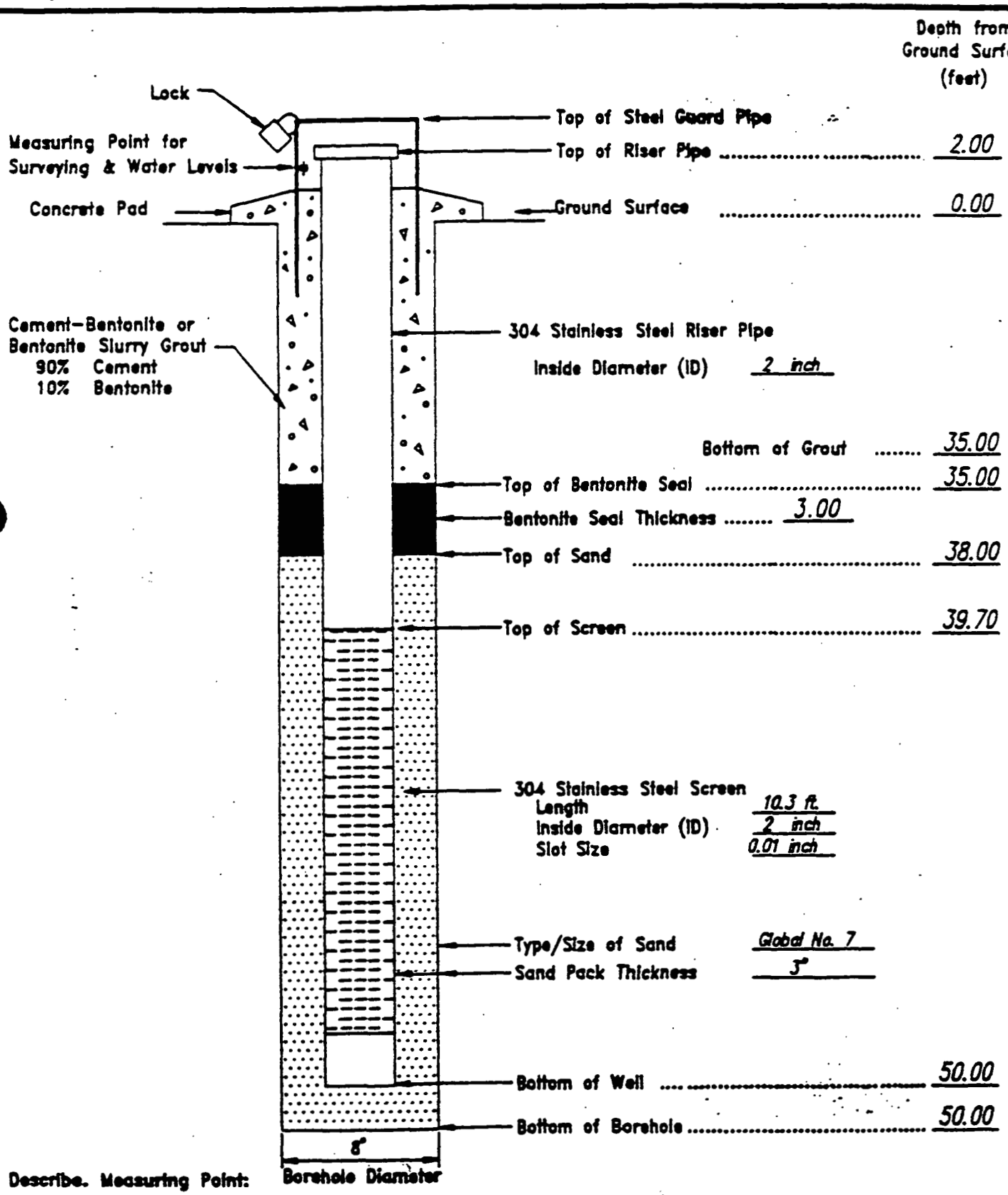
MONITORING WELL CONSTRUCTION DETAIL

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

6703 5711

Well Identification: MW-331
Well Location: A & W
Date Of Installation: 12/13/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 529.74
Geologist/Engineer: B.E.M.
Project Number: 4700-062



• Describe. Measuring Point:

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-33I Sh 1 of 3
Date Started 12/12/90 Completed 12/12/90 Ground Elev. 527.79
Total Depth 50 Feet Location A & W/Mobil Logged by MAF & BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units, & Remarks
0	1	-	0-2	1.0	Brown, soft, silt and clay, moist	0 Units no odor
2	2	-	2-4	1.5		0 Units no odor
4	3	15	4-6	1.5	Tan, medium stiff, clay, moist	0 Units no odor
6	4	14	6-8	1.5	Brown, medium stiff, silt, with some fine sand, moist	0 Units no odor
8	5	24	8-10	1.5	Black, medium dense, medium to coarse sand, with some silt, moist	0.6 Units no odor
10	6	27	10-12	1.5		2.0 Units no odor
12	7	-	12-14	1.0		2.5 Units no odor
14	8	93	14-16	1.4		2.2 Units no odor
16	9	47	16-18	0	Brown, very dense, medium to coarse sand and fine to coarse gravels, with some silt, wet	4.0 Units no odor
18	10	27	18-20	1.2		3.2 Units no odor
20						

ENSR

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-33I Sh 2 of 3
Date Started 12/12/90 Completed 12/12/90 Ground Elev. 527.79
Total Depth 50 Feet Location A & W/Mobil Logged by MAF & BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	37	20-22	1.4		2.0 Units no odor
24	12	25	22-24	1.5		1.8 Units no odor
26	13	27	24-26	1.2		3.2 Units no odor
26	14	30	26-28	1.3		0.2 Units no odor
28	15	60	28-30	1.3	Brown, very dense, medium sand, trace of fine gravel, wet	0 Units no odor
30	16	18	30-32	1.0		0 Units no odor
32	17	59	32-34	1.3		0 Units no odor
34	18	64	34-36	1.1	Brown, very dense, coarse sand, trace fine sand and gravels, wet	0 Units no odor
36	19	60	36-38	1.3	Brown, very dense, fine to medium gravel, with some fine to medium sand and silt, wet	0 Units no odor
38	20	58	38-40	1.3		0 Units no odor
40						

ENSR

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-33I Sh 3 of 3
Date Started 12/12/90 Completed 12/12/90 Ground Elev. 527.79
Total Depth 50 Feet Location A & W/Mobil Logged by MAF & BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
42	21	22	40-42	1.3		0 Units no odor
44	22	22	42-44	1.3	Brown-gray, dense, fine sand, wet	0 Units no odor
46	23	23	44-46	1.3		0 Units no odor
48	24	20	46-48	1.7	Grading into a medium sand from 46 to 50 feet	0 Units no odor
50	25	30	48-50	1.5		0 Units no odor
					Ground water encountered at approximately 12 feet.	

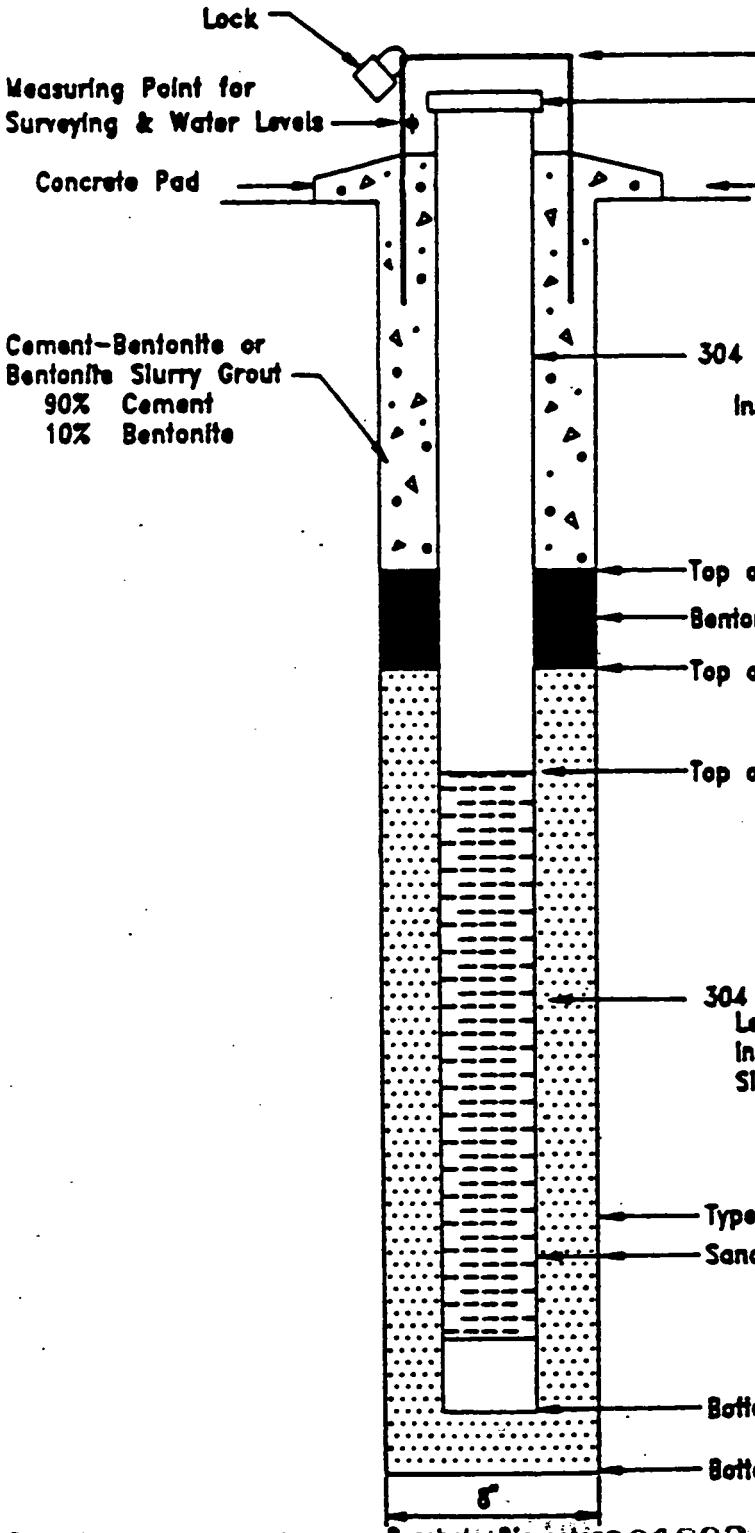
NSR

PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-34S 2704
Well Location: RMCC
Date Of Installation: 12/12/90
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 532.89
Geologist/Engineer: M.A.F.
Project Number: 4700-062



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.00
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	7.00
Top of Bentonite Seal	7.00
Bentonite Seal Thickness 2.00	
Top of Sand	9.00
Top of Screen	11.00
304 Stainless Steel Screen — Length 10.4 ft; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Type/Size of Sand: Global No. 7	
Sand Pack Thickness: 3"	
Bottom of Well	21.20
Bottom of Borehole	22.00

* Describe. Measuring Point:

001392

2704

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-34S Sh 1 of 2
Date Started 12/12/90 Completed 12/12/90 Ground Elev. 530.69
Total Depth 22 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	17	0-2	1.5	Brown, stiff, clay and silt, trace of fine sand, moist	0 Units no odor
2	2	23	2-4	1.5		0 Units no odor
4	3	-	4-6	1.8	Brown, medium to coarse sand and fine to coarse gravels, with trace to some silt, moist to wet	0.2 Units no odor
6	4	43	6-8	1.8		0.2 Units no odor
8	5	22	8-10	1.4		2.8 Units no odor
10	6	47	10-12	1.5		0.6 Units no odor
12	7	-	12-14	1.0		0.4 Units no odor
14	8	45	14-16	1.7		Flame out organic odor black stains
16	9	53	16-18	1.5		120 Units organic odor black stains
18	10	59	18-20	1.3		>1000 Units strong organic odor black stains
20						

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-34S Sh 2 of 2
Date Started 12/12/90 Completed 12/13/90 Ground Elev. 530.68
Total Depth 22 Feet Location RNCC Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	48	20-22	0.5	Medium sand from 21.5 feet to 22 feet	>1000 strong organic odor black stains
					Ground water encountered at approximately 10 feet on 12/12/90. Ground water was measured at 8.5 feet on morning of 12/13/90.	

ENSR

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-35S 2705
Well Location: Off-Site
Date Of Installation: 1/8/91
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 525.98
Geologist/Engineer: B.E.M.
Project Number: 4700-062

	Depth from Ground Surface (feet)
Lock	
Measuring Point for Surveying & Water Levels	
Concrete Pad	
Top of Steel Guard Pipe	
Top of Riser Pipe	2.00
Ground Surface	0.00
Cement-Bentonite or Bentonite Slurry Grout 90% Cement 10% Bentonite	
304 Stainless Steel Riser Pipe Inside Diameter (ID) 2 inch	
Bottom of Grout	13.00
Top of Bentonite Seal	13.00
Bentonite Seal Thickness 2.00	
Top of Sand	15.00
Top of Screen	17.00
304 Stainless Steel Screen Length 10.4 ft. Inside Diameter (ID) 2 inch Slot Size 0.01 inch	
Type/Size of Sand Global No. 7	
Sand Pack Thickness 3"	
Bottom of Well	27.00
Bottom of Borehole	27.00

* Describe. Measuring Point:

001395

2705

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

5711

Project 4700-062 Site PRRS BORING MW-35S Sh 1 of 2
Date Started 1/08/91 Completed 1/09/91 Ground Elev. 523.97
Total Depth 26 Feet Location Off-Site Logged by BEM
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	3	0-2	2.0	Brown-black, very loose, silt and medium sand, moist	0 Units
2	2	7	2-4	1.9	Brown, loose, medium sand, moist	0 Units
4	3	11	4-6	1.8	Brown-Black, soft, silt moist	0 Units
6	4	12	6-8	2.0		0 Units
8	5	8	8-10	2.0	Brown, soft, sandy (fine), silt, moist	0 Units
10	6	12	10-12	1.7	Brown, loose medium gravel and some fine sand, moist	0 Units
12	7	13	12-14	2.0	Brown, loose, sandy (fine) silt trace of fine gravels, moist "shells noted"	0 Units
14	8	28	14-16	1.3	Brown, dense, fine to medium sand and medium to coarse gravels, moist to wet	0 Units
16	9	55	16-18	1.9		0 Units
18	10	30	18-20	1.0		0 Units
20						

ENSR

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-35S Sh 2 of 2
ate Started _____ Completed _____ Ground Elev. 523.97
Total Depth _____ Feet Location Off-Site Logged by BEM
Remarks _____

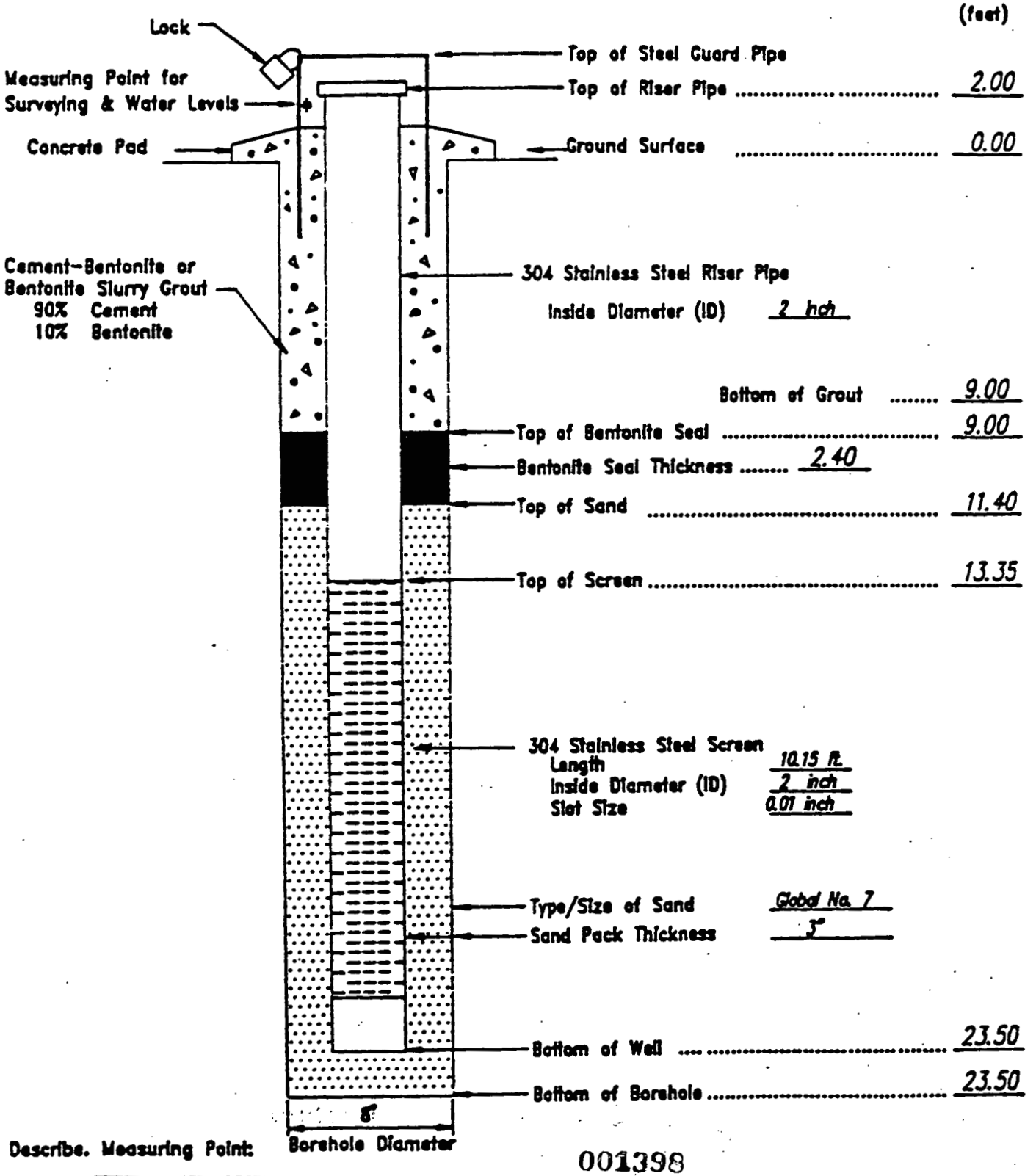
Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
	11	52	20-22	1.0		0 Units
22						
	12	21	22-24	1.0	Brown, medium dense, medium to coarse sand, wet	0 Units
24						
	13	15	24-26	1.0	Trace of fine gravels from 24 to 26 feet	0 Units
26					Ground water encountered at approximately 19.5 feet	

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

5711

Well Identification: MW-36S 2706
Well Location: Off-Site
Date Of Installation: 1/7/91
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 518.15
Geologist/Engineer: R.E.M.
Project Number: 4700-062



* Describe. Measuring Point:

001398

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-36S Sh 1 of 2
ate Started 1/07/91 Completed 1/07/91 Ground Elev. 516.19
Total Depth 26 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	10	0-2	1.2	Brown, soft, silt, with some fine sand, moist	0 Units
2	2	12	2-4	1.5		0.1 Units no odor
4	3	9	4-6	1.2		0.9 Units no odor
6	4	7	6-8	0.9	Brown, loose, fine to medium sand, moist	0.3 Units no odor
8	5	8	8-10	0.9		0.8 Units no odor
10	6	22	10-12	0.3		0.6 Units "natural gas odor"
12	7	56	12-14	0.8		1.7 Units no odor
14	8	53	14-16	0.9	Brown, very dense, medium to coarse sand and fine to coarse gravels, moist	1.0 Units no odor
16	9	68	16-18	1.0		2.6 Units no odor
18	10	93	18-20	2.6		1.5 Units "natural gas odor"
20						

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-36S Sh 2 of 2
Date Started 1/07/91 Completed 1/07/91 Ground Elev. 516.19
Total Depth 24 feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	48	20-22	.8	Tan, very dense, medium to coarse sand and fine to coarse gravels, with trace to some silt, wet	6.2 Units "natural gas odor"
24	12	23	22-24	1.3		2.6 Units "natural gas odor"
					Ground water encountered at 16.7 feet.	

ISR

LOCATION MAP

6706

ERM–MIDWEST WELL LOG

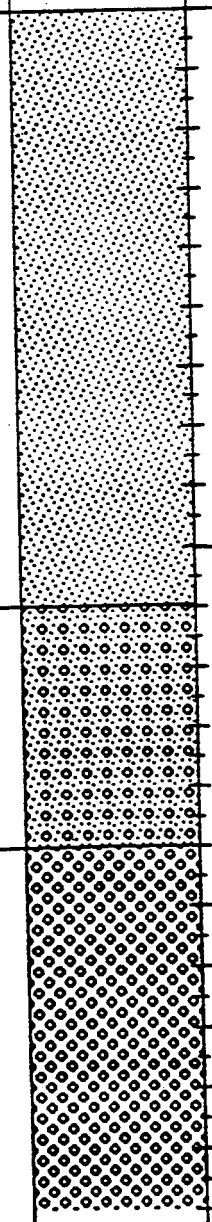
BORE NUMBER ▶ MW-36I	LOCATION ▶ PRRS, Fernald, Ohio
DATE ▶ 10/01/91	WEATHER ▶ Clear, Sunny, 60'sF
LOGGED BY ▶ D. Jakim	DRILLED BY ▶ Mathes & Associates
DRILLING METHOD ▶ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▶ Split Spoon
ELEVATION ▶ Ground 516.31 FT. T.O.C. 518.44 FT.	GRAVEL PACK ▶ #7 36-19 FT. / SEAL ▶ Bentonite Slurry, 19-9 FT.

CASING ▶ TYPE 306 S.S. DIAMETER 2 IN. LENGTH 21 FT. | WATER LEVEL INITIAL 23.0 FT. ■ B.G.S. □ B.M.P. | HOLE DIA. 8 IN.

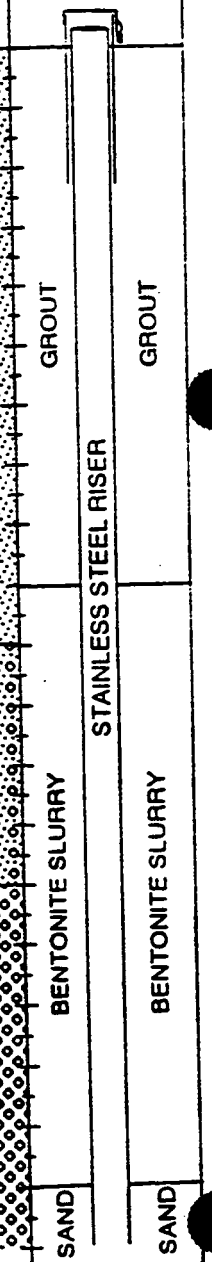
SCREEN ▶ TYPE 306 S.S. SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 15 FT. | WATER LEVEL AT COMPLETION 23.0 FT. H.M.P. | TOTAL DEPTH 36.5 FT.

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
				0		2	Brown SAND and roots organics.
1	Moist	Loose	0	1	0.2'	4 6 4	
				2		4	Brown SAND and organics.
2	Moist	Loose	0	3	0.7'	3 3 4	
				4		4	Brown SAND trace organics.
3	Moist	Loose	0	5	1.0'	5 5 4	
				6		2	Brown SAND.
4	Damp	Loose	0	7	0.7'	4 4 3	
				8		2	Fine SAND and clay.
5	Moist to Dry	Loose	2	9	0.8'	2 4 3	
				10		3	Fine to coarse SAND and brown to gray GRAVEL, slight odor.
6	Moist to Dry	Loose	0	11	1.5'	4 4 4	
				12		4	Brownish gray, well sorted, coarse SAND and GRAVEL, slight odor.
7	Damp	Medium Dense	0	13	0.5'	7 15 41	
				14		22	Brownish gray, well sorted GRAVEL and sand, slight odor.
8	Damp	Compact	0	15	1.0'	33 36 37	GRAVEL and coarse sand, odor.
				16		5	
9	Damp	Dense	0	17	1.3'	15 23 21	
				18		8	Gray to brownish GRAVEL and coarse sand, slight odor.
10	Damp	Medium Dense	0	19	1.7'	14 16 10	
				20			

GRAPHIC LOG



WELL COMPLETION



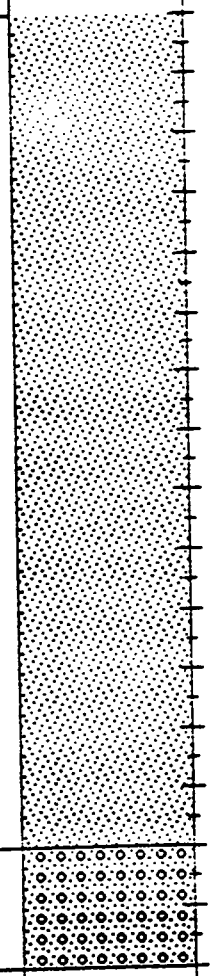
PROJECT\S39-13\S391336I.DRW

WELL NUMBER ▶ MW-36I

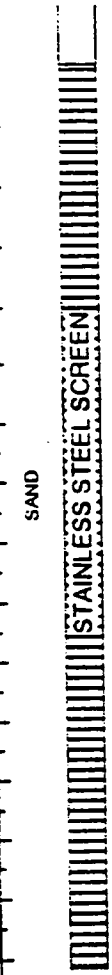
ERM–MIDWEST WELL LOG

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
11	Damp	Dense	0	20–21	0.7'	9, 18, 12, 23	Brown-grayish coarse SAND and pebbles and gravel, rounded pebbles and gravel, odor.
12	Moist	Medium Dense	0	22–23	1.7'	6, 7, 12, 16	Brown GRAVEL, pebbles and coarse sand.
13	Wet	Medium Dense	0	24–25	1.5'	6, 6, 15, 16	Brown coarse SAND, pebbles and gravel, well sorted, slight odor.
14	Wet	Dense	0	26–27	1.5'	10, 20, 20, 24	Coarse, poorly sorted SAND to fine well sorted sand and gravel, trace odor.
15	Wet	Medium Dense	0	28–29	2.0'	20, 15, 10, 14	Coarse SANDS and pebbles, rare brown gravel, trace odor.
16	Wet	Medium Dense	0	30–31	2.0'	4, 4, 13, 15	Coarse SAND and pebbles rare brown gravel, no odor.
17	Wet	Dense	0	32–33	1.7'	5, 15, 19, 24	Brown medium to coarse SAND and pebbles, no odor.
18	Wet	Dense	0	34–35	2.0'	14, 7, 16, 20	Coarse SAND and GRAVEL, few gravel, brown well sorted sand.
				36			Total Depth 36.0 FT.
				37			
				38			
				39			
				40			
				41			
				42			
				43			
				44			
				45			

GRAPHIC LOG



WELL COMPLETION

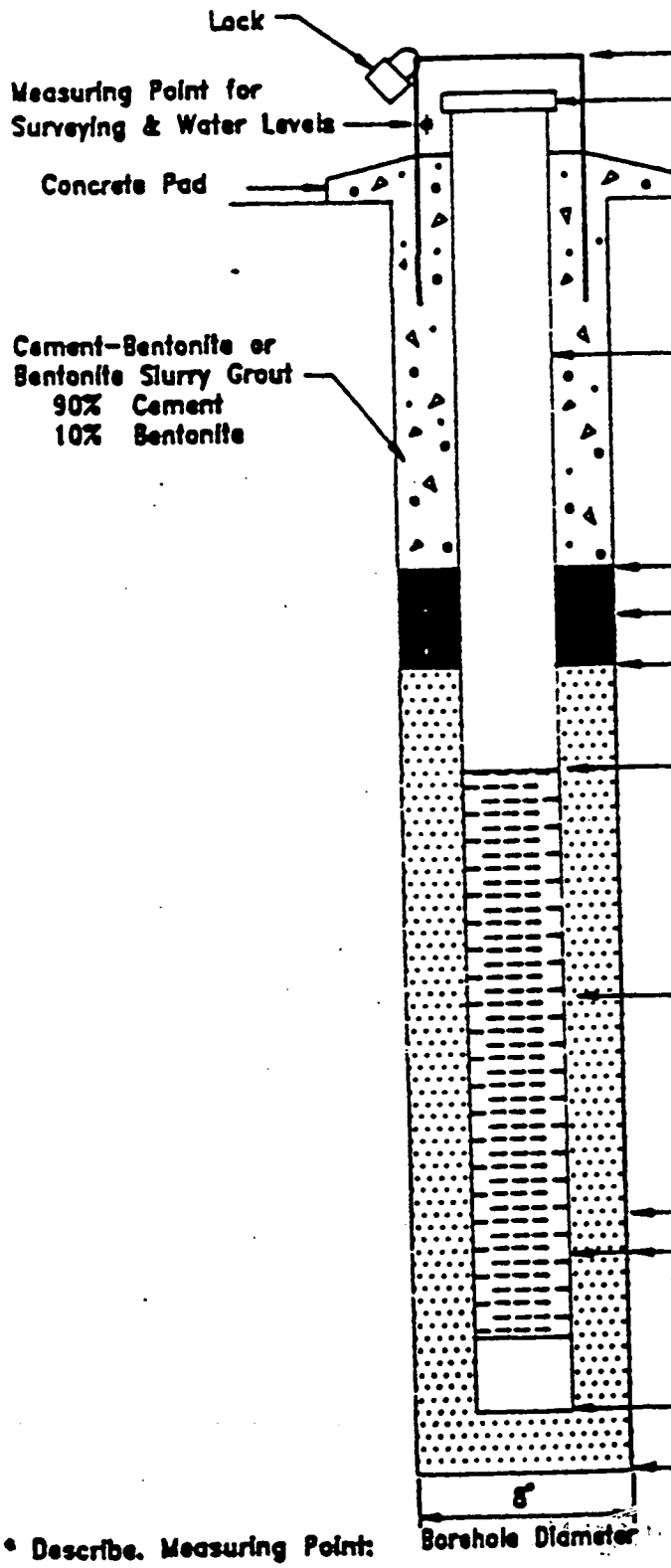


PROJECT\539-13\539133GLDRW

MONITORING WELL CONSTRUCTION DETAIL
PADDYS RUN ROAD SITE RI/FS
CROSBY TOWNSHIP, OHIO

Well Identification: MW-37S 2707
Well Location: Off-Site
Date Of Installation: 1/8/91
Drilling Contractor: BOWSER-MORNER

Drilling Method: Cable Tool
Top Of Casing Elev.(MSL): 518.95
Geologist/Engineer: B.E.M.
Project Number: 4700-082



	Depth from Ground Surface (feet)
Top of Steel Guard Pipe	
Top of Riser Pipe	2.00
Ground Surface	0.00
304 Stainless Steel Riser Pipe — Inside Diameter (ID) 2 inch	
Bottom of Grout	8.50
Top of Bentonite Seal	8.50
Bentonite Seal Thickness 2.30	
Top of Sand	11.80
Top of Screen	13.90
304 Stainless Steel Screen — Length 10.1 ft; Inside Diameter (ID) 2 inch; Slot Size 0.01 inch	
Type/Size of Sand: Global No. 7	
Sand Pack Thickness: 3'	
Bottom of Well	24.00
Bottom of Borehole	24.00

001403

* Describe. Measuring Point:

2707

5711

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-37S Sh 1 of 2
Date Started 1/08/91 Completed 01/08/91 Ground Elev. 517.13
Total Depth 26 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Blows Per 2ft.	Depth Range Feet	Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
0	1	9	0-2	1.3	Brown, medium stiff silt with some fine to medium sand, moist	0 Units no odor
2	2	12	2-4	1.6		0.1 Units no odor
4	3	4	4-6	2.0	Medium sand from 5.0-5.3 feet Browm, medium stiff, clay	8.8 Units no odor
6	4	21	6-8	.9	Brown, loose, medium to coarse sand, and fine gravels, moist	2.2 Units no odor
8	5	7	8-10	1.4		4.8 Units no odor
10	6	6	10-12	.8	Tan, loose, medium sand, with trace of silt, moist	2.6 Units "natural gas odor"
12	7	11	12-14	0		no recovery
14	8	23	14-16	1.7		1.7 Units "natural gas odor"
16	9	22	16-18	0.9		5.5 Units "natural gas odor"
18	10	60	18-20	0.7	Brown, very dense, medium to coarse sand and fine to coarse gravels, trace to some silt, moist to wet	3.2 Units no odor
20						

ENSR

2707

SOIL BORING LOG
PADDYS RUN ROAD SITE RI/FS - CROSBY TOWNSHIP, OHIO

Project 4700-062 Site PRRS BORING MW-37S Sh 2 of 2
Date Started 1/08/91 Completed 1/08/91 Ground Elev. 517.13
Total Depth 26 Feet Location Off-Site Logged by MAF
Remarks

Depth Feet	Sample: Split Spoon Number	Sample: Blows Per 2ft.	Sample: Depth Range Feet	Sample: Rec. Feet	Lithologic Description	OVA Readings (in Units) & Remarks
22	11	70	20-22	1.0	Brown, very dense, medium to coarse sand and fine gravels, wet	1.0 Units no odor
24	12	18	22-24	1.3	Brown, medium dense, medium sand, trace of silt, wet	0.1 Units no odor
26	13	18	24-26	2.0	Brown, medium dense, medium to coarse sand with trace of silt, wet	0.1 Units no odor
					Ground water encountered at 17.6 feet.	

ENSR

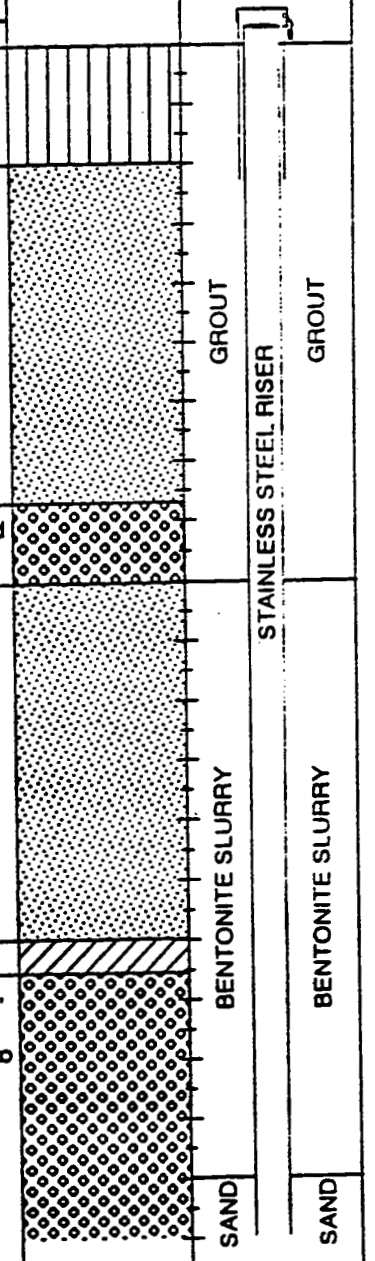
LOCATION MAP 6107

ERM–MIDWEST WELL LOG

BORE NUMBER ▶ MW-371	LOCATION ▶ PRRS, Fernald, Ohio
DATE ▶ 10/01/91	WEATHER ▶ Clear, Dry, Warm
LOGGED BY ▶ P. Gephard	DRILLED BY ▶ Mathes & Associates
DRILLING METHOD ▶ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▶ Split Spoon
ELEVATION ▶ Ground 517.42 FT. T.O.C. 519.15 FT.	GRAVEL PACK ▶ #7 36-19 FT. / SEAL ▶ Bentonite Slurry 19-9 FT.
CASING ▶ TYPE 306 S.S. DIAMETER 2 IN. LENGTH 21 FT.	WATER LEVEL INITIAL 25 FT. ■ B.G.S. □ B.M.P. / HOLE DIA. 8 IN.
SCREEN ▶ TYPE 306 S.S. SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 15 FT.	WATER LEVEL AT COMPLETION 25 FT. H.M.P. / TOTAL DEPTH 36 FT.

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
1	Dry	Stiff	0	0–1	1.2'	11, 25, 13, 14	Brown SILT, some fine sand.
2	Dry	Medium Dense	0	2–3	1.8'	11, 9, 12	Brown medium SAND, friable minor amount of silt.
3	Dry	Loose	0	4–5	1.2'	9, 7, 8, 7	Brown medium SAND.
4	Dry	Loose	0	6–7	1.4'	8, 7, 8, 5	Brown fine SAND, minor amount of silt.
5	Dry	Loose	2	8–9	1.2'	5, 7, 8	Brown Medium GRAVEL to coarse sand poorly sorted.
6	Dry	Loose	0	10–11	1.4'	5, 5, 6, 5	Light brown medium SAND. Light brown medium SAND. Lower 2 IN. Brown, medium gravel, poorly sorted.
7	Dry	Loose	1	12–13	1.6'	9, 8, 6, 7	Brown, medium SAND, minor silt.
8	Dry	Very Stiff	1	14–15	1.2'	9, 9, 20, 23	Brown, medium SAND. Dark brown CLAY, moist.
9	Dry to Moist	Compact	0	16–17	1.5'	28, 18, 19, 30	Brown coarse GRAVEL to coarse sand, poorly sorted. Light brown to white, coarse GRAVEL to medium sand.
10	Moist	Dense	0	18–19	0.1'	32, 18, 27, 18, 22	Light gray medium GRAVEL.

GRAPHIC LOG / WELL COMPLETION



PROJECT\539-13\5391337I.DRW

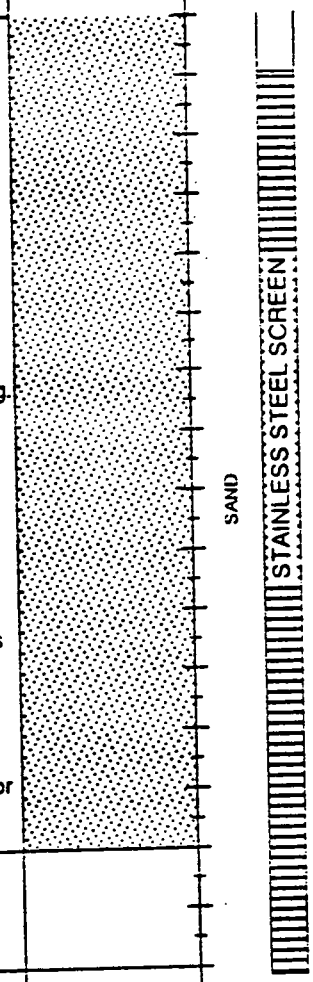
WELL NUMBER ▶ MW-371

ERM—MIDWEST WELL LOG

SAMPLE NO.	MOISTURE CONTENT	CONSISTENCY	Hnu (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
				20		10	Brown, medium SAND, minor amounts of medium gravel and coarse SAND.
11	Moist	Dense	0	21	1.5'	22 23 27	
				22		19	Dark brown to brown medium SAND, minor coarse sand and 1-1/2 FT. medium gravel, poorly sorted.
12	Moist	Dense	0	23	1.5'	15 15 20	6 IN. light brown, medium SAND, good sorting.
				24		7	
13	Wet	Medium Dense	2	25	1.8'	10 13 20	Brown, medium SAND, minor amounts of medium gravel.
				26		9	6 IN. of brown, fine SAND, good sorting.
14	Wet	Medium Dense	2	27	1.7'	13 14 19	1-1/2 FT. of brown, medium to coarse SAND, with coarse to medium gravel, poorly sorted.
				28		5	1 FT. brown to dark brown, medium to coarse SAND, minor medium gravel.
15	Wet	Dense	0	29	2.0'	23 23 28	1 FT. brown, medium SAND, medium sorting.
				30		18	Brown, medium SAND, minor amounts of coarse SAND to fine gravel.
16	Wet	Dense to Compact	0	31	2.0'	18 22 38	
				32		10	
17	Wet	Compact	2	33	2.0'	22 32 37	Brown, medium to coarse SAND, minor fine gravel.
				34			No Sample
				35			
				36			Total Depth 36.0 FT.
				37			
				38			
				39			
				40			
				41			
				42			
				43			
				44			
				45			

GRAPHIC LOG

WELL COMPLETION



001407

PROJECT\539-13\5391371.DRW

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.91.316	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1708	COORDINATES: N 477710.64 E 1379166.88	DATE: 6-14-91	
ELEVATION:	GWL: Depth NA Date/Time NA	DATE STARTED: 6-14-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 6-17-91	
DRILLING METHODS: Auger Mobile 53		PAGE 1 OF 5	

S.A.A. - Same As Above

N.R. - No Recovery

	DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1	67091 1500 6-14-91	25 27 19	18	v. hard, black (2.5Y, 2/) asphalt, Trace gravel, dry (1.25) v. hard brown to yellowish brown (10YR, 5/3 to 10YR, 4/6) silty clay, some gravel low plas. dry.	NA N CL	>4.0 >4.0	Hnu - 0 Bq - 50-100cpm α - 0
	2 3	67092 1505 6-14-91	14 14 14	18	S.A.A (1.25) Dense, very dark gray (2.5Y, 3/) silt, Trace sand & gravel, dry	CL ML	>4.0 NA	Hnu - 0 Bq - 50-100cpm α - 0
	4	67093 1510 6-14-91	14 14 18	18	S.A.A. (4.0) Dense, black, (2.5Y, 2/) silt, trace sand trace gravel, sl. moist.	ML ML	NA NA	Hnu - 0 Bq - 50-100cpm α - 0
	5 6	67094 1515 6-14-91	6 6 5	18	S.A.A add med dense (5.25) med dense, very dark gray (2.5Y, 3/) silt, some sand, some gravel, dry	ML ML	NA NA	Hnu - 0 Bq - 50-100cpm α - 0
	7	67095 1550 6-14-91	2 2 2	10	Very loose, black, (2.5Y, 2/) silt, trace sand and gravel, sl. moist	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0
Full HSL	8 9	67096 1555 6-14-91	2 2 2	16	S.A.A.	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0
Shelby	10	67097 0955 6-15-91	NA	18	S.A.A. add Some Sand, Some gravel	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0
Shelby	11 12	67098 1000 6-15-91	NA	16	S.A.A.	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0
TCLP	13	67099 6-16-91 0900	3 3 3	13	S.A.A.	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0
	14 15	67100 6-16-91 0905	3 3 4	18	S.A.A some sand, Trace gravel	ML	NA	Hnu - 0 Bq - 50-100cpm α - 0

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Auger Mobile 53

Driller: Bob Yost

Asst. Bill Anderson

Samples classified according to munsel color chart.

Background

Hnu - 0 ppm

Bq - 50-100cpm

α - 0 cpm

REVIEWED BY QA [illegible] DATE 6-23-91

2438-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6062 ~~26-9R~~ 3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1708	COORDINATES: See attached		DATE: 6-16-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-14-91
ENGINEER/GEOLOGIST: J. Lear	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Auger Mobile 53			PAGE 2 OF 5

	DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
Full Rad	16	67101 0910 6-16-91	3 3 4	18	S.A.A.	ML	NA	Hnu - 0 Bz - 50-100 α - 0
Full HSL	17 18	67102 0915 6-16-91	5 2 3	18	S.A.A	ML	NA	Hnu - 0 Bz - 50-100 α - 0
	19	67103 1015 6-16-91	5 5 5	0	N.R	NA	NA	Hnu - 0 Bz - 50-100 α - 0
	20 21	67104 1020 6-16-91	5 3 4	18	loose, black (2.5Y, 2/) silt, trace sand trace gravel, sl. moist. wood chip. 2"L	ML	NA	Hnu - 0 Bz - 50-100 α - 0
	22	67105 1025 6-16-91	2 2 3	18	21.5' S.A.A loose, black (2.5Y, 2/) sandy silt, trace gravel sl moist. 22.0' loose, black (2.5Y, 2/) silt, trace sand. Trace gravel, moist	ML ML ML	NA NA NA	Hnu - 0 Bz - 50-100 α - 0
	23 24	67106 1030 6-16-91	3 3 3	18	loose, black, (2.5Y 2/) silt, some gravel, trace sand, sl moist. 23.8' loose, black to yellowish brown (2.5Y, 2/) to olive gr. 5/4) sandy silt, trace gravel, sl. moist	ML ML	NA NA	Hnu - 0 Bz - 50-100 α - 0
	25	67107 1330 6-16-91	5 5 4	18	loose black, (2.5Y, 2/) silt, some poorly sorted sand, sl moist.	ML	NA	Hnu - 0 Bz - 50-100 α - 0
	26 27	67108 1335 6-16-91	3 3 2	18	S.A.A.	ML	NA	Hnu - 0 Bz - 50-100 α - 0
	28	67109 1340 6-16-91	2 2 4	18	S.A.A 28.2' - loose, dark grayish brown (10Y, 4/2) Poorly sorted sand, trace gravel, sl. moist	ML SP	NA NA	Hnu - 0 Bz - 50-100 α - 0
	29 30	67110 1345 6-16-91	2 8 6	16	29.0' S.A.A. medium dense medium dense, very dark gray, (2.5Y, 3/) sandy silt, moist 29.5' medium dense, (2.5Y, 4/2) olive brown, silt some sand some clay, slight plasticity, moist.	SP ML ML	NA NA NA	Hnu - 0 Bz 50-100 α - 0

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost

Asst. Bill Anderson

B.G.
Hnu - 0 ppm
Bz - 50-100 cpm
α - 0 cpm

001409

REVIEWED BY QA [illegible] DATE 8-23-91

2438-3-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1123.26.11.3.116	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 17028	COORDINATES: N 47771.0.64 E 1379166.89		DATE: 6-16-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6-14-91
ENGINEER/GEOLOGIST: J Lear	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Auger mobile 53			PAGE 5 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
Full Rad	67111	8		medium dense, black (5Y/2.5/1) silt some light olive brown (2.5Y, 5/6) sand (fine) moist	ML	NA	Hnu - 0
31	1415	11	18	31.0 medium dense, dark olive gray to black 5Y, 3/2 to 5Y/2.5/2) silt trace sand, moist	ML	NA	BD - 50-100
	6-16-91	13					α - 0
Full HSL	67112	8		Dense, dark olive gray, (5Y/3/2) silt, some clay, moist low plasticity	ML	NA	Hnu - 0
32	1420	14	18				Bd - 50-100
33	6-16-91	20					α - 0
				Drilling and Sampling ceases at 33.0' boring plugged and abandoned according to OU-2 work plan			
				Sample # 67113 - field trip			
				67114 - Drum TCLP			
				67115 - Comp TCLP			
				67116 - SPLP			
				67117 - Comp. Archive			
				67118 - Ignite Corro. Tot, Reac.			
				67119 - Shelby-Geotech			
				~~67120~~ 7-1-91			
				67120 - Treatability			

NOTES:

Drilling Contractor Denn Drilling

Drilling Equipment Mobile 53 Auger

Driller: Bob Yost

Asst. Bill Anderson

Background
Hnu - 0 ppm
Bd - 50-100 cpm
α - 0 cpm

001410

2438-3-86

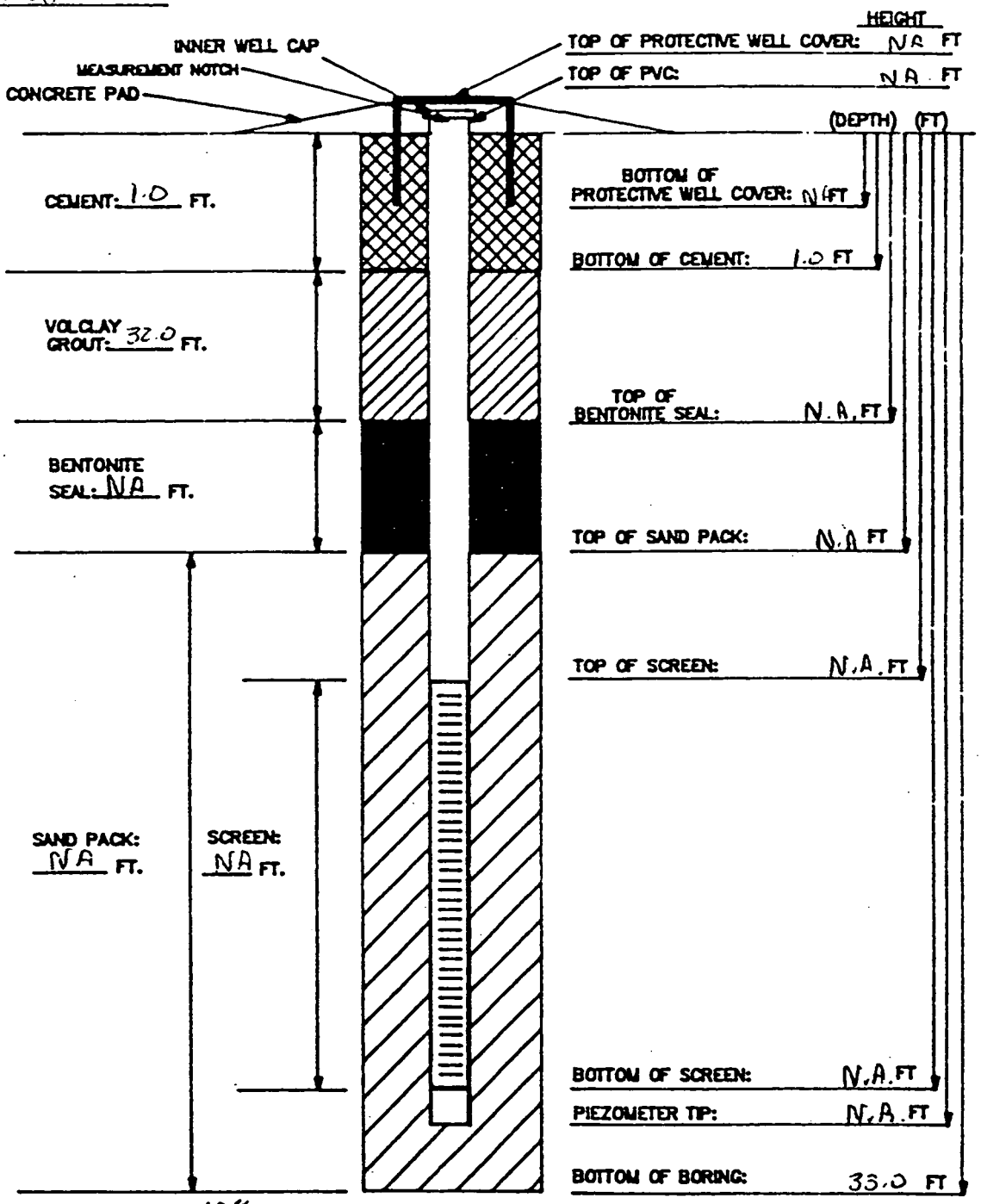
REVIEWED BY QA MB DATE 8-23-91

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged boring 1708

INSTALLATION DATE: 6-15-91



BOREHOLE DIAMETER: 10" INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 7 bags/50 lb bags

AMOUNT OF CEMENT: 1/2 bag/80 lb bags

AMOUNT OF WATER USED: 100 gals

OTHER:

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602-26-91 GEOLOGIST/ENGINEER: J. Lear

001411

REVIEWED BY QA MB DATE 8-23-91

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 6-18-91
PROJECT NO. 602.26.91 CHECKED BY 6- DATE
BORING NO. 1708
PIEZOMETER NO. NA DATE OF INSTALLATION 6-17-91

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT 10" Hollow Auger
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM TO	SIZE NA FROM TO
FLUID NA FROM TO	SIZE NA FROM TO

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS: NA
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 TOP 1.0	BOTTOM 1.0 BOTTOM 33.0	TOP	BOTTOM NA-B
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	33.0'			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001412 REVIEWED BY QA MR DATE 8-23-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ET 8/19/91

ROJECT NUMBER: 602.26.11.3.16	PROJECT NAME: FMPC RI/FS		
ORING NUMBER: 1709	COORDINATES: N.477814.23, E.1378969.43	DATE: 6-4-91	
ELEVATION: 571.0 GROUND	GWL: Depth NA Date/Time NA	DATE STARTED: 6-4-91	
ENGINEER/GEOLOGIST: J. Lecr	Depth NA Date/Time NA	DATE COMPLETED: 6-12-91	
DRILLING METHODS: Auger		PAGE 1 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION (S.A.A - Same as above; N.R - No recovery)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67059 1515 6-4-91	4 10 15	14	medium dense, dark brown (10yr, 3/3) clayey silt, trace sand, some organics, sl. moist 1.5' medium dense, yellowish brown, (10yr, 5/3) clayey silt, Trace sand, Trace gravel, dry	ML ML	NA NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
2 3	67060 1520 6-4-91	4 15 17	0	N.R.	NA	NA	Hnu - 0 ppm Bb - 50-100cpm
4	67061 1525 6-4-91	3 16 18	12	v. stiff, yellowish brown to dark brown (10yr, 5/8 to 3/3) silty clay, some gravel, trace sand, low plasticity, dry. * one brick cobble was recovered	CL	3.5	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
5 6	67062 1535 6-4-91	4 25 17	4	Dense, black, (2.5Y, 2/0) silt, trace gravel, dry	ML	NA	Hnu - 0 ppm Bα - 110 cpm β - 0 cpm
7	67063 0900 6-6-91	3 13 7	8	medium dense, black (2.5Y, 2/) silt, Trace gravel, dry	ML	NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
8 9	67064 0905 6-6-91	7 7 7	18	medium dense, very dark gray, (10yr 3/) silt, some gravel, dry. 7.5' medium dense, black (2.5Y, 2/) silt, Trace gravel, dry	ML ML	NA NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
10	67065 67066 0910 6-6-91	4 6 6	18	S.A.A	ML	NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
11 12	67067 1000 6-6-91	1 2 3	18	S.A.A add Trace sand add slightly moist.	ML	NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
13	67068 1005 6-6-91	2 3 3	18	Loose, black (2.5Y, 2/) silt, some gravel fragments, Trace sand, sl. moist.	ML	NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm
14 15	67071 1010 6-6-91	2 3 3	18	S.A.A	ML	NA	Hnu - 0 ppm Bb - 50-100cpm α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Rob Yost

Asst. Bill Anderson

All samples classified to munsel color chart standards

*Field Blank Sample No 67068

*Trip Blank Sample No 67069

Background

Hnu - 0 ppm

Bb - 50-100 cpm

α - 0 cpm

001413

REVIEWED BY QA KS DATE 7-8-92

243B-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 60226.11.3.16 ET PYS-51	PROJECT NAME: Fmpc RI/FS		DATE: 6-4-91
BORING NUMBER: 1709	COORDINATES: N.477814.23, E.1378969.43		DATE STARTED: 6-4-91
ELEVATION: 571.0 GROUND	GWL: Depth NA	Date/Time NA	DATE COMPLETED: 6-12-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	PAGE 1 OF 5
DRILLING METHODS: Auger			

S.A.A - Same as above

N.R - No recovery

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67059 1515 6-4-91	4 10 15	14	medium dense, dark brown, (10yr, 3/3) clayey silt, trace sand, some organics, sl. moist 1.5' medium dense, yellowish brown, (10yr, 5/3) clayey silt, trace sand, trace gravel, dry	ML ML	NA NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
2	67060 1520 6-4-91	4 15 17	0	N.R.	NA	NA	Hnu - 0 ppm Bb - 50-100 cpm
3 4	67061 1525 6-4-91	3 16 18	12	v. stiff, yellowish brown to dark brown (10yr, 5/8 to 3/3) silty clay, some gravel, trace sand, low plasticity, dry. * one brick cobble was recovered	CL	3.5	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
5 6	67062 1535 6-4-91	4 25 17	4	Dense, black, (2.5y, 2/1) silt, trace gravel, dry	ML	NA	Hnu - 0 ppm Bα - 110 cpm β - 0 cpm
7	67063 0900 6-6-91	3 13 7	8	medium dense, black (2.5y, 2/1) silt, trace gravel, dry	ML	NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
8 9	67064 0905 6-6-91	7 7 7	18	medium dense, very dark gray, (10yr 3/1) silt, some gravel, dry. 8.25' medium dense, black (2.5y, 2/1) silt, trace gravel, dry	ML ML	NA NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
10	67065 67066 0910 6-6-91	4 4 6	18	S.A.A	ML	NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
11	67067 1000 6-6-91	1 2 3	18	S.A.A add trace sand add slightly moist.	ML	NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
12 13	67070 1005 6-6-91	2 3 3	18	Loose, black (2.5y, 2/1) silt, some gravel fragments, trace sand, sl. moist.	ML	NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm
14 15	67071 1010 6-6-91	2 3 3	18	S.A.A	ML	NA	Hnu - 0 ppm Bb - 50-100 cpm α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Rob Yost

Asst. Bill Anderson

All samples classified to munsel color chart standards

*Field Blank Sample No 67068

*Trip Blank Sample No 67069

Background

Hnu - 0 ppm

Bb - 50-100 cpm

α - 0 cpm

REVIEWED BY QA ____ DATE ____

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26-91.3.16 ET 875-5	PROJECT NAME: fmpc RI/FS		
BORING NUMBER: 1709	COORDINATES: See p.1		DATE: 6-6-91
ELEVATION: See p.1	GWL: Depth NA	Date/Time NA	DATE STARTED: 6-4-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 6-12-91
DRILLING METHODS: Auger			PAGE 2 OF 5

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67072 1015 6-6-91	4 3 5	18	S.A.A	ML	N.A	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0 cpm
17, 18	67073 1100 6-6-91	1 2 2	18	S.A.A. add very loose	ML	NA	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0 cpm
19	67074 1105 6-6-91	2 3 4	18	S.A.A. Add loose	ML	NA	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0 cpm
20, 21	67075 1105 6-6-91	2 3 3	18	S.A.A.	ML	NA	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0cpm
22	67076 1110 6-6-91	3 3 3	18	S.A.A. Add: Trace gravel Trace sand	ML	NA	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0cpm
23, 24	67077 1330 6-11-9	2 3 4	18	S.A.A	ML	N.A.	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0cpm
25	67078 1340 6-11-91	2 2 4	18	S.A.A. Add. Some sand	ML	N.A	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0 cpm
26, 27	67079 1345 6-11-91	3 3 3	18	S.A.A.	ML	N.A	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0cpm
28	67080 1350 6-11-91	3 4 3	16	27.4 S.A.A. loose, very dark gray (2.5Y, 3/) silt, some sand, Trace gravel, moist.	ML / ML	NA / NA	Hnu - 0ppm; Bβ - 50-100cpm; α - 0cpm
29, 30	67081 1500 6-11-91	1 2 2	14	S.A.A. add very loose, moist to v. moist	ML	N.A.	Hnu - 0 ppm; Bβ - 50-100cpm; α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53

Driller: Bob Yost

Asst. Bill Anderson

Background

Hnu - 0 ppm

Bβ - 50-100 cpm

α - 0 cpm

243B-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.26.91 3.16	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1709	COORDINATES: See p.1		DATE: 6-11-91
ELEVATION: See p.1	GWL: Depth NA	Date/Time NA	DATE STARTED: 6-4-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 6-12-91
DRILLING METHODS: Auger			PAGE 3 OF 5

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY ( ) in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	67082	3		Dark black (2.5Y. 2/1) silt trace sand trace gravel, V. moist	ML	NA	Hnu - 0ppm
31	1505 6-11-91	5 7	18	30.5' Stiff, dark grayish brown, (2.5Y. 4/2) silt, clayey silt, V. moist JC 6-11-91	ML	1.25 NA	Bq - 100-150cpm a - 0cpm
32	67083 1510 6-11-91	8 12 19	18	S.A.A.	ML	1.5	Hnu - 0ppm Bq - 80-120cpm a - 0cpm
33				Sampling Ends at 33.0' Boring plugged and abandoned. Samples taken according to OU-2 work Plan			
34							
35							
36							

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost

Asst. Bill Anderson

TCLP - 67087

SRLP - 67085 @ 1545

Eq. Corr. 67086

Rinse. TCLP - 67087 DR

Trip blank - 67090

REVIEWED BY QA DATE 1-8-92

243B-3-86

4/5 8.8.91

FERNALD RI/FS

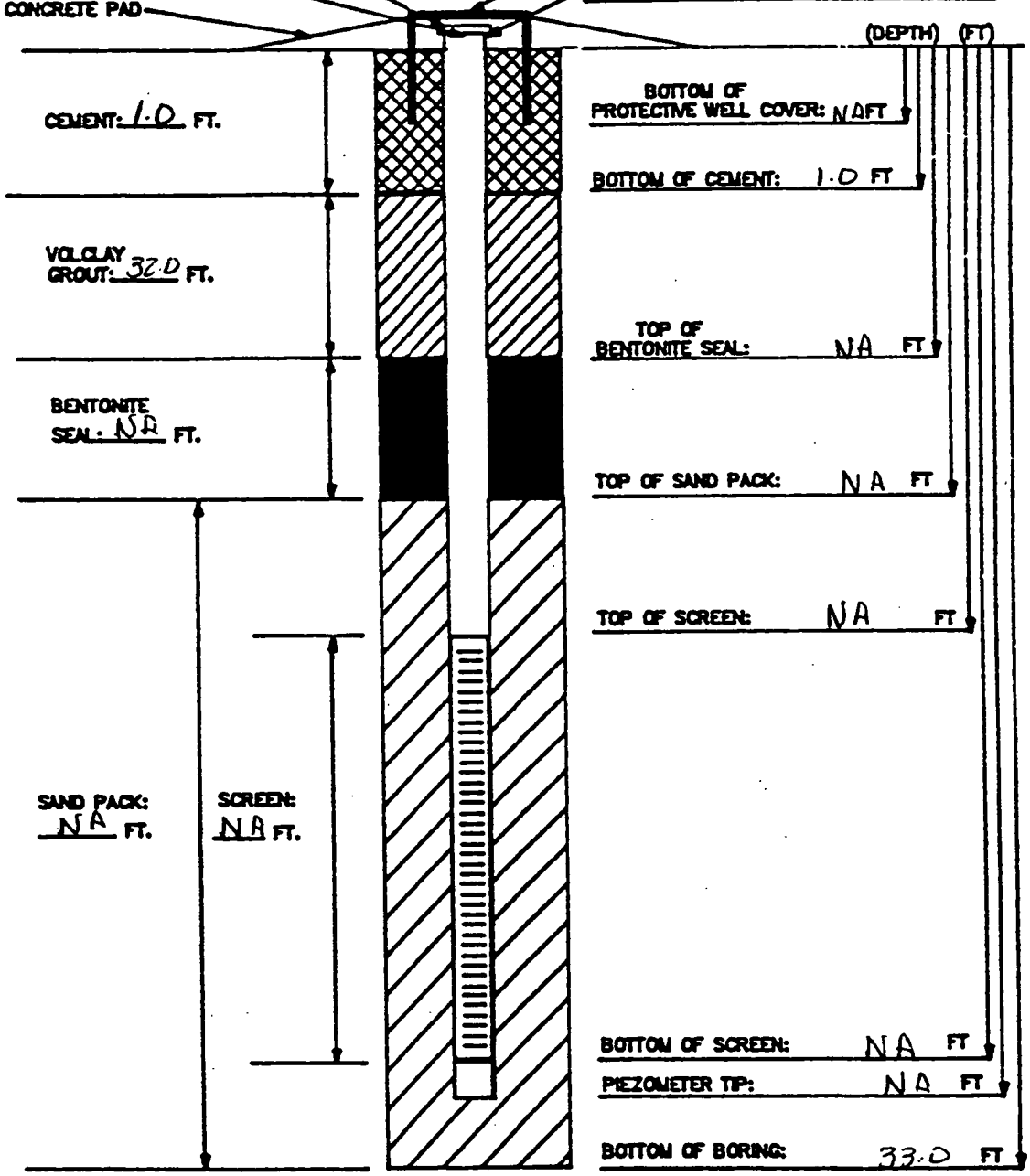
INSTALLATION DIAGRAM

~~MONITORING WELL~~ Plugged boring NO. 1709

~~INSTALLATION~~ Plugging DATE: 6-12-91

J.L 6-17-91

J.L 6-17-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 0

BAGS OF VOLCLAY GROUT: 7

AMOUNT OF CEMENT: 1 bag 90 lb cement

AMOUNT OF WATER USED: 160 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.26 ~~91~~ ET 8-19-91

GEOLOGIST/ENGINEER: J. Lear

3.16

001417

FERNALD RI/FS

5/5 8-8-91 5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS OU-2 FIELD ENG./GEO. J. Lear DATE 6-12-91
PROJECT NO. 602.26.91 3.16 ET 8-19-91 CHECKED BY E.T. DATE 8-19-91
BORING NO. 1709
PIEZOMETER NO. NA DATE OF ~~INSTALLATION~~ Plugging 6-12-91
J.L 6-12-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 10" Hollow Auger
CASING SIZE (S) USED: NA
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS: NA
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft.)		ELEVATION (Ft.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		571.0	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0	TOP 571.0	BOTTOM 570.0
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 33.0	TOP 570.0	BOTTOM 538.0
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	33.0		538.0	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS BOREHOLE PLUGGED & ABANDONED

REVIEWED BY QA KG DATE 1-8-92

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602-24-91-3.16	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1710	COORDINATES: N. 477931.49 E. 1378993.38		DATE: 5-31-91
ELEVATION: 377.41 Ground	GWL: Depth NA	Date/Time NA	DATE STARTED: 5-31-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 6-4-91
DRILLING METHODS: Auger, Mobile 53			PAGE 1 OF 5

S.A.A. - Same As Above

N.R. - No Recovery

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67026 1330 5-31-91	4 10 12	18	medium dense, dark brown (10yr 3/3) clayey silt, some organics, some gravel, low plasticity, sl. moist .75 / medium dense, brown (10yr 4/3) clayey silt Trace gravel, sl. moist .75	ML / ML	NA / NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0cpm
2 3	67027 1340 5-31-91	8 9 10	18	medium dense, black (2.5y, 2/) sandy silt, Trace gravel, dry	ML	NA	Hnu - 0ppm Bγ - 50-100cpm α - 0cpm
4	67028 1350 5-31-91	7 10 10	18	S.A.A.	ML	NA	Bγ - 50-100cpm Hnu - 0 ppm α - 0 cpm
5 6	67029 1400 5-31-91	7 8 8	18	S.A.A / 5.5' medium dense, very dark gray (2.5y. 3/1) sandy silt, Trace gravel, dry	ML / ML	NA / NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0cpm
7	67030 1435 5-31-91	1 3 3	12	loose, black (2.5y. 2/) silt, some sand trace gravel, dry.	ML	NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0cpm
8 9	67031 1440 5-31-91	2 3 3	16	S.A.A.	ML	NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0 cpm
10	67032 1445 5-31-91	2 2 2	18	S.A.A	ML	NA	Hnu - 0ppm Bγ - 50-100cpm α - 0 cpm
11 12	67033 1450 5-31-91	2 3 3	0	N.R.	NA	NA	Hnu - 0ppm Bγ - 50-100cpm α - 0cpm
13	67034 1530 5-31-91	1 1 2	18	loose, black. (2.5y, 2/) silt, some sand Trace gravel, sl. moist.	ML	NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0cpm
14 15	67035 1535 5-31-91	1 2 2	18	S.A.A	ML	NA	Hnu - 0 ppm Bγ - 50-100cpm α - 0cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobil 53 Auger

Driller: Bob Yost

Asst. Bill Anderson

Background
Hnu - 0ppm
Bγ - 50-100cpm
α - 0cpm

All soils classified according to Munsel color chart.

001419

2438-3-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

ET 849-91

PROJECT NUMBER: 602 ~~26-91~~ 3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1710	COORDINATES: See p.1	DATE: 6-1-91	
ELEVATION: See p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 5-31-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 6-4-91	
DRILLING METHODS: Auger		PAGE 3 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	67048 67049 1530 6-1-91	20 30 32	18	S.A.A	SP	NA	H_{au} - 0ppm $\beta\gamma$ - 50-180cpm α - 0cpm
32				Boring Plugged and Abandoned Samples taken according to OU-2 Work Plan			
33							
34							
35							
36		10-3-91 J.L	full Rad ~~Trip Blank~~ full Rad ~~Field Blank~~ ~~full Rad~~ ~~full Rad~~	TCLP COMP. - 67051 1545 SRLP COMP. - 67050 1545 - 67052 0830 - 67053 0930 - 67054 1400 5/31 - 67055 1445 5/31 Tg. Corr Tox - 67056 1545 6/1 - 67057 27.0-28.5 Archive J.L - 6-4-91			

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment Mobile 53 Auger

Driller: Ben Yost

Asst. Bill Anderson

Background
H_{au} - 0 ppm
$\beta\gamma$ - 50-100 cpm
α - 0 cpm

2438-3-86

FERNALD RI/FS

4/5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS OU-2
PROJECT NO. 602.26-GT 3.16 ET 8-19-91
BORING NO. 1710
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Lear . DATE 6-3-91, 6-4-91
CHECKED BY E. Trollinger DATE 8-19-91
DATE OF ~~INSTALLATION~~ Plugging 6-3-91, 6-4-91 6-3-91, JL

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA FROM ~~TO~~
FLUID NA FROM ~~TO~~

TYPE OF BIT 10in Hollow Stem Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS: NA
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		577.41	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	Bottom 1.0	TOP 577.41	BOTTOM 576.41
	TOP 1.0	BOTTOM 31.5	TOP 576.41	BOTTOM 545.91
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	31.5		545.91	
GWL AFTER INSTALLATION	NA		NA	

S THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
S A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS No water observed in Boring thus plugged and Abandoned
Bentonite was used throughout the Grouting process to impede lateral migration of Grout

001421

5/5

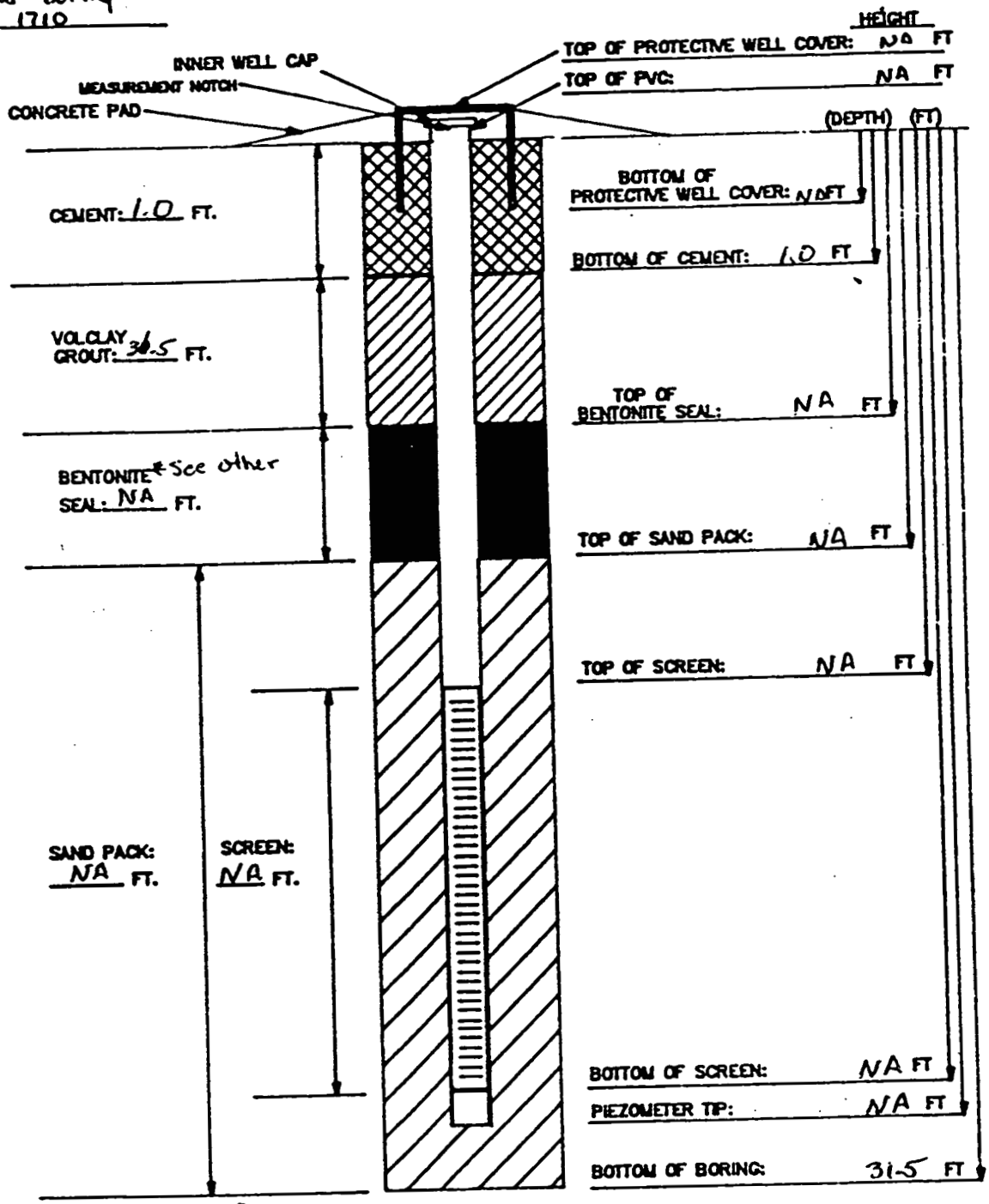
5711

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Plugged Boring NO. 1710

~~INSTALLATION~~ Plugging DATE: 6-3, 6-4-91



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF PVC:	NA FT	
BOTTOM OF PROTECTIVE WELL COVER:	NA FT	
BOTTOM OF CEMENT:	1.0 FT	
TOP OF BENTONITE SEAL:	NA FT	
TOP OF SAND PACK:	NA FT	
TOP OF SCREEN:	NA FT	
BOTTOM OF SCREEN:	NA FT	
PIEZOMETER TIP:	NA FT	
BOTTOM OF BORING:	31.5 FT	

BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): 2

BAGS OF VOLCLAY GROUT: 7

AMOUNT OF CEMENT: 1 bag

AMOUNT OF WATER USED: 10 gals

OTHER: Bentonite was used to attempt to stop migration of grout laterally

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6.02.36 TI ET 8-8-91 GEOLOGIST/ENGINEER: J. [illegible]

3.16

001422

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602.~~26-91~~ 3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1711	COORDINATES: N.478126.51, E.1378968.82	DATE: 5-23-91	
ELEVATION: 578.97 TOC	GWL: Depth NA Date/Time NA	DATE STARTED: 5-23-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 5-30-91	
DRILLING METHODS: Auger Mobile 53		PAGE 1 OF 4	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION (S.A.A - Same As Above; N.R. - No Recovery)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67007 0943 5-23-91	2 13 13	18	medium dense, (2.5y, 2/) black, Ash some gravel ignats, dry. -.25' very st. ff, dark grayish brown, (2.5y, 4/2) silty clayey silt trace gravel, dry.	ML / ML	NA / 2.5 NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
2 3	67010 0948 5-23-91	9 12 11	18	medium dense, black (2.5y, 2/) silty Ash Sand some fine gravel, dry.	SM / ML	NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
4	67011 0953 5-23-91	10 13 9	18	S.A.A.	SM / ML	N.A	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
FULL ISC 5 6	67012 1053 5-29-91	6 8 9	18	S.A.A	SM	N.A.	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
7	67013 1115 5-29-91	5 4 3	16	loose, black (2.5y, 2/) silt, some sand, trace gravel, dry	ML	NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
8 9	67014 1120 5-29-91	4 5 5	18	loose, black (2.5y. 2/) silty sand trace fine gravel, dry. -8.5' loose, black (2.5y 2/) silt, some sand, trace gravel, dry.	SM / ML	NA / NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
11 SC 10	67015 1250 5-29-91	3 4 4	18	S.A.A.	ML	NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
LP TOX 11 12	67016 67017 1305 5-29-91	4 4 4	18	loose, black (2.5y. 2/) sandy silt, some fine gravel, sl. moist to dry.	ML	NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
13	67018 1335 5-29-91	2 3 3	18	S.A.A -12.75' loose, black (2.5y. 2/) silty sand some fine gravel, moist to wet.	ML / SM	NA / NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm
ched 14 ewel ins 15	67019 1340 5-29-91	2 2 3	4	loose, light olive brown, (2.5y. 5/2) clayey silt, trace sand, wet.	ML	NA	Hnu - 0 ppm; BZ - 70-100 cpm; α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Auger Mobile 53

Driller: Bob Yost / Mark Rebold

Asst. Bill Anderson

Backgrounds
Hnu - 0 ppm
BZ - 70-100 cpm
α - 0 cpm

All samples classified using Munsell color chart.

001423 REVIEWED BY QA DATE 8-23-91

2438-3-86

FERNALD
RI/FS

Date		
Initial		
1st Key In	2nd Key In	Hard Copy Verification

571

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602.36-91.3.16	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1711	COORDINATES: See p.1	DATE: 5-29-91
ELEVATION: See p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 5-23-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 5-30-91
DRILLING METHODS: Auger Mobile 53		PAGE 2 OF 4

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	NA	Between 15' & 18' a void was discovered Thus no material was recovered for sampling	NA	NA	NA
18	67020	0		Soft, dark grayish brown (2.5Y. 5/2) clay Trace med gravel. med to high Plast., wet			Hnu - 0 ppm
	1345	2	18		CL	0.25	Bd - 200-300 cpm
M	5-29-91	3					α - 0 cpm
20				End of boring at 19.5' well set at 15.5'. Samples taken according to OU-2 work Plan			
				Sample # 67021 - composite TCLP			
				67022 " Ig, TOX			
				67023 " Trip Blank			
				67024 " field Blank			
				67025 - Drum Cuts TCLP			

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment Mobile 53 Auger

Driller: Bob Yost

Asst. Bill Anderson

Background

Hnu - 0 ppm

Bd - 70-100 cpm

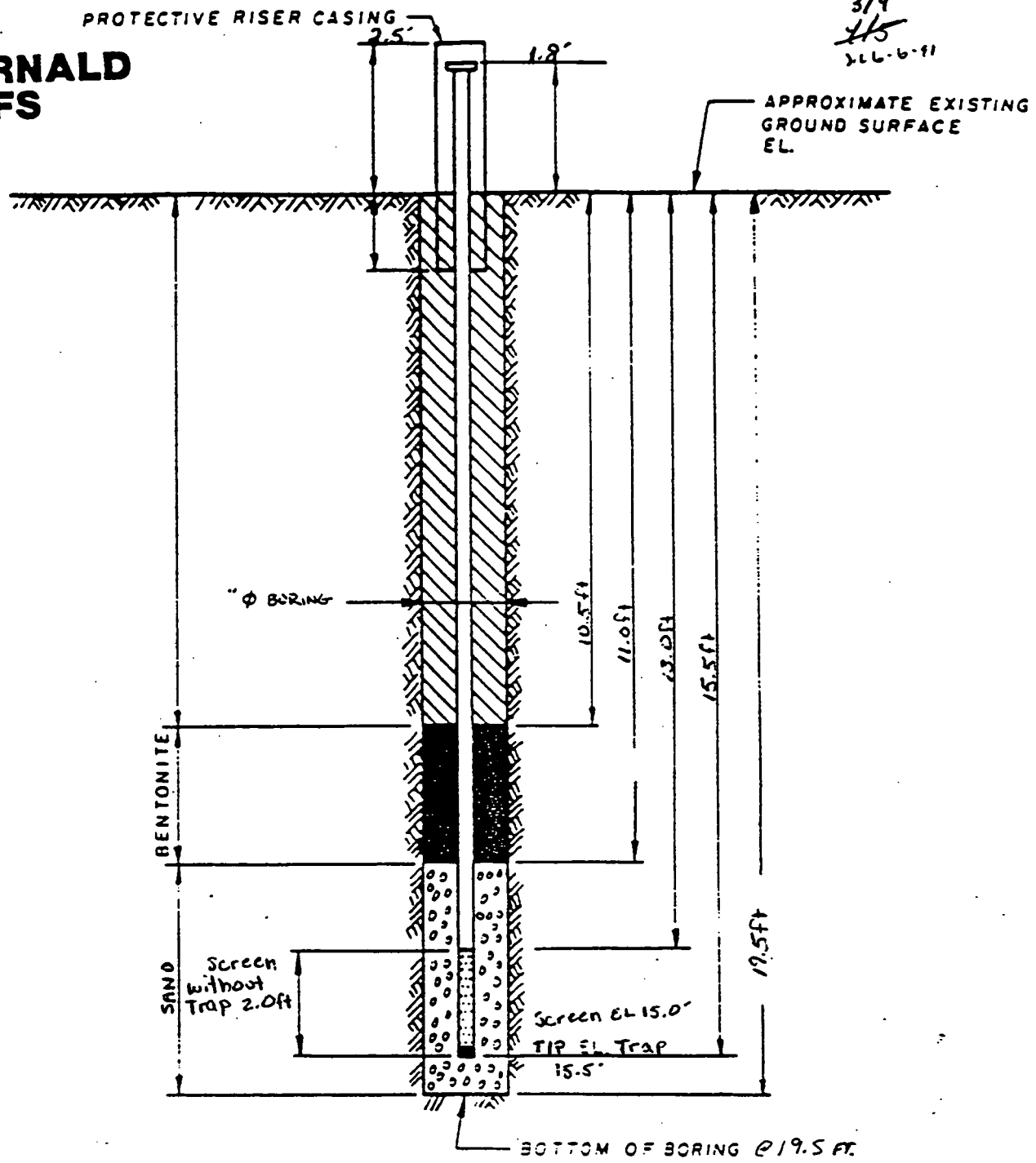
α - 0 cpm

2438-3-86

6-23-91

FERNALD RI/FS

3/4 ~~4/5~~ JLL-6-91



DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
J. Leas 5-31-91			

NOTES:

1. RISER PIPE IS 4 IN ID SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

3 80lb bags of 10/20 sand
3 50lb bags of volclay grout
1/2 5 gal buckets of bentonite pellets
15 gals H_2O used for grout & drilling

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR
Fernald RI/FS

* Screen has an additional 3" at top of Non perforated S.S. material

001425

REVIEWED BY QA [illegible] DATE 8-23-91

FERNALD RI/FS

5711

4/4 ~~5/5~~ J.L 6-6-91

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.26.91 3.16 E.T. 8-15-91
BORING NO. 1711
PIEZOMETER NO. 1711

FIELD ENG./GEO. J. Lear DATE 5-31-91
CHECKED BY E. Trollinger DATE 8-19-91
DATE OF INSTALLATION 5-30-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE 4.0 in ID Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in I.D
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 2.0 ft

RISER PIPE MATERIAL 4.0 in ID Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10 ft, 2 ft
JOINING METHOD flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION Hinged, locked well cover, well cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	(~~2.5~~ ET) 1.8		578.27	
GROUND SURFACE	0.0		576.47	
BOTTOM OF PROTECTIVE PIPE	2.5		573.97	
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0.0	BOTTOM 1.5 ft	TOP 576.47	BOTTOM 574.97
	TOP 1.5 ft	BOTTOM 10.5 ft	TOP 574.97	BOTTOM 565.97
BENTONITE	TOP 10.5 ft	BOTTOM 11.0 ft	TOP 565.97	BOTTOM 565.47
SAND	TOP 11.0 ft	BOTTOM 15.5 ft	TOP 565.47	BOTTOM 560.97
J.L 5-31-91 ~~GRAVEL~~	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 13.0 ft	BOTTOM 15.0 ft	TOP 563.47	BOTTOM 561.47
PIEZOMETER TIP	15.5 ft		560.97	
BOTTOM OF BOREHOLE	15.5 ft		560.97	
GWL AFTER INSTALLATION	NOT MEASURED		VARIABLE	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Samples were taken to 19.5 ft slurry grout was used to fill the section between 15.5 - 19.5 ft as per Geotech standards

7-2-91

FERNALD
RI/FS

Initial	1st Rev In	2nd Rev In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: FMPC RI/FS 3.16	PROJECT NAME: 602.26.91	
BORING NUMBER: 1718	COORDINATES: N482144.49 E1379649.44	DATE 7-31-91
ELEVATION: 587.5	GWL: Depth Date/Time	DATE STARTED: 7-31-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-7-91
DRILLING METHODS: Mobile 53 Auger		PAGE 1 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A - Same As Above N.R. No Recovery			
1	67265 1500 7-31-91	14 29 33	14	Dense, light yellowish brown, (10yr 6/4) silty clay trace gravel & trace sand. No plasticity, dry	CL	NA	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
2	67266 1505 7-31-91	14 17 19	18	Dense, brown, (10yr 5/3) silty clay, some gravel, trace sand, No plasticity, dry	CL	NA	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
3	67267 1510 7-31-91	19 24 23	18	S.A.A	CL	NA	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
4	67268 1515 7-31-91	12 19 21	16	Med. dense, light yellowish brown, (10yr 6/4) silty clay some gravel, no plast. dry 5.0'	CL	NA	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
5	67269 1520 7-31-91	9 11 10	16	V. stiff (10yr 5/4) yellowish brown silty clay some gravel some sand med plast. sl moist.	CL	2.5	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
6	67270 1525 7-31-91	6 7 9	18	Firm dark gray to yellowish brown, (10yr 4/1 to 10yr 5/8) silty clay some sand some gravel, med plast. moist.	CL	.75	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
7	67274 67275 0830 8-1-91	6 8 9	17	Soft olive (5y 4/3) clay, trace clay, med plast., moist.	CL	.25	Hnu - 0 ppm BG - 150-200 cpm α - 0 cpm
8	67276 0835 8-1-91	10 9 11	18	S.A.A. add pumice	CL	.5	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
9	67277 0840 8-1-91	11 16 18	18	Soft olive, dark gray to olive, 2.5y 4/1 to 2.5y 4/3) clay trace sand, med to high plasticity moist	CL	.5	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
10	67278 0845 8-1-91	18 22 50	18	S.A.A 12.75' Firm, dark yellowish brown to gray, 10yr 4/6 to 10yr 5/1) silty clay, low to med. plasticity moist	CL	.5	Hnu - 0 ppm BG - 150 cpm α - 0 cpm
				very hard, brown mottled (10yr 5/3) silty clay, some gravel, some sand low plast. moist.	CL	1.5	Hnu - 0 ppm BG - 150-200 cpm α - 0 cpm
					CL	4.5	Hnu - 0 ppm BG - 150-200 cpm α - 0 cpm

NOTES: Drilling Equipment - Mobile 53 Auger
Drilling Contractor - Penn Drilling
Driller Bob Yost
Asst. Mark Rebold

Background
Hnu - 0 ppm
BG - 150-200 cpm
α - 0 cpm

Landfill [illegible] at Bgs 12.75'

001427

REVIEWED BY QA [illegible] DATE 9-10-91

402-11-66

FERNALD
RI/FS

Date	8/1/91	8/27/91	
Initial	[illegible]	[illegible]	
	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.91.	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1718	COORDINATES: See p 1		DATE: 7-31-91
ELEVATION: See p 1	GWL: Depth	Date/Time	DATE STARTED: 7-31-91
ENGINEER/GEOLOGIST: J. Lear	Depth	Date/Time	DATE COMPLETED: 8-7-91
DRILLING METHODS: 53 Mobile Auger			PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67279 0900 8-1-91	43 50 38		S.A.A	CL	4.5	Hnu - 0 ppm BB - 150-200cpm α - 0cpm
				Drilling & Sampling Ends at 16.5' all Samples Taken according to the OU-2 Sampling Plan. Landfill ends at App. 12.75' 67272 - Field Blank 67273 - Field Blank Appx 67280 - TCLP met Herb Pest. 67281 - SPLP 67282 - Tq etc. 67283 - TCLP Drum 67284 - Archive Comp			

NOTES:

Drilling Contractor: Veon Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost
Mark Fehrold

Background
Hnu - 0 ppm
BB - 150-200cpm
α - 0cpm

REVIEWED BY: [illegible] DATE 9-10-91

243B-3-86

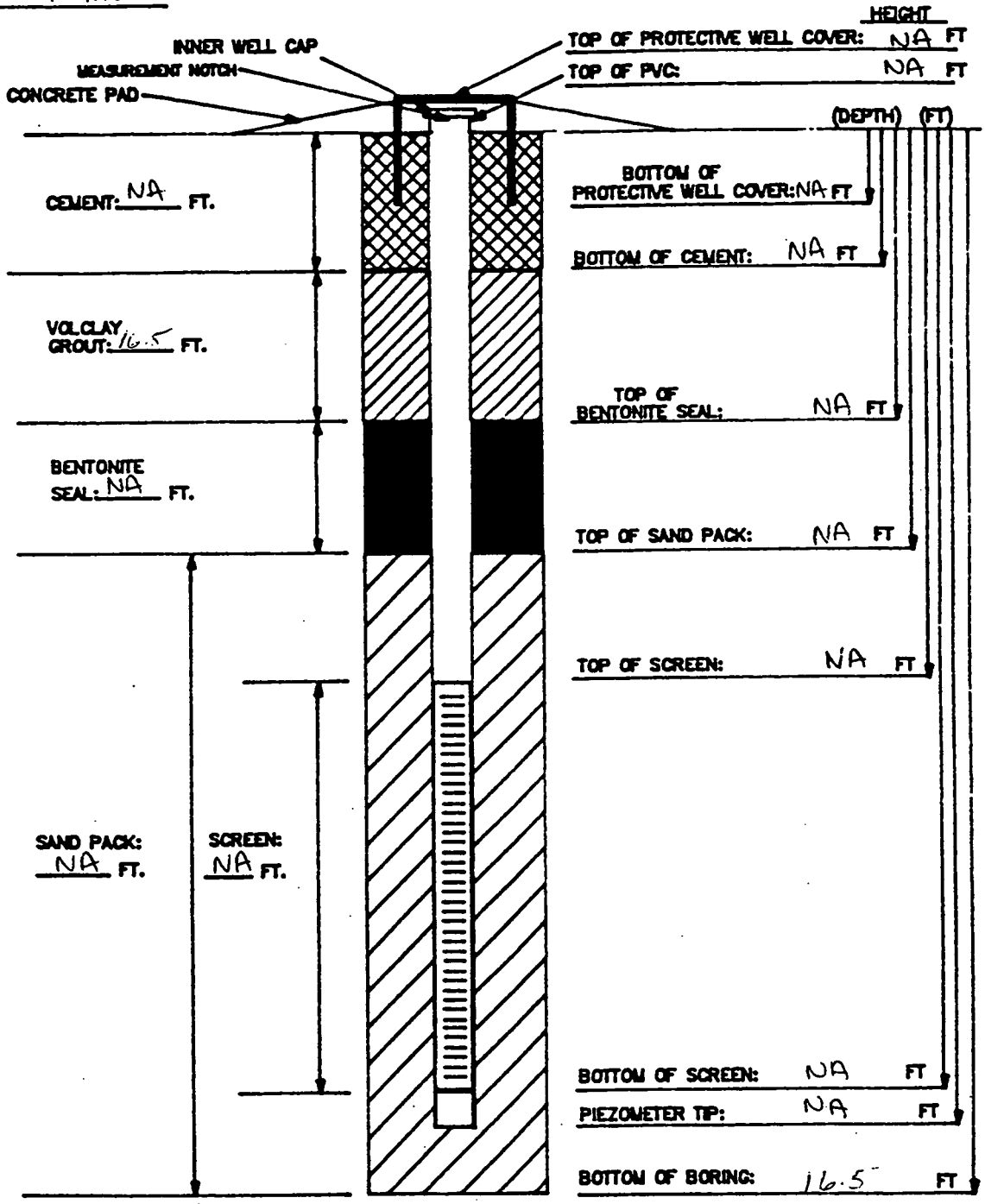
3/4

FERNALD RI/FS

INSTALLATION DATE: 8-7-91

INSTALLATION DIAGRAM
MONITORING WELL NO.
Boring 178

J.L. 8-3-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 1/2
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 55 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.26.91 GEOLOGIST/ENGINEER: J Lear

9-10-91

Date	9-11-91	9-11-91	
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J Gear
DATE 8-5-91
PROJECT NO. 602.2691
CHECKED BY
DATE
BORING NO. 171B
PIEZOMETER NO. NA
DATE OF INSTALLATION 8-7-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 10 in Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION (ft)	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0		587.5	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 16.5	TOP 587.5	BOTTOM 571
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	~~NA~~ 16.5		571	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001430

MB DATE 9-10-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.26.91	PROJECT NAME FMPC RI/FS		
BORING NUMBER: 1719	COORDINATES N 483215.57 E 1379899.88	DATE 8-7-91	
ELEVATION: 590.5	GWL: Depth 17.71 Date/Time 8-11-91 @ 1000	DATE STARTED: 8-7-91	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-10-91	
DRILLING METHODS: Mobile 53 Auger		PAGE 1 OF 4	

S.A.A. Same As Above

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				N.R. No Recovery			
1	67285 1430 8-7-91	4 14 19	18	Stiff, brown, (10yr 4/3) silty clay, some organics trace cobbles, low plasticity, moist. 5.75 v. hard, lighty yellowish brown, (10yr, 6/4) silty clay, trace gravel, trace cobble, dry	CL	2.0	Hnu - 0 ppm Bq - 80 cpm α - 0
2	67286 1435 8-7-91	02 64 4	7	Vdense, brown, (10yr, 5/3) trace sand, silt styraphome installation. sl. moist	ML	NA	Hnu < 2.0 ppm Bq - 100-150 cpm α - 0 cpm
3	67287 1440 8-7-91	13 13 15	16	Stiff, dark gray, (2.5y, 4/1) silty clay, trace sand & Trace gravel, med plast., moist	CL	2.0	Hnu - 0 ppm Bq - 80-120 cpm α - 0 cpm
5	67288 1445 8-7-91	24 13 11	0	N.R	NA	NA	Hnu, Bq, α } NA
7	67289 1515 8-7-91	13 21 14	18	Dense, dark yellowish brown. (10yr, 4/4) silt, trace sand, Trace gravel, moist. 5.75 Soft, dark gray (2.5y 4/1) clay, organics trace sand, med plast. moist.	ML CL	NA .5	Hnu - 1-5 ppm Bq - 80-150 cpm α - 0 cpm
8 9	67290 1520 8-7-91	3 15 19	0	N.R	NA	NA	Hnu, Bq, α } NA
10	67291 1525 8-7-91	3 19 21	0	N.R	NA	NA	Hnu, Bq, α } NA
11	67292 1530 8-7-91	19 15 18	8	Soft, olive gray (2.5 4/2) clay, trace sand and trace gravel, med plast. moist	CL	.5	Hnu - < 2 ppm Bq - 80-150 cpm α - 0 cpm
12 13	67293 0830 8-8-91	43 13 15	3	mdense, brown, (10yr, 5/3) silty clay some gravel, low to med plasticity, moist to wet. * unable to use penetrometer	CL	NA	Hnu < 2.0 ppm Bq 80-100 cpm α 0 cpm
14	67294 0840 8-8-91	11 13 24	14	Dense, dense, brown (10yr, 5/3) gravelly clay, trace cobbles, med plast. wet. organics * unable to use penetrometer	CL	NA	Hnu - 0-1 ppm Bq - 80-100 cpm α - 0 cpm

NOTES

Drilling Contractor - Penn Drilling
Driller - Bob Yost
Helper - Mark Rebold

Background
Hnu - 0 ppm
Bq - 80-180 cpm
α - 0 cpm

67298 - Field Blank APPA
67299 - Field Blank

001431

402-11-86

REVIEWED BY QA MB DATE 9-9-91

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.91	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1719	COORDINATES: See p 1	DATE 8-8-91
ELEVATION: See p 1	GWL: Depth Date/Time	DATE STARTED: 8-7-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-10-91
DRILLING METHODS: Mobile 53 Auger		PAGE 2 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67295 0850 8-8-91	13 44 50/5	14	hard, brown, (10yr, 5/3) Gravelly clay. Some organics, med plast. wet. -15.75 V. hard, brown to gray (10yr 5/3 to 10yr 5/1) silty clay, trace gravel, low plast., moist	CL.	4.0	Hnu - 0 ppm Bb - 80-100cpm α - 0cpm
17	67296 0855 8-8-91	38 47 50/5	14	S.A.A. add sl moist No gray (10yr. 5/1)	CL	4.5	Hnu - 0 ppm Bb - 80-100cpm α - 0cpm
18 19	67300 0900 8-8-91	24 35 48	16	S.A.A add brown mottled (10yr. 5/3)	CL	4.5	Hnu - 0 ppm Bb - 80-100cpm α - 0cpm
				Drilling & sampling Ends at 19.5' All samples taken according to OU-2 work plan.			
				Wet Zone 12.0'-15.75			
				Landfill ends at App 15.75'			
				67297 SBLP			
				67301 TCLP			
				67302 Iq. corr...			
				67303 TCLP Drum			
				67304 Archive			

REVIEWED BY QA [signature] DATE 9-9-91

NOTES

Background
Hnu - 0 ppm
Bb - 80-100 cpm

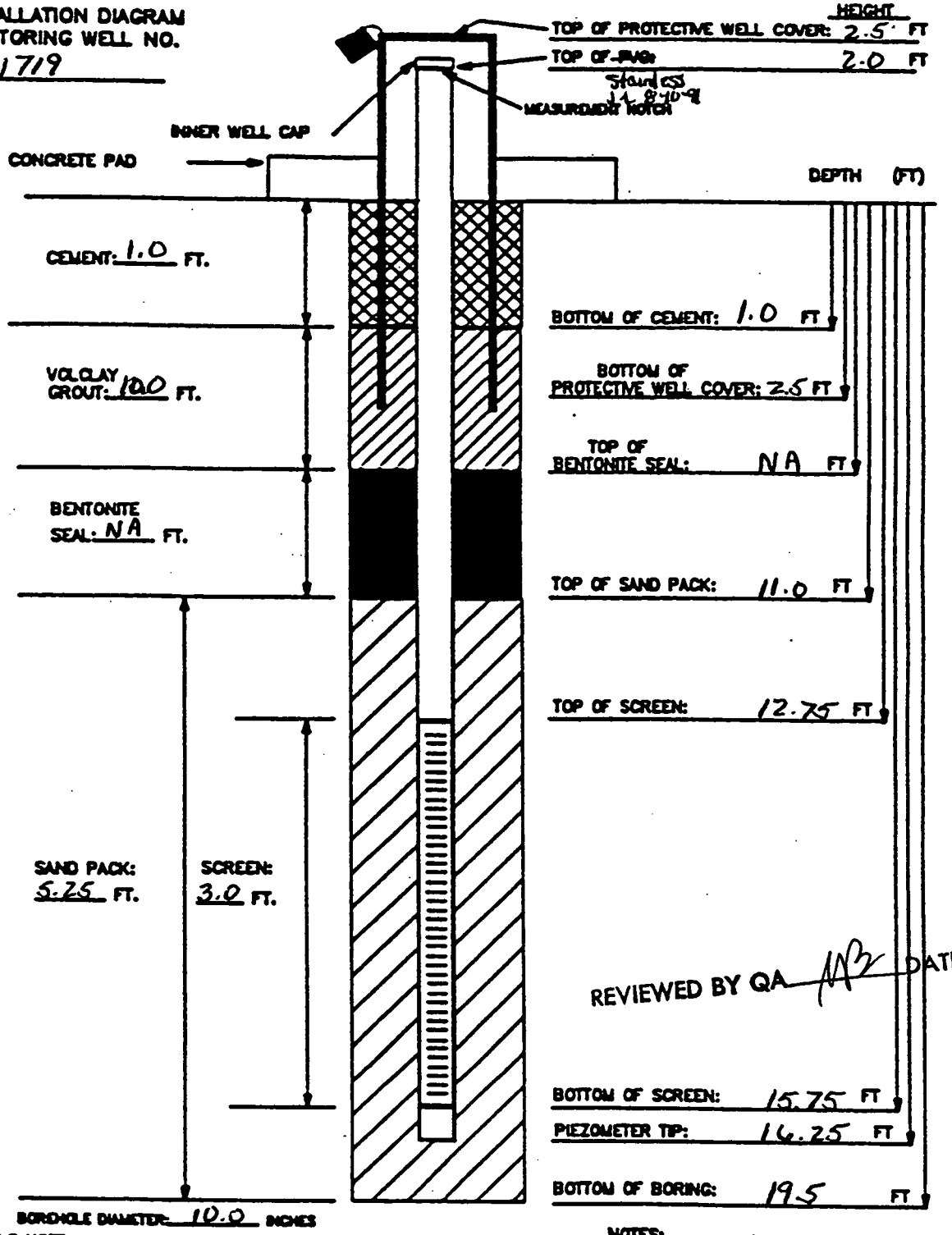
402-11-86

3/4

INSTALLATION DATE: 8-8-91, 8-10-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1719



REVIEWED BY QA AB DATE 9-9-91

BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10x20, 4-80lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: 1.5
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 55 gals
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC-PIPE, FLUSH-THREADED JOINTS. 4 in Stainless
2) SCREEN IS 2-INCH I.D. SCHEDULE-40 PVC-PIPE WITH 0.020-INCH SLOTS. .010 in Slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. J.L
4) WATER DEPTH/DATE: 8-10-91

TASK: 602.26.91 GEOLOGIST/ENGINEER: J. Lear

FERNALD RI/FS

Date	8-11-91	8-12-91	
Initial			
	1st Review	2nd Review	Final Review/Verification

4/4

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS OU-2 FIELD ENG./GEO. J. Lear DATE 8-10-91
PROJECT NO. 602.26.91 CHECKED BY J.W. DATE
BORING NO. 1719
PIEZOMETER NO. 1719 DATE OF INSTALLATION 8-10-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: None
FLUID None ~~FROM~~ TO
FLUID None ~~FROM~~ TO

TYPE OF BIT 10" Hollow Auger
CASING SIZE (S) USED: NA
SIZE None ~~FROM~~ TO
SIZE None ~~FROM~~ TO

PIEZOMETER DESCRIPTION

TYPE 4in Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 3.0 ft

RISER PIPE MATERIAL 4in ID Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10ft, ~~2ft~~ J.L 8-10-91, 5ft
JOINING METHOD Threaded, flush Joined

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.75 in

OTHER PROTECTION Hinged Well cap, Riser cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0'		592.1	
GROUND SURFACE	0.0		590.8 JLM	
BOTTOM OF PROTECTIVE PIPE	2.5'		587.4	
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0	590.15	
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 11.0	TOP 589.1	BOTTOM 579.1
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP 11.0	BOTTOM 16.25	TOP 579.1	BOTTOM 573.85
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 12.75	BOTTOM 15.75	TOP 577.35	BOTTOM 572.35
PIEZOMETER TIP	16.25		573.85	
BOTTOM OF BOREHOLE	19.5		570.6	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS 1/2 bucket of bentonite was used to secure sand

001434

REVIEWED BY QA MB DATE 9-9-91

FERNALD RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Date	9-3-91	9-20	
Initial	[illegible]	[illegible]	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: FMPC RI/FS	PROJECT NAME: FMPC RI/FS OU-2	
BORING NUMBER: 1720	COORDINATES N482218.22 E 137976.16	DATE 8-10-91
ELEVATION: 590.1	GWL: Depth Date/Time	DATE STARTED: 8-10-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-10-91
DRILLING METHODS: Mobile 53 Auger		PAGE 1 OF 3

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. Same As Above			
1	67305 1400 8-10-91	3 7 15	15	m. dense, dark yellowish brown, (10yr, 4/4) clayey silt, trace sand, glass, plastic, moist.	ML	NA	Hnu - 0 ppm; Bd - 100 cpm; α - 0 cpm
2	67306 1405 8-10-91	13 15 15	18	Hard; brown (10yr, 5/3) silty clay, trace gravel plastic, wood, brick, low plast., sl. moist.	CL	4.0	Hnu - 0; Bd - 100-150 cpm; α - 0 cpm
3 4	67307 1410 8-10-91	16 13 17	18	Firm, olive, (2.5y, 4/3) silty clay, Trace gravel med plast. moist	CL	1.5	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
5 6	67308 1415 8-10-91	10 12 12	18	S.A.A.	CL	1.5	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
7	67309 1515 8-10-91	19 9 8	16	S.A.A plastic, paper, brick	CL	1.5	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
8 9	67310 67311 1520 8-10-91	7 8 10	18	Firm, olive gray, (2.5y, 4/2) clay trace gravel, Pumice, med plast. moist.	CL	.75	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
10	67312 67313 1525 8-10-91	23 20 21	18	Hard, yellowish brown to gray, (10yr. 5/8, to 10yr, 6/1) silty clay, trace gravel, sl moist	CL	4.0	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
11 12	67314 1530 8-10-91	20 21 22	18	S.A.A.	CL	4.0	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
13	67315 1535 8-10-91	19 17 20	18	S.A.A.	CL	4.0	Hnu - 0 ppm; Bd - 80-100 cpm; α - 0 cpm
14				Boring Plugged and Abandoned @ 13.5' All samples Taken According to OU-2 work plan			

NOTES

Drilling Contractor - Penn Drilling
Drilling Eq. - Mobile 53 Auger
Driller - Bob Yost
Asst. - Mark Retold

Ignite etc. 67316
SELP 67317
TCLP 67318
Prep TCLP 67319

Background
Hnu - 0 ppm
Bd - 80-120 cpm
α - 0 cpm

* Landfill Ends app. 9.0 ft

001435

402-11-86

REVIEWED BY QA [illegible] DATE 9-19-91

FERNALD RI/FS

Date	6-8-92	6-8-92	
Initial	8-8-92		
	1st Key In	2nd Key In	Hard Copy Verification

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 8-11-91
PROJECT NO. 602.26.91 CHECKED BY [illegible] DATE 9.5.91
BORING NO. 1720
PIEZOMETER NO. NA DATE OF INSTALLATION 8-11-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA FROM ~~TO~~
FLUID NA FROM ~~TO~~

TYPE OF BIT 10in Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE None
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		590.1	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 13.5	TOP 590.1	BOTTOM 576.6
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.5		576.6	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001436 REVIEWED BY [illegible] DATE 9-19-91

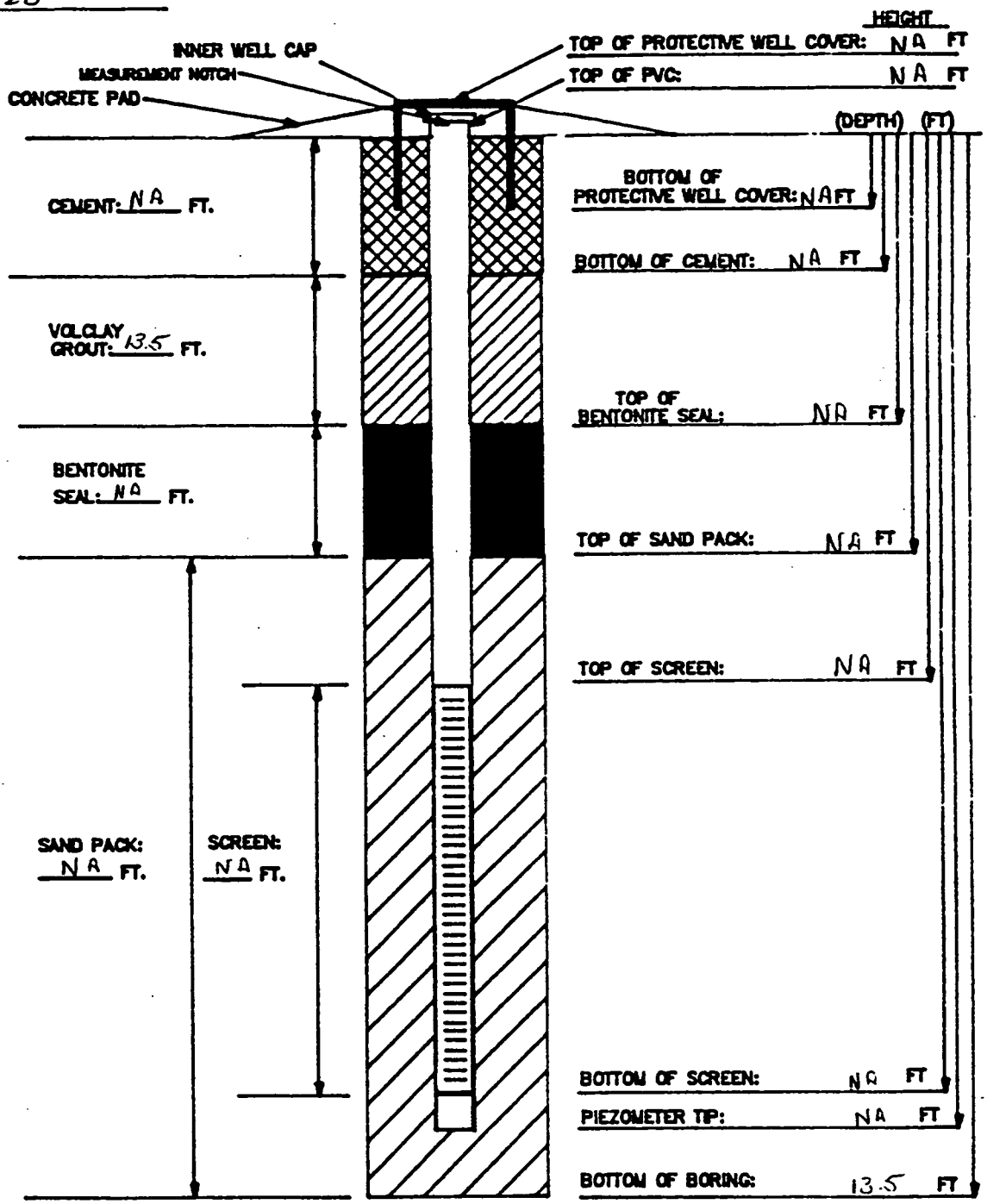
J.L 8-11-91

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1720

INSTALLATION DATE: 8-11-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 2

AMOUNT OF CEMENT: NA

AMOUNT OF WATER USED: 55 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.26.91 GEOLOGIST/ENGINEER: J. Lear

00143 REVIEWED BY QA [signature] DATE 9/19/91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

J.L 7-26-91 3:16

PROJECT NUMBER: ~~1721~~ 602.26-91	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1721	COORDINATES: N 482 136.40 E 1379785.34	DATE: 7-26-91	
ELEVATION: 588.6	GWL: Depth NA Date/Time NA	DATE STARTED: 7-26-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-28-91	
DRILLING METHODS: Auger Mobile 53		PAGE 1 OF 4	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION (S.A.A. Same as Above; N.R. No Recovery)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67228 1500 7-26-91	17 39 28	18	V. Hard, brown (10yr, 5/3) silty clay, some cobbles, v. low plasticity, dry.	CL	4.5	Hnu - 0 ppm; BD - 150-200cpm; α - 2 cpm
2, 3	67229 1505 7-26-91	14 21 19	8	S.A.A. add Hard, sl. moist	CL	3.0	Hnu - 0 ppm; BD - 100cpm; α - 0cpm
4	67230 1510 7-26-91	17 14 11	12	Hard, light olive brown, (2.5y, 5/4) silty clay, Trace gravel, low to med. plast. moist	CL	2.5	Hnu - 1-3 ppm; BD - 100cpm; α - 0cpm
5, 6	67231 1515 7-26-91	10 9 7	0	N.R	NA	NA	NA
7	67232 1600 7-26-91	4 10 12	0	N.R	NA	NA	NA
8, 9	67233 1605 7-26-91	14 15 17	5	Soft, very dark gray, (5y, 3/1) silty clay, trace sand, med plast., moist to wet.	CL	.50	Hnu - 1-3 ppm; BD - 100 cpm; α - 0cpm
10	67234 1610 7-26-91	10 17 18	16	Soft, olive gray, (5y, 4/2) silty clay, trace sand med plast., moist. Firm, very dark gray, (5y, 3/1) silty clay, trace sand med plast. moist	CL CL	.25 1.0	Hnu - 1-3 ppm; BD - 100 cpm; α - 0cpm
11, 12	67235 1615 7-26-91	20 22 21	0	N.R	NA	NA	NA
13	67236 1030 7-27-91	21 20 24	16	Firm, olive gray (5y, 4/2) silty clay med plast. moist. 12.6 Firm, yellowish brown, (10yr, 5/6) silty clay trace sand, trace gravel, sl. moist. low plast.	CL CL	1.5 1.5	Hnu - < 1.0 ppm; BD - 80-100cpm; α - 0cpm
14, 15	67237 1035 7-27-91	13 10 11	8	Firm, gray to yellowish brown (10yr, 5/2 to 10yr 5/6) mottled silty clay, trace sand & gravel, moist.	CL	1.0	Hnu - 0 ppm; BD - 90 cpm; α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost.
Mark Rebold

Background
Hnu - 0 ppm
BD - 80-200cpm
α - 0 cpm

001438

REVIEWED BY QA 13 DATE 8-23-91

2438-3-86

FERNALD RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Date	8-28-91	8-28-91	
Initials	[illegible]	[illegible]	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.99.3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1721	COORDINATES: See pl	DATE: 7-28-91	
ELEVATION: See p. 1	GWL: Depth NA Date/Time NA	DATE STARTED: 7-26-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-28-91	
DRILLING METHODS: Mobile 53 Auger		PAGE 2 OF 4	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67238 1030 7-28-91	3 7 10	10	Firm, brown (10yr, 5/3) silty clay, Trace sand, Trace Gravel, moist, low plasticity	CL	2.0	Hnu - 0 ppm βγ - 80 cpm α - 0 cpm
17	~~67239~~ 7-28-91			Landfill Ends at App. 12.5' Boring Ends at 16.5' No water encountered, Boring plugged and Abandoned			
18	~~67240~~						
19	J.L.			67242 - Archive 67243 - Field Blank 67244 - Ignite etc. 67245 - TCLP 67246 - SRLP 67247 - TCLP Drum			
20	~~67245~~						
21				All samples taken According to the HSL Sampling plan & Sanitary Landfill sample addendum			

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost
Erik Anderson

Background
Hnu - 0 ppm
βγ - 80-200 cpm
α - 0 cpm

001439

REVIEWED BY QA MS DATE 8-23-91

2438-3-86

FERNALD RI/FS

Date	8-27-91	8-28-91	
Initial			5711
	1st Key In	2nd Key In	Hard Copy Verification

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. J. Lear DATE 7-28-91
PROJECT NO. 1602.26.9T 3.16
CHECKED BY E. Trollinger DATE 8-19-91
BORING NO. ~~M4228~~ ET 1721
PIEZOMETER NO. NA
DATE OF INSTALLATION 7-28-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 10 in Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0		588.6	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 16.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	NA			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001440

REVIEWED BY [illegible] 8-23-91

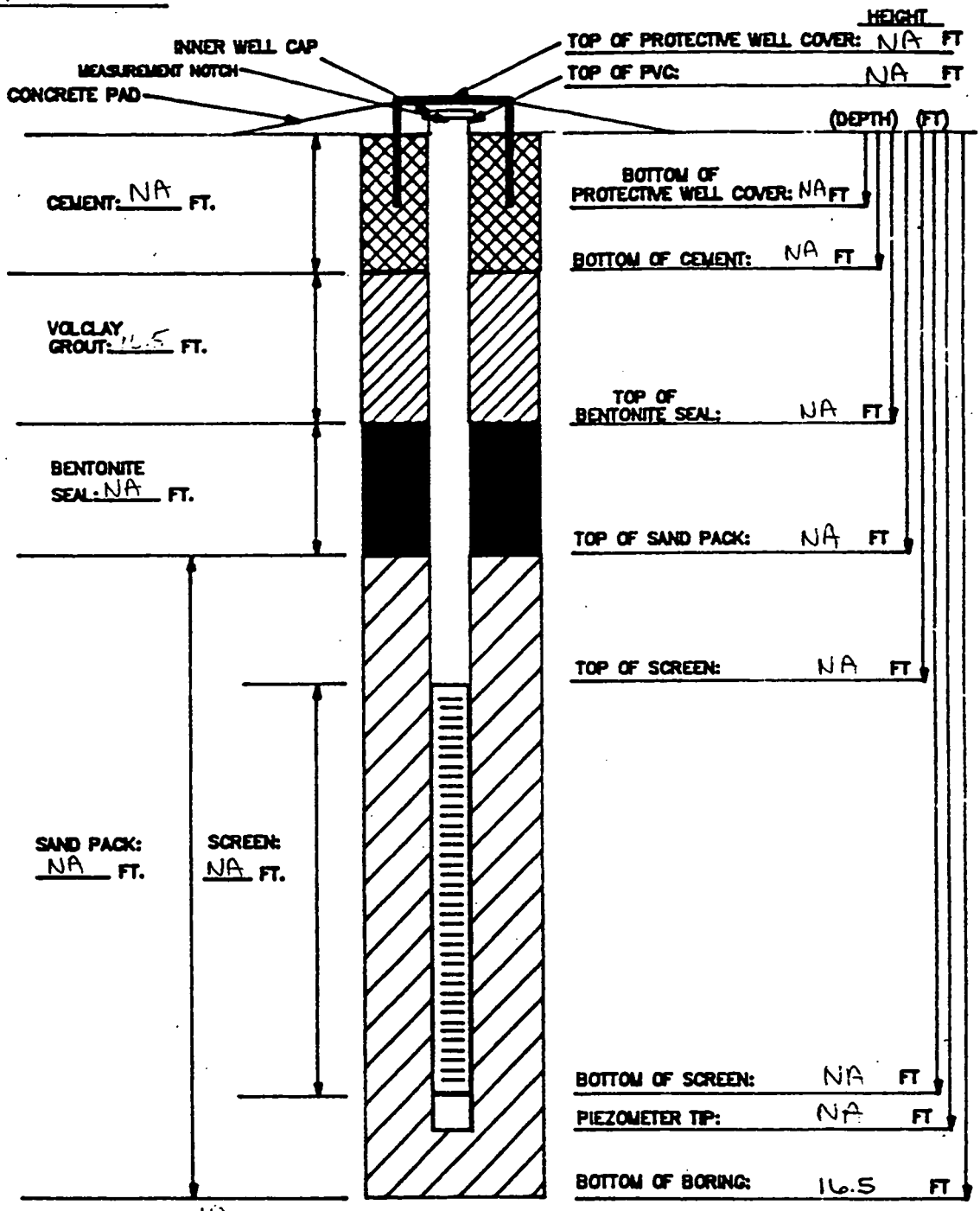
3/4

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ BORING NO. 1721

INSTALLATION DATE: 7-28-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 1/2
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 55gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: GCA ~~2691~~ ET 8-19-91 GEOLOGIST/ENGINEER: J Lear

001441 216

REVIEWED BY QA: MB DATE 8-28-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.91 3.16	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1722	COORDINATES: N482114.81 E 1379739.45	DATE	7-30-91
ELEVATION: 588.4	GWL: Depth / Date/Time	DATE STARTED:	7-29-91
ENGINEER/GEOLOGIST: J. Lear	Depth / Date/Time	DATE COMPLETED:	7-30-91
DRILLING METHODS: Mobile 53 Auger		PAGE	1 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67249 17000 7-29-91	9 37 46	16	V. dense, brownish yellow (10yr. 6/4) Gravelly clay, some sand, V. Low plasticity, some organic. V. Dry	CL	NA	Hnu - 0 ppm Bq - 150-200cpm α - 0cpm
2	67250 1705 7-29-91	27 23 22	14	Glyraphone & woodchips. 1.5' V. hard, dark yellowish brown to dark gray (10yr. 4/4) to (10yr. 4/1) silty clay. Some gravel low plasticity, damp	CL	4.5	Hnu - 10-50ppm Bq - 8000cpm α - 20cpm
4	67251 1710 7-29-91	34 34 29	5	Hard, olive gray (5y. 4/2) silty clay. Some gravel, low plast to med plast. sl. moist.	CL	3.75	Hnu - 5-10ppm Bq - 10000-19000cpm α - 50-100cpm
5	67252 1915 7-29-91	27 17 42	0	N.R.	NA	NA	Hnu, Bq, α NA
7	67253 1000 7-30-91	50/6	6	Dark olive gray (5y. 3/2) mud, saturated. 6.4' Limestone. Augering to 8.0 ft			Hnu - 5-10ppm Bq - 15000cpm α - 50-100cpm
9	67254 1410 7-30-91	14 23 17	0	N.R.			Hnu, Bq, α NA
10	67255 1420 7-30-91	13 15 18	0	N.R. Augering to 11.0'			Hnu, Bq, α NA
12	67256 67257 1530 7-30-91	6 6 13	14	m. dense, light yellowish brown, (10yr. 6/4) silt, some cobbles, dry	ML	NA	Hnu - 0 ppm Bq - 150cpm α - 0 cpm
				very stiff, yellowish brown to dark gray, (10yr 4/6) to (10yr. 4/2) silty clay, low to med plast. moist	CL	2.5	
13	67258 1598 7-30-91	10 11 15	16	m. dense, light yellowish brown (10yr. 6/4) silt, some cobbles, trace sand, dry	ML	NA	Hnu - 0 ppm Bq - 150cpm α - 0cpm

NOTES:

Drilling Contractor: Penn Drilling
Equipment: Mobile 53 Auger
Driller: Bob Yost
Asst: Mark Ketold

Background
Hnu - 0 ppm
Bq - 100-200cpm
α - 0cpm

* Land fill Liner Located at Appr 11.0'

402-11-86

001442

REVIEWED BY QA [illegible] DATE 9-16-91

FERNALD RI/FS

Date			
Initial			
	1st Key In	2nd Key In	Hard Copy Validation

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602.26.91 3.16	PROJECT NAME: FMPC RI/FS OU-2	
BORING NUMBER: 1722	COORDINATES: See p 2	DATE 7-30-91
ELEVATION: See p 2	GWL: Depth Date/Time	DATE STARTED: 7-29-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 7-30-91
DRILLING METHODS: Mobile 53 Auger		PAGE 2 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	67259 1540 7-30-91	25 27 28	15	Hard, yellowish brown, to gray (10yr, 4/6 to 10yr, 5/1) s.Hy clay, trace gravel, low plast sl. moist	CL	4.0	Hno - 0 ppm BZ - 150 cpm α - 0 cpm
				Drilling & Sampling ends at 15.5'. All samples taken according to OU-2 work plan. 67260 67261 TCLP mets pest. herb 1630 67262 SPLP -230 1630 67263 Cyanide 1630 67264 TCLP Drum 1645 Not Ample recovery to get second Sample interval thus App is switched to 1st interval			

NOTES:

Drilling Contractor - Penn Drilling
Drilling Equipment Mobile 53 Auger
Driller Bob Yost
Rig Mark Reland

Background
Hno - 0 ppm
BZ - 150-200 cpm
α - 0 cpm

001443

402-11-86

REVIEWED BY QA [illegible] DATE 9/10/91

S/4 FW 8.9.91

5711

FERNALD RI/FS

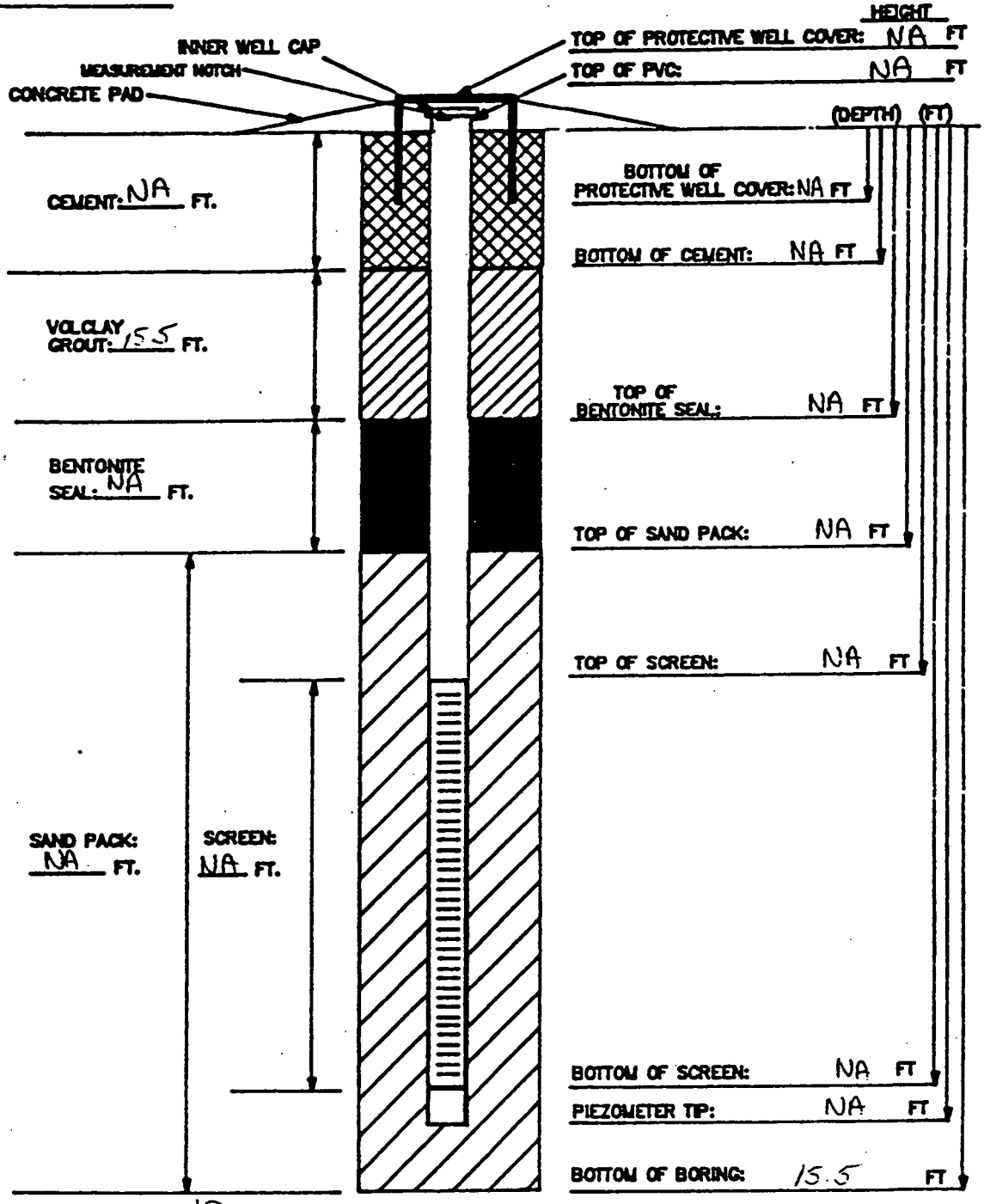
INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. 1722 Boring

Plugged

INSTALLATION DATE: 7-31-91

JL 7-31-91



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF PVC:	NA FT	
BOTTOM OF PROTECTIVE WELL COVER:	NA FT	
BOTTOM OF CEMENT:	NA FT	
TOP OF BENTONITE SEAL:	NA FT	
TOP OF SAND PACK:	NA FT	
TOP OF SCREEN:	NA FT	
BOTTOM OF SCREEN:	NA FT	
PIEZOMETER TIP:	NA FT	
BOTTOM OF BORING:	15.5 FT	

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 1 1/2

AMOUNT OF CEMENT: NA

AMOUNT OF WATER USED: 55 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.26.91 ET 8-19-91

GEOLOGIST/ENGINEER: J. Lear

3.16

001444

REVIEWED BY QA [illegible] DATE 9-16-91

FERNALD
RI/FS

4/4

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J Lear DATE 7-31-91
PROJECT NO. 1102.26.9T 3.16 CHECKED BY DATE
BORING NO. 1722 ET 8-19-91
~~PIEZOMETER~~ BORING NO. 1722 DATE OF INSTALLATION 7-31-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA FROM TO
FLUID NA FROM TO

TYPE OF BIT 10 in Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM TO
SIZE NA FROM TO

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		588.4	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 15.5	TOP 588.4	BOTTOM 568.9
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	~~NA~~ 15.5 JRW		568.9	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001445

REVIEWED BY QA [illegible] DATE 9-10-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

E.T. 8-19-91

PROJECT NUMBER: 602.24-9T-3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1723	COORDINATES: N477243.17, E1379955.88	DATE: 7-11-91	
ELEVATION: 588.8 GROUND	GWL: Depth NA	Date/Time NA	DATE STARTED: 7-11-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 7-12-91
DRILLING METHODS: mobile 53 Auger			PAGE 1 OF 5

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. - Same as above N.R. No Recovery			
1	67164 0945 7-11-91	1 5 5	18	loose, black (2.5Y, 2/) S.H. Some sand trace gravel, Sl. moist.	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
2 3	67165 0950 7-11-91	8 14 15	18	S.A.A. add med dense	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
4	67166 0955 7-11-91	10 11 12	18	S.A.A. Add. Trace clay 4.0' medium dense, black, (2.5Y, 2/) S.H, Some gravel Trace Sand Sl. moist	ML ML	NA NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
5 6	67167 1000 7-11-91	10 10 10	18	med dense, black, (2.5Y, 2/) S.H, Trace sand Trace gravel Sl. moist.	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
7	67168 1025 7-11-91	8 10 11	18	S.A.A.	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
8 9	67169 1030 7-11-91	11 12 15	18	S.A.A.	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
10	67170 1035 7-11-91	5 15 16	18	S.A.A. add dense 9.75' Dense,	ML GL	NA NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
11 12	67171 1040 7-11-91	16 16 13	18	med. dense, black (2.5Y, 2/) S.H, trace Sand, trace gravel, Sl. moist.	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
13	67172 1330 7-11-91	14 18 22	14	S.A.A. add dense	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm
14 15	67173 1335 7-11-91	11 12 15	16	S.A.A. add med. dense. add trace cobbles	ML	NA	Hnu - 0 ppm BD - 80-100cpm α - 0cpm

NOTES:

Drilling Contractor: Penn Drilling
Drilling Equipment: Mobile 45 Auger
Driller: Bob Yost
Asst: Bill Anderson

Background
Hnu - 0 ppm
BD - 80-100cpm
α - 0 cpm

2438-3-86

REVIEWED BY QA 113 DATE 8-23-91

FERNALD RI/FS

Date			
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.~~26-91~~ 3.16 (ET 8-A-91)	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1723	COORDINATES: see p.1	DATE 7-11-91
ELEVATION: see p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 7-11-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-12-91
DRILLING METHODS: Mobile 53 Auger		PAGE 2 OF 5

S.A.A. - Same as above

N.R. No Recovery

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67174 1540 7-11-91	10 12 14	18	S.A.A.	ML	NA	Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
17	67175 1345 7-11-91	8 5 5	18	S.A.A. Add loose No cobbles			Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
18	67176 1455 7-11-91	3 3 4	18	S.A.A.			Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
19	67177 1440 7-11-91	2 3 3	18	S.A.A			Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
20				N.R.	NA		Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
21	67178 1445 7-11-91	2 3 3	10	loose, black (2.5Y, 2/1) silt, some sand, trace gravel moist; loose, yellowish brown (10yr. 4/6) silty clay, trace sand, low plasticity, moist.	ML CL		Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
22				N.R.	NA		Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
23	67179 1450 7-11-91	4 6 9	18	m. dense, yellowish brown (10yr. 4/6) silty clay, trace sand, low plasticity, moist; m. dense, black (2.5Y, 2/1) silt trace sand, trace gravel, v. moist.	CL ML	V	Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
24							
25	67181 1000 7-12-91	10 10 15	0	N.R	NA	NA	Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
26	67182 1005 7-12-91	15 11 7	18	Hard, dark yellowish brown (10yr. 4/6) silty clay, some sand, low plast. moist.	CL	2.5	Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
27							
28	67183 1010 7-12-91	3 5 11	0	N.R.	NA	NA	Hnu - 0 ppm; Bd - 80-100cpm; α - 0cpm
29							

NOTES: see page 1

cont. next page

402-11-86

REVIEWED BY QA MB DATE 9-23-91

FERNALD RI/FS

Date			
Initial			
1st Key In	2nd Key In	Hard Copy Verification	

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.26 FT 3.16 (FT 8-19-91)	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1723	COORDINATES: See p.1	DATE: 7-12-91	
ELEVATION: See p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 7-11-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-12-91	
DRILLING METHODS: Mobile 53 Auger		PAGE 3 OF 5	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
29							
30	67184 1015 7-12-91	11 17 16	18	Hard, dark yellowish brown, (10YR, 4/6) sandy clay, trace gravel, med Plast. moist.	CL	2.75	Hnu - 0 ppm Bb - 80-100 cpm α - 0 cpm
				Drilling & Sampling ends at 30.5'. All samples taken According to OU2 work Plan.			
				67185 - SRLP 67186 - TCLP 67187 - Ig Recr. etc. 67188 - Archive 67189 - TCLP (Drum)			
				Fly Ash ends at App. 26.0'			

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost
Bill Anderson

Background
Hnu - 0 ppm
Bb - 80 100 cpm
α - 0 cpm

001448

2438-3-86

REVIEWED BY QA MB DATE 8-23-91

4/5 Fwd 8.8.91

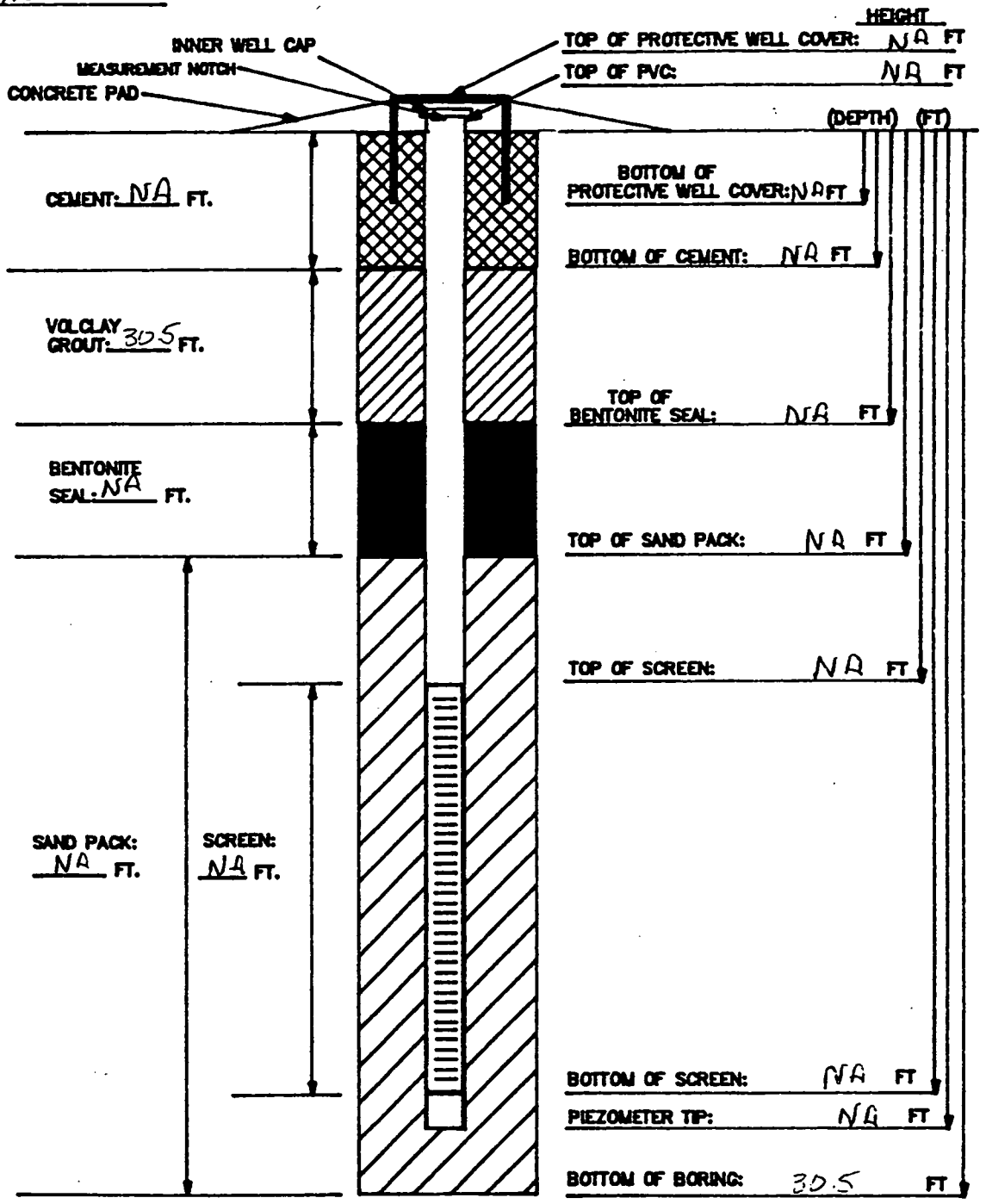
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ BORING NO. 1723

INSTALLATION DATE: 7-12-91

7-12-91 J.C.



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF PVC:	NA FT	
BOTTOM OF PROTECTIVE WELL COVER:	NA FT	
BOTTOM OF CEMENT:	NA FT	
TOP OF BENTONITE SEAL:	NA FT	
TOP OF SAND PACK:	NA FT	
TOP OF SCREEN:	NA FT	
BOTTOM OF SCREEN:	NA FT	
PIEZOMETER TIP:	NA FT	
BOTTOM OF BORING:	30.5 FT	

BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 75 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.26.91 ET 8-19-91 3.16

GEOLOGIST/ENGINEER: J. Lear

001449

REVIEWED BY QA NB DATE 8-23-91

FERNALD RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Date	8-19-91	8-22-91	
Initial	[illegible]	[illegible]	

5/5 Jmo 9.8.91

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 7-12-91
PROJECT NO. 602.26.01 3.16 ET 8-8-91 CHECKED BY E. Trollinger DATE 8-19-91
BORING NO. 1723
PIEZOMETER NO. NA DATE OF INSTALLATION 7-12-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 10in Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		588.8	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 30.5	TOP 588.8	BOTTOM 558.3
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	~~NA~~ ET 30.5		558.3	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001450

REVIEWED BY QA [illegible] DATE 8-22-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.26-91 3.16	PROJECT NAME FMPC RI/FS		
BORING NUMBER: 1724	COORDINATES: N.477239.70, E.1379830.96	DATE 7-12-91	
ELEVATION: 586.8 GROUND	GWL: Depth NA Date/Time NA	DATE STARTED: 7-12-91	
ENGINEER/GEOLOGIST J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-16-91	
DRILLING METHODS 53 Mobile Auger		PAGE 1 OF 6	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. - Same as above N.R. No Recovery			
1	67190 1430 7-13-91	2 4 6	18	loose, black (2.5Y, 2/) silt, trace sand trace gravel, dry	ML	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
2	67191 1435 7-13-91	4 6 9	18	S.A.A. add med dense			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
3	67192 1440 7-13-91	9 7 7	18	med. dense, black, to very dark gray, 2.5Y 2/) to 10YR. 3/1) some sand, some gravel, dry.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
5	67193 1445 7-13-91	15 15 13	18	med. dense, black, (2.5Y, 2/) silt, trace sand, Trace gravel dry.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
7	67194 1520 7-13-91	14 14 13	18	S.A.A.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
8	67195 1525 7-13-91	10 8 10	18	S.A.A.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
10	67196 1530 7-13-91	7 8 8	18	S.A.A.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
11	67197 1535 7-13-91	6 6 6	14	med. dense, black, (2.5Y, 2/) silt, trace sand & Gravel, Trace brown (10YR. 5/3) clayey silt.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
13	67199 0930 7-14-91	N.A.	30	med dense, black (2.5Y, 2/) silt, trace sand, Trace gravel, dry.	ML	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
15							

NOTES:
Drilling Contractor - Penn Drilling
Drilling Equipment - Mobile 53 Auger
Driller - Bob Yost
Asst - Bill Anderson

Background
Hnu - 0 ppm
Bq - 80-100 cpm
α - 0cpm

001451

402-11-88

REVIEWED BY QA MB DATE 8-23-91

FERNALD
RI/FS

	Date		
	Initial		
		1st Key	2nd Key

5711

VISUAL CLASSIFICATION OF SOILS

ET 8-15-91 JMW 8-8-91

PROJECT NUMBER: 1602.26.91 3.16	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1724	COORDINATES: See p. 1	DATE: 7-14-91
ELEVATION: See p. 1	GWL: Depth NA Date/Time NA	DATE STARTED: 7-13-91
ENGINEER/GEOLOGIST: J. Lacr	Depth NA Date/Time NA	DATE COMPLETED: 7-16-91
DRILLING METHODS: Mobile 53 Auger		PAGE 2 OF 6

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. Same as above N.R. - No recovery			
15	67200 0935 7-14-91	8 5 3	16	loose, black, (2.5Y, 2/1) silt, trace sand, trace gravel, dry	ML	NA	Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
16–17	67201 0940 7-14-91	7 4 4	17	S.A.A.			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
18–19	67202 0945 7-14-91	3 3 3	18	S.A.A.			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
20	67203 0950 7-14-91	2 4 4	18	S.A.A.			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
21–22	67204 0915 7-14-91	3 3 5	18	S.AA			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
23	67205 0920 7-15-91	4 4 4	18	loose, black, (2.5Y, 2/1) silt, some sand trace gravel, dry			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
24–25	67206 0925 7-15-91	3 4 3	18	S.A.A.			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
26	67207 0930 7-15-91 ~~67207~~	5 4 J.C. 7	18	medium dense, (2.5Y, 2/1) silt, trace sand trace gravel, ~~[illegible]~~ 7-15-91, dry			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
27–28	67208 1000 7-15-91	6 3 2	18	S.A.A.			Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm
29	67209 1005 7-15-91	5 2 2	18	S.A.A.	ML	NA	Hnu - 0 ppm Bd - 80-100 cpm α - 0 cpm

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment Mobile 53 Auger

Driller: Bob Yost
Bill Anderson

Hnu - 0 ppm
Bd - 80-100 cpm
α - 0 cpm
Background

001452

243B-3-86

REVIEWED BY QA MB DATE 9-23-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER: 602.26.91T 3.16 (ET 8-19-91)	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1724	COORDINATES: See p.1	DATE: 7-15-91	
ELEVATION: See p.1	GWL: Depth NA	Date/Time NA	DATE STARTED: 7-13-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 7-16-91
DRILLING METHODS: 53 Mobile Auger			PAGE 3 OF 6

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				S.A.A. - Same ~~as~~ above N.R. No Recovery			
30 31	67210 1010 7-15-91	3 4 4	16	S.A.A.	ML ML	NA NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
32	67211 1015 7-15-91	2 2 5	16	31.5 S.A.A S.A.A. add trace organics, sl. moist.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
33 34	67212 1045 7-15-91	10 10 11	16	S.A.A add med dense			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
35	67213 1050 7-15-91	6 6 7	16	S.A.A.			Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
36 37	67214 1055 7-15-91	4 4 3	14	loose, black (2.5Y. 2/1) S.H. alternating with brown, (10yr 5/3) clayey silt trace sand and gravel, sl. moist.	ML	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
38	67215 1100 7-15-91	2 2 3	0	N.R.	NA	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
39 40	67216 0900 7-16-91	7 10 8	0	N.R.	NA	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
41	67217 0905 7-16-91	5 5 8	10	Firm, dark yellowish brown, (10yr 4/6) sandy clay trace gravel, med plast. moist	CL	.75	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
42 43	67218 0910 7-16-91	9 13 13	14	S.A.A.	CL	.75	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm
44	67219 0915 7-16-91	12 10 13	0	N.R.	NA	NA	Hnu - 0 ppm Bq - 80-100cpm α - 0cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost
Bill Anderson

Background
Hnu - 0 ppm
Bq - 80-100cpm
α - 0 cpm

001453

2438-3-86

REVIEWED BY QA HB DATE 8-23-91

FERNALD
RI/FS

5711

4/6
JW 8.8.91

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602.26.TT 3.1b	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 6724	COORDINATES: see p.1	DATE 7-15-91
ELEVATION: see p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 7-12-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-16-91
DRILLING METHODS: Mobile 53 Auger		PAGE 4 OF 6

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				~~67177~~ - J.L 67220 - 5gal Geotech bucket 67221 - Archive 67222 - SRCP 67223 - Tyvorr etc. 67224 - TCLP 67225 - TCLP Drum 67198 - field Blank composite and Drum Sample Nos. Drilling and Sampling Ends at 44.5 ft Fly Ash Ends at - Ap. 38' Samples Taken According to the OU-2 Sampling Plan			

NOTES see page 1

001454

402-11-85

REVIEWED BY QA MB DATE 8-23-91

FERNALD RI/FS

Initial			
	1st Key In	2nd Key In	Hard Copy Verification

Jan 8.p.91

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 7-16-91
PROJECT NO. 1602.26.91 3.14 CHECKED BY E. Trollinger DATE 8-19-91
BORING NO. 1724 ET 8-19-91
PIEZOMETER NO. NA DATE OF INSTALLATION 7-16-91

BOREHOLE DRILLING

DRILLING METHOD AUGER
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ____ TO ____
FLUID NA ~~FROM~~ ____ TO ____

TYPE OF BIT 10 in Hollow Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ____ TO ____
SIZE NA ~~FROM~~ ____ TO ____

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		586.8	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 44.5	TOP 586.8	BOTTOM 542.3
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	8-19-91 ET ~~NA~~ 44.5		8-19-91 ET ~~NA~~ 542.3	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

~~001455~~

REVIEWED BY QA MR DATE 8-23-91

JTW 8.8.91 5711

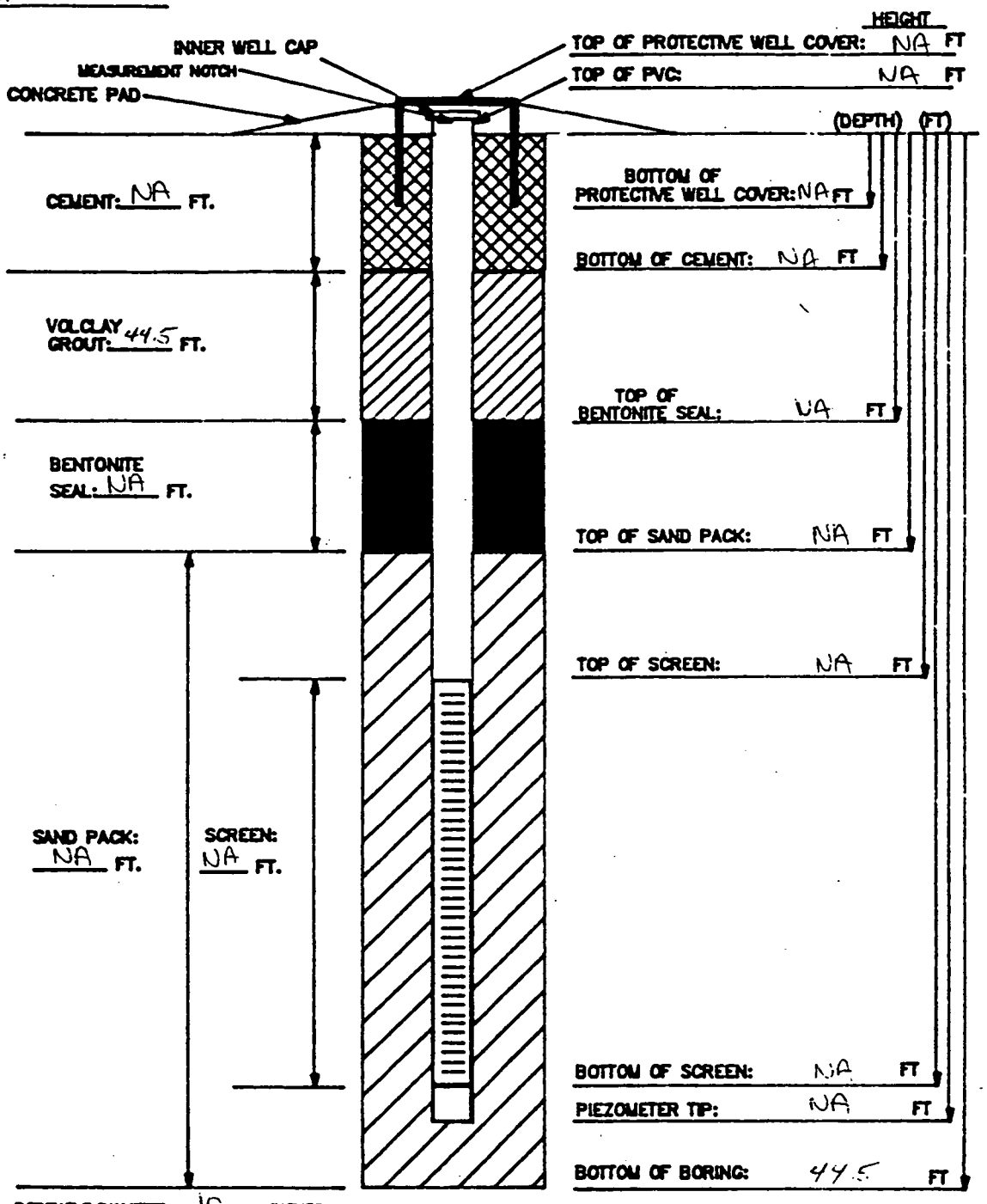
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ BORING NO. 1724

7-16-91 JL

INSTALLATION DATE: 7-16-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 9

AMOUNT OF CEMENT: NA

AMOUNT OF WATER USED: 75 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: GCD 8-6-91 3.16 ET 8-9-91 GEOLOGIST/ENGINEER: J. Lear

001456

REVIEWED BY QA MB DATE 8-23-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

E.T. 8-19-91

ROJECT NUMBER: 602.26-91-3.16	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1726	COORDINATES: N.477317.49, E.1380039.59	DATE: 6-29-91	
ELEVATION: 591.2 GROUND	GWL: Depth NA Date/Time NA	DATE STARTED: 6-29-91	
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 7-2-91	
DRILLING METHODS: 53 Mobile Auger		PAGE 1 OF 4	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67143 1530 6-29-91	4 11	18	Medium dense, black (2.5Y. 2/)silt, some sand, trace gravel, dry.	ML	NA	Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
2 3	67144 1595 6-29-91	10 11 11	18	S.A.A.	ML	NA	Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
4	67145 1540 6-29-91	7 7 7	18	S.A.A.	ML	NA	Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
5 6	67146 1545 6-29-91	11 11 11	18	S.A.A			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
7	67147 0845 7-1-91	11 13 13	18	S.A.A add some gravel			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
8 9	67148 0850 7-1-91	7 7 7	18	S.A.A.			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
10	67149 0855 7-1-91	4 5 9	18	S.A.A. Trace sand trace gravel			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
11 12	67150 0900 7-1-91	6 6 10	18	S.A.A.			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
13	67151 0905 7-1-91	20 25 15	18	S.A.A.			Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm
14 15	67152 0910 7-1-91	10 10 10	18	S.A.A.	ML	NA	Hnu - 0 ppm; Bγ - 60-110 cpm; α - 0 cpm

TCLP
TOX

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost
Bill Anderson

Background
Hnu 0 ppm
Bγ 60-110 cpm
α 0 cpm

001457

REVIEWED BY QA: [illegible] DATE: 8-22-91

2438-3-86

FERNALD RI/FS

Date			
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.~~26~~-91-3.16 ET 8-19-91	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1726	COORDINATES: See p.1	DATE: 6-29-91	
ELEVATION: See p.1	GWL: Depth NA	Date/Time NA	DATE STARTED: 6-29-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 7-2-91
DRILLING METHODS: Mobile 53 Auger			PAGE 2 OF 4

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	67153 0930 7-1-91	5 5 5	18	S.A.A.	ML	NA	Hnu - 0 ppm; BG 60-110cpm α 0cpm
17 18	67154 0935 7-1-91	2 3 3	18	S.A.A. add moist			Hnu 0 ppm BG 60-110cpm α 0 ppm
19	67155 0940 7-1-91	10 8 15	18	S.A.A. wet firm yellowish brown, (10yr, 5/8) silty clay, trace organics, low plasticity, moist.	ML CL	NA 1.5	Hnu - 0 ppm BG - 60-110cpm α - 0 ppm
20 21	67156 0945 7-1-91	14 20 25	18	S.A.A. add some sand	CL	2.0	Hnu - 0 ppm BG - 60-110cpm α - 0 ppm
22	~~67157~~ ~~0950~~ 7-1-91			Drilling & sampling ceases at 21.0' all samples taken according to OU-2 work Plan			Hnu BG α
23 24	67158 ~~0955~~ J.L.			67157 Comp. TCLP 67158 Ignite corros. react. Tox			Hnu BG α
25				67159 SRLP			Hnu BG α
26				67160 Archive comp 67161 Treatability			Hnu BG α
27				67162 TCLP DC			Hnu BG α
28				67173 - Field Blank			Hnu BG α
29 30							Hnu BG α

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobile 53 Auger

Driller: Bob Yost, Bill Andersen

Background
Hnu - 0 ppm
BG - 60-110cpm
α - 0 cpm

001458 REVIEWED BY QA MB DATE 8-27-91

243B-3-86

3/4

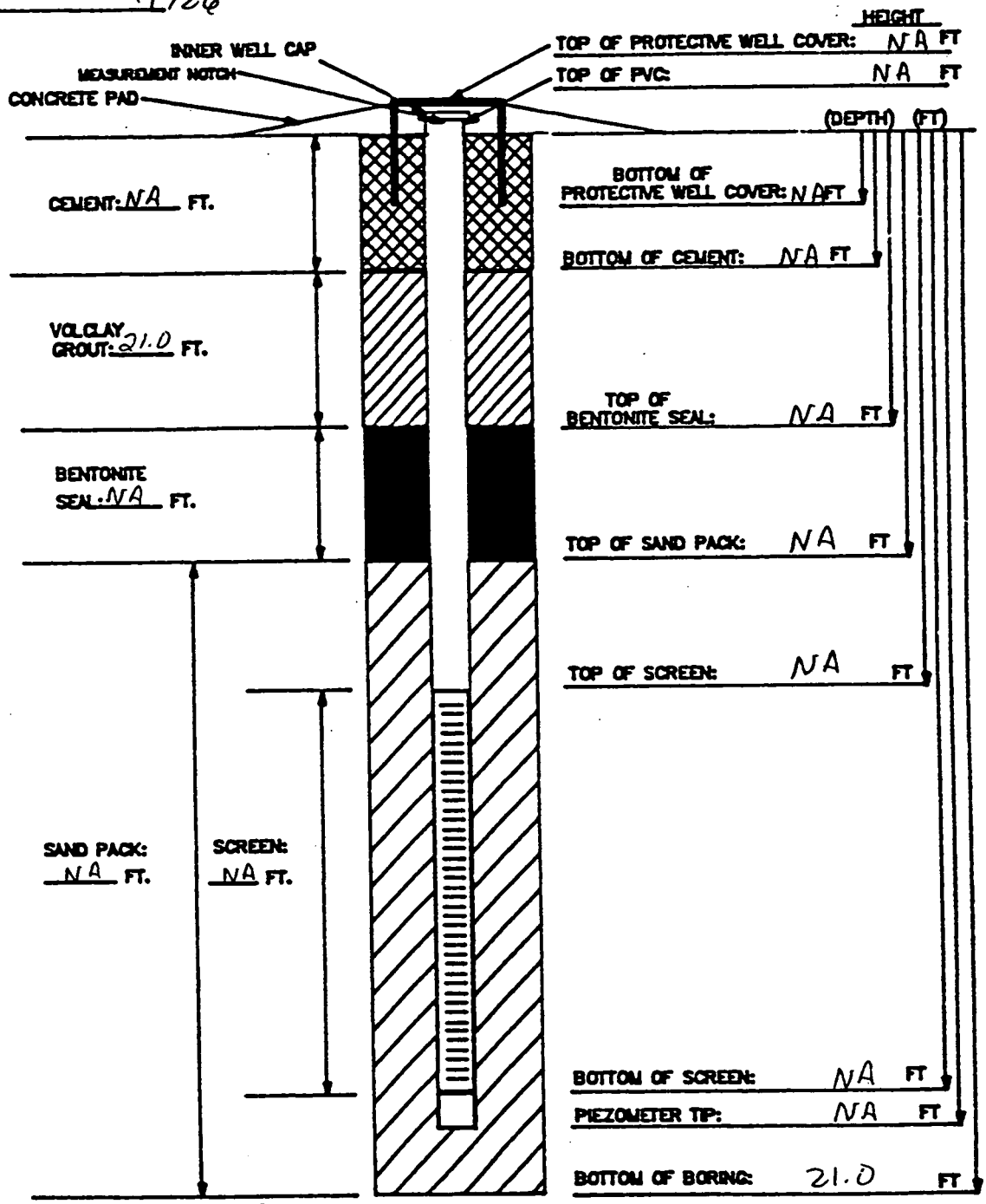
J.L 7-2-91

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. plugged boring 1726

INSTALLATION DATE: 7-2-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 4 80lb bags

AMOUNT OF CEMENT: NA

AMOUNT OF WATER USED: 30 gals

OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.~~26.11~~ ET 8-19-91 3.16

GEOLOGIST/ENGINEER: J. Lear

001459

REVIEWED BY QA AB DATE 8-27-91

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 7-2-91
PROJECT NO. 602.26-FT 3.16 ET. 8-19-91 CHECKED BY E. Trollinger DATE 8-19-91
BORING NO. 1726
PIEZOMETER NO. NA DATE OF INSTALLATION 7-2-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ TO
FLUID NA ~~FROM~~ TO

TYPE OF BIT 10 in Hollow Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ TO
SIZE NA ~~FROM~~ TO

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		591.2	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 21.0	TOP 591.2	BOTTOM 570.2
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	21.0		570.2	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001460

REVIEWED BY QA MB DATE 8-27-91

FERNALD
RI/FS

CDuke 4/22/92

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 402-3.22	PROJECT NAME: Fernald RI/FS EWMF	
BORING NUMBER: 1728	COORDINATES:	DATE 2/6/92
ELEVATION:	GWL: Depth 20.3 Date/Time 2/6/92	DATE STARTED: 2/4/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 2/6/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				For soil description refer to boring 2728			
27							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment:

Foreman: Joe Basile, Rick Purce

HNU = 0 PPM
BG = 40 CPM

402-11-86

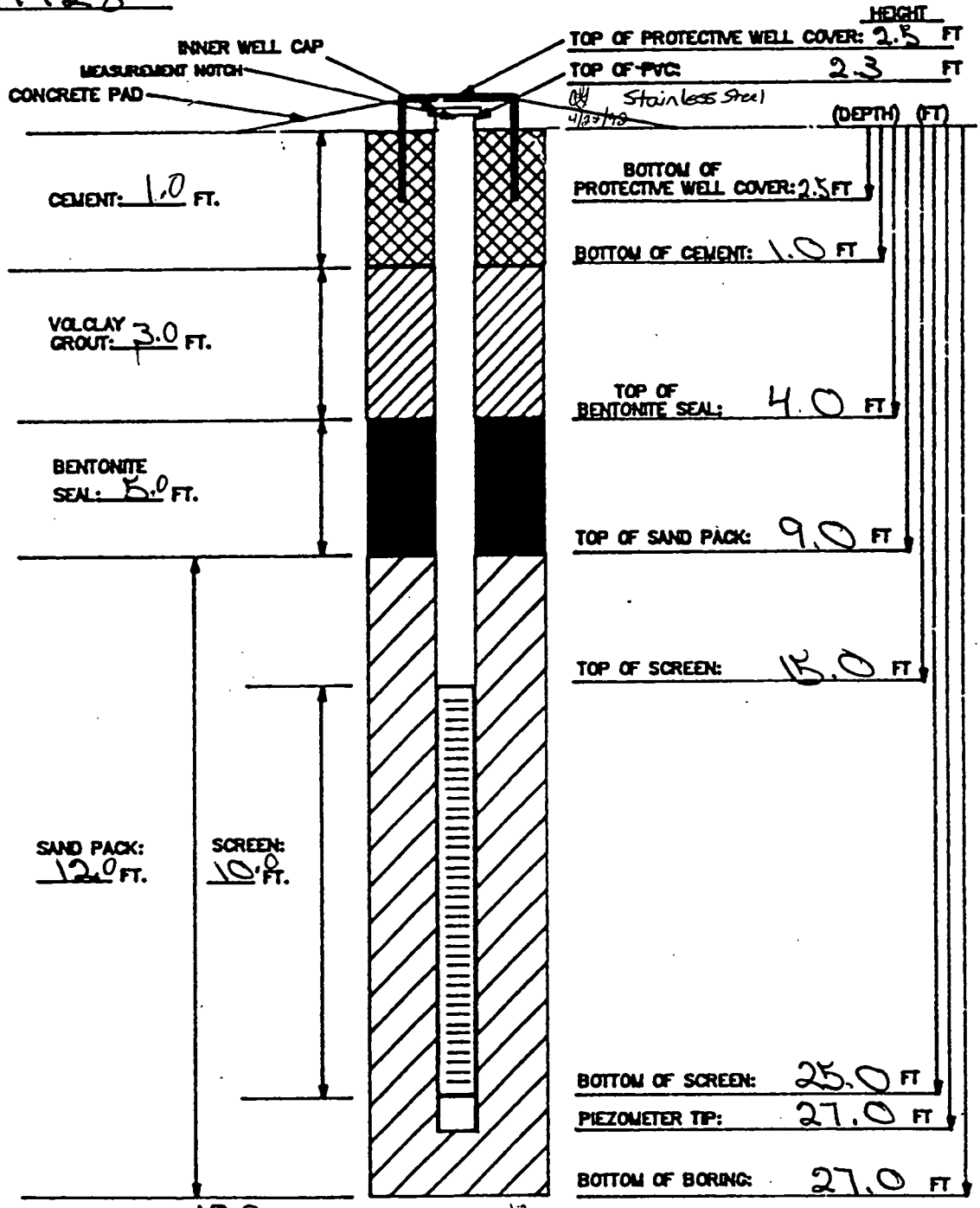
2 of 3

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1728

INSTALLATION DATE: 2/6/92



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10 bag
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 1 bag
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 150 gal
OTHER: NA

NOTES:
1) RISER PIPE IS ~~3-INCH SCHEDULE 40~~ 4-inch 316 Stainless Steel PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~3-INCH I.D. SCHEDULE 40~~ 4-inch 316 Stainless Steel PVC PIPE WITH ~~0.020-INCH SLOTS~~ 0.010 inch.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP. or welded
4) WATER DEPTH/DATE: 20.3 ft/2-6-92
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

3 of 3

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FCWMF FIELD ENG./GEO. D. O'Brien DATE 2/6/92
PROJECT NO. 1602.3.22 CHECKED BY C. Grube DATE 4/22/92
BORING NO. 1728
PIEZOMETER NO. 1728 DATE OF INSTALLATION 2/6/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 27.0	SIZE 10 3/4" FROM 0 TO 27.0
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 ID inch	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 1 10' Screen w/ 2' sump, 1 10' riser, 15' riser, 1 2' riser
AVERAGE SIZE OF PERFORATIONS 0.010 in	JOINING METHOD Flush joint threaded
TOTAL PERFORATED AREA 10.0 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 inch	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.3 ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 1.0	BOTTOM 1.0 4.0	TOP	BOTTOM
BENTONITE	TOP 4.0	BOTTOM 9.0	TOP	BOTTOM
SAND	TOP 9.0	BOTTOM 27.0	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 15.0	BOTTOM 25.0	TOP	BOTTOM
PIEZOMETER TIP	27.0			
BOTTOM OF BOREHOLE	27.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

EMARKS

001463

409-11-86

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 5711

100365		
PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	DATE: 1-15-92
BORING NUMBER: 2728	COORDINATES:	DATE STARTED: 1-15-92
ELEVATION: ≈593.5 ft	GWL: Depth 73.85 Date/Time 1/30/92/1530	DATE COMPLETED: 1-30-92
ENGINEER/GEOLOGIST: P. GASSEDAY	Depth Date/Time	PAGE 1 OF 7
DRILLING METHODS: CABLE TOOL		

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS: Background βγ = 60 cpm
0	100365 1-15-92 9:20	2	6	VERY SOFT, (10 YR, 4/2) DARK GRAYISH BROWN SILTY CLAY. MINOR SAND. SOME ORGANIC MATERIAL (RNTS). SLIGHTLY MOIST. NOT VERY PLASTIC	CL	0.5	βγ = 0 cpm α = NA; HNU = 0 ppm
	100366 1-15-92 9:20	6	6	VERY STIFF, (10YR, 5/6) YELLOWISH BROWN CLAY. SLIGHTLY PLASTIC, SLIGHTLY MOIST LITTLE SILT, NO SAND.	CL	2.5	βγ = 0 cpm α = NA; HNU = 0 ppm
1	1-15-92 9:20	9	0 NR	NR	NA	NA	βγ = 0 cpm α = NA; HNU = 0 ppm
	1-15-92 9:20	10	0 NR	NR PC 1-15 NR	NA	NA	βγ = 0 cpm α = NA; HNU = 0 ppm
2	100366 1-15-92 9:35	5	6	SAA	CL	2.75	βγ = 0 cpm α = NA; HNU = 0 ppm
	100366 1-15-92 9:35	7	3	SAA	CL	2.5	βγ = 0 cpm α = NA; HNU = 0 ppm
3							

NOTES: DRILLER - PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERLE - HELPER

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

Please note: Sample numbers 100311 to 100376 were not used for this well

SAMPLE TECH - CHRIS JOHNSON

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE 1-15-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSIDY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3	1-15-92 9:35	11	0	NR	NA	NA	βγ = 0 cpm α = NA Hnu = 0 ppm
	1-15-92 9:35	13	0	NR	NA	NA	βγ = 0 cpm α = NA Hnu = 0 ppm
4	1-15-92 100367 9:45	17	6	MEDIUM STIFF, ~~VERY DENSE~~ (2.5Y, 6/6) OLIVE YELLOW SILTY CLAY WITH SOME GRAVEL PIECES SLIGHTLY MOIST, PLASTIC. (CJ 2/3/92)	CL	1.5	βγ = 0 cpm α = NA Hnu = 0 ppm
	1-15-92 9:45 100367	19	6	SAA	CL	1.5	βγ = 0 cpm α = NA Hnu = 0 ppm
5	1-15-92 9:45 100368	31	6	HARD, ~~VERY DENSE~~ (2.5Y, 6/6) OLIVE YELLOW CLAY WITH MORE EXTENSIVELY INTERSPERSED GRAVEL THAN 4'-5'. SLIGHTLY MOIST, SLIGHTLY PLASTIC (CJ 2/3/92)	CL	>4.0	βγ = 0 cpm α = NA Hnu = 0 ppm
	1-15-92 9:45 100368	41	2	SAA	CL	>4.0	βγ = 0 cpm α = NA Hnu = 0 ppm

NOTES: DRILLER - PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERLE - HELPER

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

SAMPLE TECH - CHRIS JOHNSON

402-11-66

FERNALD
RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	
BORING NUMBER: 2728	COORDINATES:	DATE 1-15-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL		PAGE 3 OF ~~15~~ 17

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN)	DESCRIPTION (CH 2/3/92)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (CH 2/3/92)
6	1-15-92 ~~1030~~ 100369 9:50	PL1-15 50/5	6	HARD, ~~VERY DENSE~~ (2.5Y, 6/4) LIGHT YELLOWISH BROWN CLAY WITH GRAVEL. SOME DARK MOTTLING. LITTLE SILT OR SAND. SLIGHTLY MOIST. INCREASING PLASTICITY	CL	>4.0	ATTEMPTED GEOCHEM. INSUFFICIENT RECOVERY SO BOTTLED AND ARCHIVED. βγ: 0 cpm α = NA HNu: 0 ppm
	1-15-92 9:50	NA	NR	NR	NA	NA	βγ = NA α = NA HNu = NA
7	1-15-92 9:50	NA	NR	NR	NA	NA	βγ = NA α = NA HNu = NA
	1-15-92 9:50	NA	NR	NR	NA	NA	βγ = NA α = NA HNu = NA
8	1-15-92 1310 100370	10	6	MEDIUM STIFF, ~~DENSE~~ (2.5Y, 5/3) LIGHT OLIVE BROWN SILTY CLAY WITH NUMEROUS CHERT FRAGMENTS. LITTLE SAND. SLIGHTLY MOIST, LOW PLASTICITY.	CL	0.75	βγ = 0 cpm α = NA HNu = 0 ppm
	1-15-92 1310 100370	15	6	SAA, ONLY HARD.	CL	>4.0	βγ = 0 cpm α = NA HNu = 0 ppm
9							

NOTES:
DRILLER - PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAMPLE TECH - CHRIS JOHNSON

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE: 1-15-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 4 OF ~~15~~ 17

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9	1-15-92 1310 100376	32	6	~~MEDIUM~~ PC 1-15 HARD ~~DENSE~~ (2.5Y, 5/3) LIGHT OLIVE BROWN SILTY CLAY WITH MUCH FRAGMENTED CHERT & LIMESTONE. LITTLE SAND. SLIGHTLY MOIST, LOW PLASTICITY CB 2/3/92	CL	>4.0	β γ = 0 cpm α = NA HNU = 0 ppm
	1-15-92 1310	50	0 ~~NR~~ CB 2/3/92	NR	NA	NA	β γ = NA α = NA HNU = NA
10	PC 1-15 ~~210~~ 1-15-92 1415 100377	SHELBY TUBE ATTEMPTED	6	(2.5Y5/4) LIGHT OLIVE BROWN SILTY CLAY WITH (5Y, 5/2) OLIVE GRAY MOTTLING. SLIGHTLY MOIST LOTS OF INTERSPERSED GRAVEL, SOME QUITE LARGE. LOW PLASTICITY	CL	NA	SHELBY TUBE 10'-12' INSUFFICIENT RECOVERY. SAMPLE PULLED AND ARCHIVED. CALLED CATE GRUBE. INFORMED NOT TO ATTEMPT ANOTHER SHELBY UNTIL WE REACH SOFTER MATERIAL.
			6	SAA	CL	NA	
11	RAD SCREEN PC 1-15 ~~100376~~ 100377		0	NR	NA	NA	β γ = 0 cpm α = NA HNU = 0 ppm
			0	NR	NA	NA	
12							

NOTES

DRILLER - PENNSYLVANIA DRILLING

JOE BARILE - DRILLER

RICK PIERCE - HELPER

SAMPLE TECH - CHRIS JOHNSON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS 5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: EEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:	DATE: 1-15-92	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 1-15-92	
ENGINEER/GEOLOGIST: P. Cassedy	Depth / Date/Time	DATE COMPLETED: 1-30-92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 25	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12	1-15-92 1435 100377	21	6	HARD ~~VERY DENSE~~ (5Y, 5/2) OLIVE GRAY SILTY CLAY, WITH NUMEROUS ROCK FRAGMENTS. LITTLE SAND. Brown MOTTLING, SLIGHTLY MOIST, LOW PLASTICITY. (CM 2/3/92)	CL	>4.0	βγ = 0 cpm α = NA; HNu = 0 ppm
		31	6	SAA	CL	>4.0	βγ = 0 cpm α = NA; HNu = 0 ppm
13		33	6	SAA	CL	>4.0	βγ = 0 cpm α = NA; HNu = 0 ppm
		39	0	NR	NA	NA	βγ = ~~0~~ PC NA MS α = NA; HNu = NA
14	1-15-92 1500 100378	10	6	VERY STIFF, ~~VERY DENSE~~ (5Y, 5/1) GRAY CLAY WITH NUMEROUS GRAVEL PIECES. PLASTIC AND SLIGHTLY MOIST, WITH LITTLE TO NO SILT OR SAND (CM 02/05/92)	CL	3.0	βγ = 0 cpm α = NA; HNu = 0 ppm
	1-15-92 1500	25	0	NR	NA	NA	βγ = NA α = NA; HNu = NA
15							

TOTAL U/γ SPEC RAD GREEN

NOTES: Pennsylvania Drilling
Joe Barile - Driller
Rick Pierce - Helper

SAA - Same as Above
NR - No Recovery
NA - Not Applicable

Sample Tech - Chris Johnson

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:	DATE 1-15-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-15-92	
ENGINEER/GEOLOGIST: R.P. Cassedy	Depth Date/Time	DATE COMPLETED: 1-30-92	
DRILLING METHODS: CABLE TOOL		PAGE 6	OF 17

CB 2/3/92

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	1-15-92 1500	30	0	NR	NA	NA	βγ = NA α = NA HNU = NA
	1-15-92 1500	35	0	NR	NA	NA	βγ = NA α = NA HNU = NA
16	1-15-92 1530 100379	13	6	VERY ~~STIFF~~, ~~VERY DENSE~~ (5Y, 5/1) GRAY CLAY WITH NUMEROUS GRAVEL PIECES, SOME LARGE, MOIST AND PLASTIC	CL	3.5	βγ = 0 cpm α = NA ATTEMPTED GEOTECH SAMPLE INSUFFICIENT RECOVERY BORED & ARCHIVED. HNU = 0 ppm
	1-15-92 1530	20	PC 1-15 ~~N~~0	NR	NA	NA	βγ = NA α = NA HNU = NA
17	1-15-92 1530	25	0	NR	NA	NA	βγ = NA α = NA HNU = NA
	1-15-92 1530	50/4	0	NR	NA	NA	βγ = NA α = NA HNU = NA
18							

NOTES: PENNSYLVANIA DRILLING
JOE BARICE - DRILLER
RICK PIERCE - HELPER

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

SAMPLE TECH - CHRIS JOHNSON

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE 1-15-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. Cassidy	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: Cable Tool			PAGE 7 OF 7

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18	1-15-92 1600 100379	4	6	STIFF, MEDIUM DENS. (5Y, 5/1) GRAY CLAY WITH NUMEROUS INTERSPERSED GRAVEL MOIST AND PLASTIC. LITTLE SILT AND SAND.	CL	2.0	βγ = 0 cpm α = NA HNU = 0 ppm
Archive	1-15-92 1600 100379	6	6	SAA	CL	1.5	βγ = 0 cpm α = NA HNU = 0 ppm
19	1-15-92 1600 100379	11	6	SAA	CL	1.5	βγ = 0 cpm α = NA HNU = 0 ppm
	1-15-92 1600 100379	13	2	SAA	CL	1.5	βγ = 0 cpm α = NA HNU = 0 ppm
20	1-15-92 1656 100380	4	4	STIFF, MEDIUM DENSE (5Y, 5/1) GRAY CLAY WITH GRAVEL. LITTLE SILT, NO SAND. VERY PLASTIC AND SLIGHTLY MOIST.	CL	2.0	βγ = 0 cpm α = NA HNU = 0 ppm NOTE: SHELBY TUBE DRIVEN 20-22 NO RECOVERY - SO SAMPLED 20-22 AND SHELBY AGAIN AT 22-25
	1-15-92 1656	6	0	NR	NA	NA	βγ = NA α = NA HNU = NA
21							

NOTES

Driller: Pennsylvania Drilling
Joe Barile - Driller
Rick Pierce - Assistant

Sample Tech - Chris Johnson

NA - Not Applicable
SAA - Same as Above
NR - No Recovery

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		DATE 1-15-92
BORING NUMBER: 2728	COORDINATES:		DATE STARTED: 1-15-92
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 1-30-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	PAGE 8 OF 17
DRILLING METHODS: CABLE TOOL			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (2/3/92)
21	1-15-92 1656	18	0	NR	NA	NA	βγ = NA α = NA HNu = NA
	1-15-92 1656	15	0	NR	NA	NA	βγ = NA α = NA HNu = NA
92 22	1-21-92 1050 100381		27	MEDIUM STIFF (5Y, 5/1) GRAY CLAY WITH GRAVEL. SOME SILT, NO SAND. VERY PLASTIC AND MOIST	CL	X (LD OPSHEET)	ATTEMPTED TO PUSH SHELBY TUBE 22.0'-25.0' βγ = 0cpm α = NA HNu = 0ppm
	RAD SCREEN TOP 100382	SHELBY TUBE PUSHED					
23	RAD SCREEN BOTTOM 100383					NA	
24							

NOTES:
PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAMPLE TECH - CHRIS JOHNSON

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEAP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:	DATE 1-21-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-15-92	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 1-30-92	
DRILLING METHODS: CABLE TOOL		PAGE 9 OF 17	

CB 2/3/92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
24	1-21-92 1050 100381 R.S TOP 100382 RS. Bottom 100383	SHELBY TUBE PUSHED		MEDIUM STIFF (PCL-21 2.5Y, 5/1) GRAY CLAY AND GRAVEL MIX. SOME SILT, NO SAND. PLASTIC AND MOIST	CL	NA	
25	1-21-92 1315 100384	8	6	VERY STIFF. ~~MOTTLED DENSE~~ (2.5Y, 4/2) DARK GRAYISH BROWN CB 2/3/92 CLAY MIXED WITH GRAVEL, SOME SILT, NO SAND. SLIGHTLY MOIST PLASTIC.	CL	3.0	βγ = 0 cpm α = NA HNu = 0 ppm
		14	6	SAA	CL	3.5	βγ = 0 cpm α = NA HNu = 0 ppm
26		16	3	SAA	CL	>4.0	βγ = 0 cpm α = NA HNu = 0 ppm
		20	0	NR	NA	NA	βγ = NA α = NA HNu = NA
27							

NOTES: PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAMPLE TECH - CHRIS JOHNSON

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

402-11-86

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2928	COORDINATES:		DATE 1-21-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 10 OF 15.17

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION (CB 2/3/92)	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (CB 2/3/92)
27 TURBED 10 FEET	1-21-92 1335 100384	7	6	~~Dense~~, VERY STIFF (2.5Y, 4/2) DARK GRAYISH BROWN CLAY WITH INTERMIXED GRAVEL, LITTLE SILT, NO SAND. MOIST AND PLASTIC.	CL	3.0	βγ = 0 cpm α = NA HNU = 0 ppm
		19	6	SAA	CL	3.5	βγ = 0 cpm α = NA HNU = 0 ppm
28		29	0	NR	NA	NA	βγ = NA α = NA HNU = NA
		40	0	NR	NA	NA	βγ = NA α = NA HNU = NA
29 ARCHIVE	1-21-92 1413 100385	14	6	DENSE, VERY STIFF (2.5Y, 4/2) DARK GRAYISH BROWN CLAY WITH VARIOUS PIECES OF GRAVEL INTERSPERSED; SOME SILT, NO SAND, MOIST AND PLASTIC	CL	3.0	ATTEMPT GEOCHEM SLEEVE SAMPLE 29'-31'. INSUFFICIENT RECOVERY SAMPLE ARCHIVED βγ = 0 cpm α = NA HNU = 0 ppm
	1-21-92 1413	25	0	NR	NA	NA	βγ = NA α = NA HNU = NA
30							

NOTES:

PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAMPLE TECH - CHRIS JOHNSON

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5211

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	
BORING NUMBER: 2728	COORDINATES:	DATE: 1-21-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. Casseday	Depth Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: Cable Tool		PAGE 11 OF 15 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (CJ 2/3/92)
30	1-21-92 1413	38	0	NR	NA	NA	βγ = NA α = NA HNU = NA
	1-21-92 1413	20	0	NR	NA	NA	βγ = NA α = NA HNU = NA
31	1-21-92 1535 100386	7	6	(CJ 2/3/92) STIFF ~~VERY DENSE~~ (2.5Y, 4/2) DARK GRAYISH BROWN CLAY WITH SILT, SAND AND GRAVEL INTERMIXED. MOIST AND VERY PLASTIC.	CL	2.5	βγ = 0 cpm α = NA HNU = 0 ppm
		27	6	SAA - SAND ENCOUNTERED IN SHOE (BASE OF TILL)	CL	2.5	βγ = 0 cpm α = NA HNU = 0 ppm SAND ENCOUNTERED - BASE OF TILL
32		40	0	NR			βγ = NA α = NA HNU = NA
		50/2	0	NR			βγ = NA α = NA HNU = NA
33							

NOTES

Pennsylvania Drilling
Joe Barile - Driller
Rick Pierce - Helper

SAA - Same As Above
NR - No Recovery
NA - Not Applicable

Sample Tech. Chris Johnson

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE 1-21-92 / 1-22-92
ELEVATION:	GWL Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. GASSEDAY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 12 OF 15-17

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
33							
34							
35	1-21-92 1700	50/.2	0	NR	NA	NA	HNu = NA α = NA βN = NA
36							
37							
38							
39							
40	1-22-92 1015 100887	11 12 11	18	CB 2/3/92 ~~STAFF~~, MEDIUM DENSE (10YR, 3/6) DARK YELLOWISH BROWN CLAYEY SILT. NO SAND SOME SMALL GRAVEL PIECES. FAIRLY WELL SORTED. MOIST	ML	NA ~~2.0~~ CB 2/3/92	HNu = 0ppm α = NA βN = 0 ppm CB 2/3/92
41							
42							
43							
44							
45	1-22-92 1025 100888	5 7 12	18	CB 2/3/92 STIFF, ~~MEDIUM DENSE~~ (2.5Y 4/2) DARK GRAYISH BROWN CLAY WITH GRAVEL SOME SILT, MOIST OVERLYING A ~~MEDIUM STIFF~~ MEDIUM DENSE (7.5YR, 4/6) STRONG BROWN CLAYEY SILT WITH INTERSPERSED SAND AND GRAVEL; MOIST	CL ML	~~1.5~~ 0.5	~~HNu = 0ppm~~ α = NA βN = 0 ~~ppm~~ CB 2/3/92
46							
47							
48							

NOTES:
DRILLING - PENNSYLVANIA DRILLING
JOE BARLE - DRILLER
RICK PERLE - HELPER

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

SAMPLE TECH - CHRIS JOHNSON

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5 211

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:	DATE 1-22-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-15-92	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 1-30-92	
DRILLING METHODS: CABLE TOOL		PAGE 13 OF ~~15~~ 17	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
48							
49							
50				CB 2/3/92			
51	1-22-92 8 1325 100389	8 8	18	~~SOFT~~, MEDIUM DENSE (10YR, 5/6) YELLOWISH BROWN SAND. SOME SILT AND GRAVEL. POORLY SORTED ~~AND GRADED~~. MOIST CB 2/5/92	SW ~~SP~~	NA ~~0.5~~ CB 02/02/92	HNU = 0 ppm α NA βγ = 0 cpm
52							
53							
54							
55				CB 2/3/92			
56	1-22-92 12 1400 100390	32 42	18	~~VERY SOFT~~ VERY DENSE (10YR, 6/6) BROWNISH YELLOW SAND WITH MUCH GRAVEL. POORLY ~~GRADED~~ ~~AND~~ SORTED WITH APPRECIABLE SILT CB 2/5/92 MOIST.	SW ~~GM~~	NA ~~0.25~~ CB 2/3/92	HNU = 0 ppm α = NA βγ = 0 cpm
57							
58							
59							
60				CB 2/5/92 CB 2/5/92			
61	1-22-92 15 1425 100391	30 50/2	14	VERY ~~SOFT~~, DENSE (10YR, 5/4) YELLOWISH BROWN SILTY GRAVEL OVERLAIN BY A ~~SOFT~~, VERY DENSE, POORLY SORTED (10YR, 6/6) BROWNISH YELLOW GRAVELLY SAND. BOTH ARE MOIST	GM SP	NA ~~0.25~~ CB 2/3/92 NA	HNU = 0 ppm α = NA βγ = 0 cpm
62							
63							

NOTES: DRILLER - PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER
CHRIS JOHNSON - SAMPLE TECH

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE 1-22-92/1-23-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 14 OF 15 17

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
63							
64							
65	1-22-92 1615 100392	50/4	6	CB 2/3/92 ~~SOFT~~, VERY DENSE (2.5Y, 5/6) LIGHT OLIVE BROWN SANDY GRAVEL. POORLY SORTED ~~AND GRADED~~. SOME SILT AND LITTLE TO NO CLAY ~~MOIST~~ SLIGHTLY MOIST PL 1-22	CB 2/5/92 GW ~~GP~~	NA ~~0.25~~ CB 2/3/92	HNu = 0 ppm α = NA βγ = 0 cpm.
66							
67							
68							
69							
70	1-22-92 1650 100393	50/6	6	CB 2/3/92 CB 2/6/92 ~~SOFT~~ VERY DENSE (2.5Y, 4/4) OLIVE BROWN SANDY GRAVEL. POORLY SORTED. ~~AND GRADED~~ WITH LITTLE TO NO SILT OR CLAY. SLIGHTLY MOIST	GW ~~GP~~	NA ~~0.25~~ CB 2/3/92	HNu = 0 ppm α = NA βγ = 0 cpm
71							
72							
73							
74							
75	1-23-92 920 100894	35 45 35	8	CB 2/3/92 ~~VERY SOFT~~, VERY DENSE (2.5Y, 5/3) LIGHT OLIVE BROWN SANDY GRAVEL. POORLY ~~SORTED AND GRADED~~ WITH LITTLE TO NO SILT OR CLAY. WET (HIT WATER TABLE) CB 2/3/92	GW ~~GP~~	NA ~~0.25~~ CB 2/3/92	HNu = 0 ppm α = NA βγ = 0 cpm
76							
77							
78							

NOTES

PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

SAMPLE TECH - CHRIS JOHNSON

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

571

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 2728	COORDINATES:		DATE: 1-23-92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-15-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	DATE COMPLETED: 1-30-92
DRILLING METHODS: CABLE TOOL			PAGE 15 OF 15

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
78							
79							
80	1-23-92 1950 100395	35 18 16	12 CW 2/3/92	CW 2/3/92 ~~VERY SOFT~~, DENSE (2.5Y, 5/2) GRAYISH BROWN GRAVEL WITH SAND. POORLY SORTED ~~AND GRADED~~, WITH LITTLE TO NO CLAY OR SILT. WET	GW ~~GP~~	NA ~~<0.25~~ CW 2/3/92	HNu = 0 ppm α = NA β γ = 0 cpm
81							
82							
83							
84							
85	1-23-92 1520 100396	45 44 35	12	CW 2/3/92 ~~VERY SOFT~~, VERY DENSE (5Y, 5/1) GRAY CLAYEY SANDY GRAVEL. POOR SORTING ~~AND GRADING~~. CW 2/3/92 SOME SILT. WET. PETROLEUM ODOR FROM CLAYS WITHIN SAMPLE.	GC	NA ~~<0.25~~ CW 2/3/92	HNu = 1.0 ppm α = NA β γ = 0 cpm
86							
87							* HNu HIT - PETROLEUM ODOR FROM SAMPLE.
88							
89							
90	1-23-92 1640 100397	17 16 14	18	CW 2/3/92 ~~VERY SOFT~~, MEDIUM DENSE (5Y, 5/1) GRAY SANDY GRAVEL WITH A LENS OF CLAY POORLY SORTED ~~AND GRADED~~. WET. PETROLEUM ODOR IN CLAY LENS.	GC	NA ~~<0.25~~ CW 2/3/92	HNu = 1.0 ppm α = NA β γ = 0 cpm
91							
92				BOTTOM OF BORE HOLE - 92.0 ft Bottom of sampling - 91.5 ft			PETROLEUM ODOR AGAIN
93							

NOTES: PENNSYLVANIA DRILLING
JOE BARILE - DRILLER
RICK PIERCE - HELPER

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

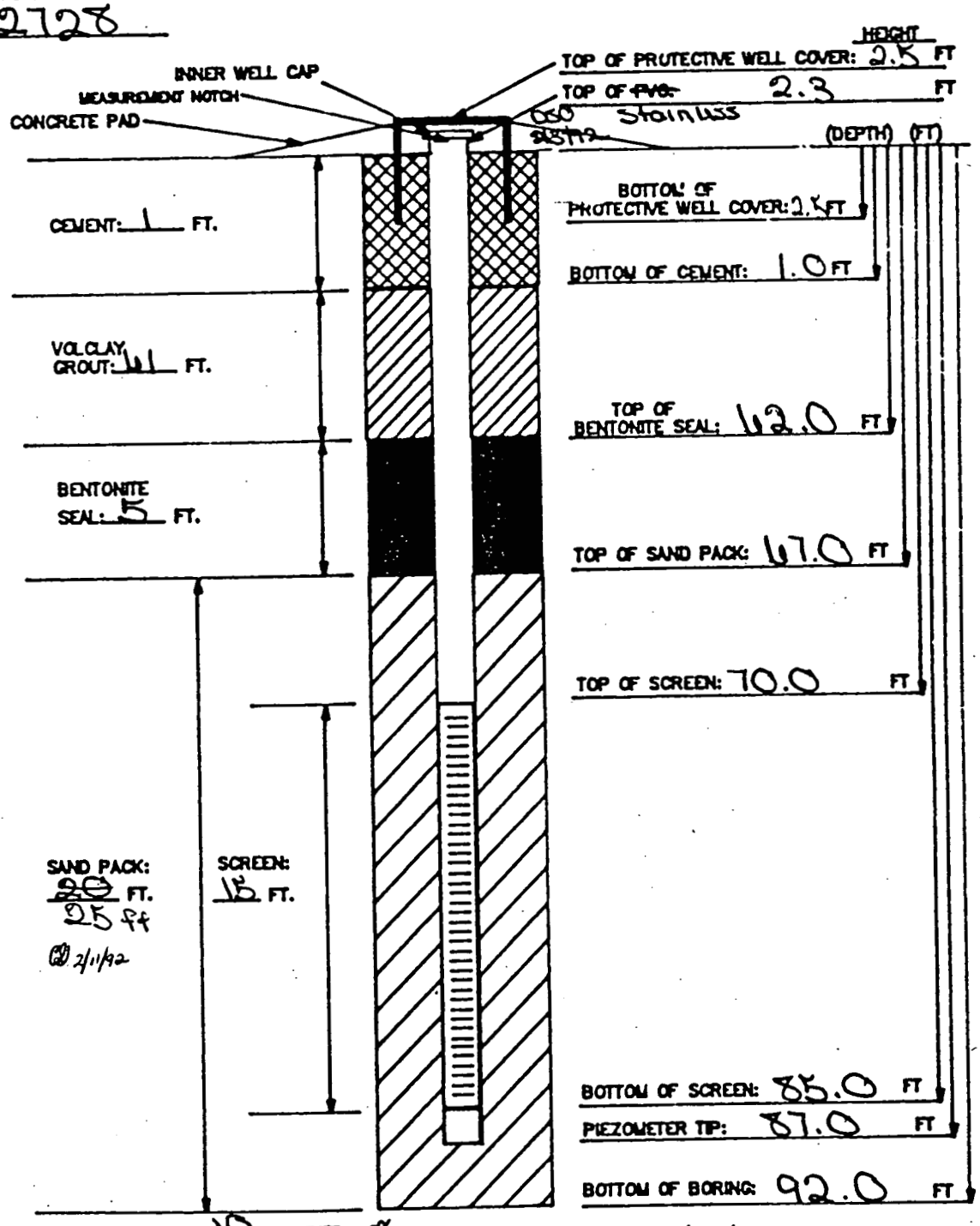
SAMPLE TECH - CHRIS JOHNSON

402-11-86

INSTALLATION DATE: 11/30/92

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
2728



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 17 bag
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: 15 bag
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 600 gallons
OTHER: NA

NOTES: 4 inch 316 Stainless steel Steel
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ ~~PVC~~ PIPE, FLUSH-THREADED JOINTS. 4 in 3 in
2) SCREEN IS ~~2-INCH LD. SCHEDULE 40~~ SS ~~PVC~~ PIPE WITH ~~0.020-INCH~~ SLOTS 0.010 in
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP or welded cap
4) WATER DEPTH/DATE: 73.8 ft
5) TOP OF ~~PVC~~ SS IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

- 5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS Fluff FIELD ENG./GEO. D. O'Brien DATE 11/30/92
PROJECT NO. 602.3.22 CHECKED BY Clarke DATE 02/11/92
BORING NO. 2728
PIEZOMETER NO. 2728 DATE OF INSTALLATION 11/30/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 92.0	SIZE 10 3/4 o.d. FROM 0 TO 92.0
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 7 10's, 1 17ft screen, 25ft Riser
AVERAGE SIZE OF PERFORATIONS 0.010 in.	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 15 ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 in.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.3 ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 ft			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	Top 0 TOP 1	Bottom 1 BOTTOM 67	TOP	BOTTOM
BENTONITE	TOP 62	BOTTOM 67	TOP	BOTTOM
SAND	TOP 67	BOTTOM 92	TOP	BOTTOM
GRAVEL	TOP ~~67~~ NA 11/30/92	BOTTOM ~~92~~ NA 11/30/92	TOP	BOTTOM
PERFORATED SECTION	TOP 70	BOTTOM 85	TOP	BOTTOM
PIEZOMETER TIP	87			
BOTTOM OF BOREHOLE	92			
GWL AFTER INSTALLATION	73.8			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FLUME		
BORING NUMBER: 1729	COORDINATES:	DATE: 1/13/92	
ELEVATION: 591 ft	GWL: Depth / Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Augers		PAGE 1 OF 10/12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1	6	Soft. 10YR (5/4) Yellowish brown silty clay. Medium plasticity, moist	CL	.25	Hand Auger 6". Sample 101409 & trip blank 101410 (0845) D50 1/13/92
	101411 (0900)	3	6	Soft. 10YR (5/4) Yellowish brown silty clay. Medium plasticity, moist.	CL	.25	HNU = 0ppm BX = 0cpm
1		3	0	No Recovery.	NA	NA	
		6	0	No Recovery.	NA	NA	
2	101412 (0950)	11	6	Very stiff. 2.5Y (6/3) Light yellowish brown gravelly sandy clay. No plasticity Moist.	CL	2.25	HNU = 0ppm BX = 0cpm
		13	6	SAA.	CL	2.25	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Clay Gardner, Kevin Myers

SAA - same as above

NA - not applicable

Background:
HNU = 0ppm
BX = 80cpm

Background has been subtracted out.

402-11-86

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FCMF		DATE 1/13/92
BORING NUMBER: 1729	COORDINATES:		DATE STARTED: 1/13/92
ELEVATION: 591 ft	GWL: Depth	Date/Time	DATE COMPLETED: 1/13/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 2 OF 10 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101413 (0950)	15	6	Hard. 2.5Y (6/3) Light yellowish brown clayey sand. Moist	SC ~~SC~~ ~~DS~~ 2/13/92	NA ~~4.0~~	
		17	6	SAA.	2/3/92 SC ~~SC~~	NA ~~3.75~~	
4	101414 101415 (1015)	11	6	Loose. 10YR (3/6) Yellowish brown. Gravelly coarse sand, moist	SW ~~SC~~ ~~DS~~ 2/13/92	NA	HNu = 0 ppm RS = 0 cpm
	101416 101417 (1015)	8	6	SAA	SW ~~SC~~ ~~DS~~ 2/3/92	NA	
5		13	0	No Recovery.	NA	NA	
		12	0	No Recovery.	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier

Driller: Elay Gardner, Kevin Myers

SAA - SAME AS ABOVE
NA - Not applicable

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1729	COORDINATES:	DATE: 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 3	OF 10/12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101418 (1030)	5	6	Loose. 10YR(5/6) Yellowish brown. Gravelly coarse sand, moist	SW	NA	HNU = 0ppm BZ = 0cpm
		7	6	SAA	SW	NA	
7		9	6	SAA	SW	NA	
	101419 (1030)	12	6	Medium dense. 10YR(5/6) yellowish brown, fine clayey sand, moist.	~~SC~~ ~~SG~~ DSO 2/3/92	NA	
8	101419 101420 (1045)	1 Shelby	24 ~~27~~ DSO 2/3/92	SAA	~~SC~~ ~~SG~~ DSO 2/3/92	NA	Shelby pushed from 8-10'.

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Elay Gardner
Kevin Myers

SAA - Same As Above
NA - Not Applicable

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1729	COORDINATES:	DATE 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 12	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	Shelby 1						
101421 (1048)	Shelby 1			Hard 5Y(5/1) Gray gravelly clay with Low plasticity moist DO 2/3/92	CI	>4.5	
10	101422 (1056)	13	6	Hard. 5Y(5/1). Gray gravelly clay with sand stringers. Low plasticity, moist.	CI	>4.5	HNU=0ppm BZ=0cpm
		15	6	SAA	CI	>4.5	
11		11	0	No Recovery.	NA	NA	
		16	0	No Recovery.	NA	NA	

CD 2/4/92

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Elay Gardner, Kevin Myers

SAA - Same as above
NA - Not applicable

001484

402-11-85

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1729	COORDINATES:	DATE 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 10 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101423 101424 (1120)	21	3	Very stiff. 5Y (5/1) Gray gravelly clay, low plasticity moist	cl	3.5	HNU=0ppm BZ=0cpm
	101425 101426 (1120)	24	6	Hard, SAA.	cl	>4.5	
13	101427 101428 (1120)	34	6	Very stiff, SAA	cl	2.5	
		24	0	No Recovery.	NA	NA	
14		2	0	No Recovery	NA	NA	~~HNU=0ppm BZ=0cpm~~ DSO 1/13/92
		6	0	No Recovery.	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Elay Gardner, Keith Myers

SAA - Same as above
NA - Not applicable

402-11-86

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1729	COORDINATES:	DATE 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 10 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		9	0	No Recovery	NA	NA	
		9	0	No Recovery	NA	NA	
16	101428 (1330)	2	6	Very stiff. BY (5/1) gray gravelly clay, low plasticity moist	CL	3.25	HNU=0ppm BZ=0ppm
		8	0	No Recovery.	NA	NA	
17		9	0	No Recovery.	NA	NA	
		11	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Elay Gardner, Kevin Myers

SAA - same as above
NA - not applicable

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1729	COORDINATES:	DATE: 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101430 101431 (1400)		34	Stiff. 5Y(5/1) Gray gravelly, sandy, clay, high plasticity, moist	cl	1.0	HNU = 0ppm BZ = 0ppm
							Shelby pushed from 18 to 21 ft.
19		Tube					
20		Shelby					

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombadier

Driller: Elay Gardner, Keith Myers

SAA - Same as above
NA - not applicable

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1729	COORDINATES:	DATE 1/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 1/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		3	0	No Recovery	NA	NA	
		7	0	No Recovery	NA	NA	
22		9	0	No Recovery	NA	NA	
	DSO 2/4/92	11	0	No Recovery	NA	NA	
23	101457 ~~101452~~ (1430)	7	6	Soft. BY (5/1) Gray gravelly sandy clay, high plasticity moist	CI <.25 DSO 1/13/92	<.25	HNU = 0 ppm BG = 0 cpm
		14	6	SAA, very stiff	CI 3.75 DSO 2/3/92	3.75	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Rambader Mobile Drill

Driller: Clay Gardner
Dan Samison

SAA - SAME AS ABOVE
NA - Not applicable

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EU MF		
BORING NUMBER: 1729	COORDINATES:	DATE 11/13/92	
ELEVATION: 591 ft	GWL: Depth Date/Time	DATE STARTED: 11/13/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 11/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 9 OF 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101422 (1445)	7	6	Soft. 5Y(3/1) Gray. Gravelly clay. Moist	CL	<.25	HNU=0ppm BZ=0cpm
		9	6	SAA, very stiff	CL	3.25	
25		20	6	SAA	CL	3.25	
		23	6	SAA	CL	3.25	
26	101422 (1505)	9	6	SAA	CL	2.25	HNU=0ppm BZ=0cpm
		20	6	SAA	CL	2.75	

NOTES:

SAA - Same as above
NA - Not applicable

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Bombardier Mobile Drill
Driller: Clay Gardner
Dan Jamison

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1729	COORDINATES:		DATE 1/13/92
ELEVATION: 59154	GWL: Depth	Date/Time	DATE STARTED: 1/13/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 1/13/92
DRILLING METHODS: Hollow Stem Auger			PAGE 10 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		25	6	DJO 1/13/92 HARD ~~Soft~~ BY(5/1) Gray gravelly clay high plasticity moist	CL	>4.5	
		30	6	SAA	CL	>4.5	
28	101433 101434 (1500)	50	6	SAA	CL	>4.5	HNU= 0ppm BG= 0cpm
	101435 101436 (1500)	50	6	Loose, gray coarse clayey sand moist	SC ~~CL~~ CH 2/4/92	NA	
29	101437 101438 (1500)	65	3	SAA	SC ~~CL~~ CH 2/4/92	NA	
				Refusal	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elgy Gardner, Dan Jamison

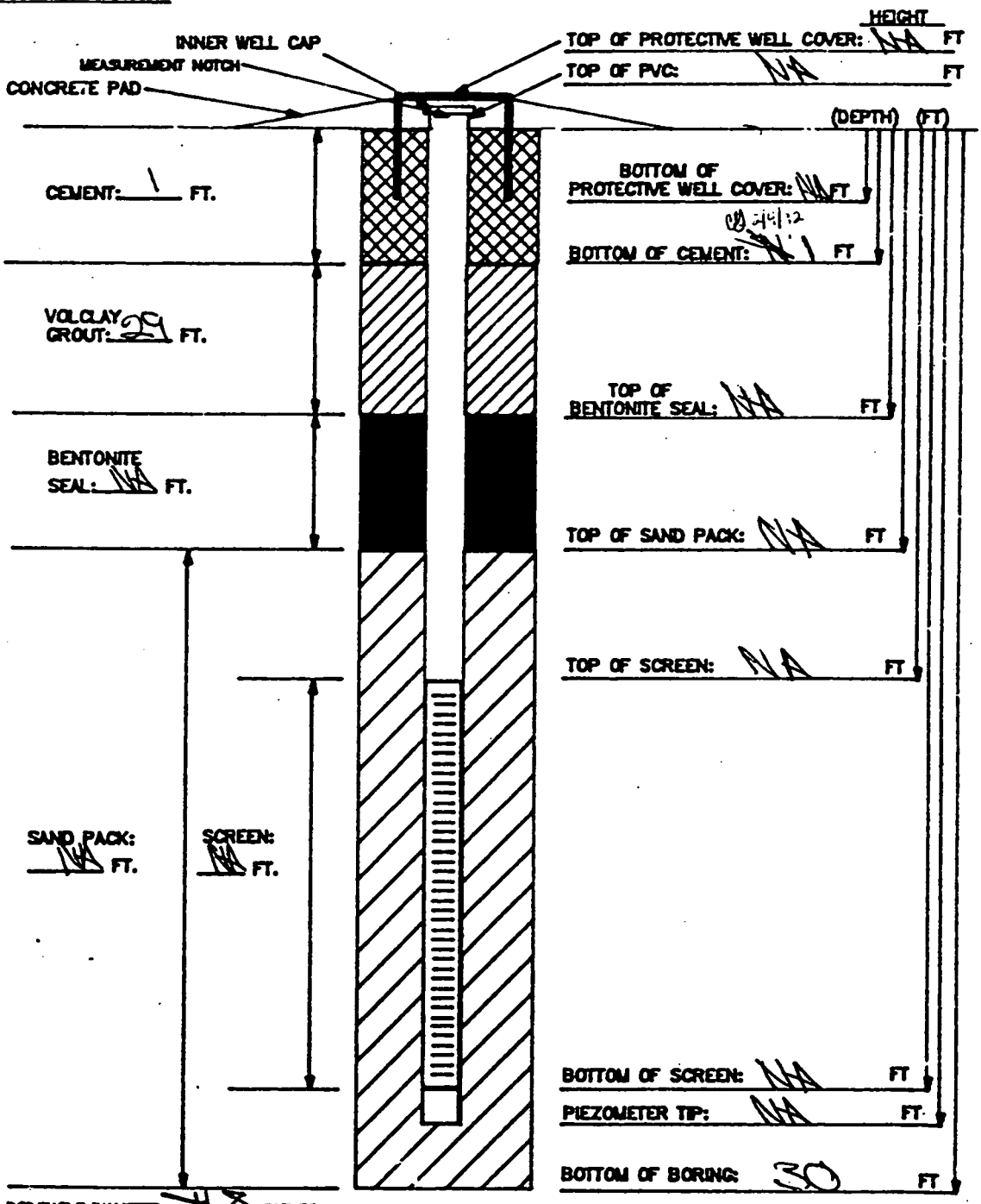
SAA - Same as Above
NA - not applicable

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1729

INSTALLATION DATE: 1/13/92



BOREHOLE DIAMETER: 4.8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 0.50
BENTONITE PELLETS (5-GALLON BUCKETS): 2/3/92
BAGS OF VOLCLAY GROUT: 1/2 bag
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED:
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUME FIELD ENG./GEO. D. O'Brien DATE 1/13/92
PROJECT NO. 9602-3.22 CHECKED BY _____ DATE _____
BORING NO. 1729
PIEZOMETER NO. NA DATE OF INSTALLATION 1/13/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP ~~29.0~~ 1.0 2/4/92	BOTTOM 30.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0 - 1.0 ft cement cap

001492

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Est 586.5	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 1 OF ~~10~~ 12

DEM 1-14-92

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 Inches	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0830 1-9-92 100865	2	6	VERY Soft (10 2/2) VERY DARK BROWN Silty clay with Root Lets, No plasticity moist.	CI	.25	Trip Field Blank Sample # 100866 HNU = Ø ppm. Bγ = Ø cpm above Background
		2	0 (1-14-92)	NO RECOVERY	NA	NA	
1		4	0	No RECOVERY	NA	NA	
		6	0	No RECOVERY	NA	NA	
2	1-9-92 0840 100867	5	6	HARD (10YR 4/4) Dark yellowish Brown Silty Clay, with TRACES of SAND (VERY fine) MEDIUM plasticity, Moist.	CI	2.25	HNU = Ø PPM Bγ = Ø cpm above Background
		7	6 (1-14-92)	A/A.	CI	2.25	
3							

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
α Meter	No METER at office	

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: 586.5' (est)	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 2 OF 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (PEN 1-14-92)
3		7	0	NO RECOVERY	NA	NA	
		8	0	NO RECOVERY	NA	NA	
4	1-9-92 0950 100868 R.S. 100870	15	6	HARD (10YR 5/6) Sandy silty clay (sand fine), yellowish Brown, no plasticity, Dry.	CI	4.5	HNU = Ø ppm Br = Ø cpm above Background
	100869	17	2	A/A.	CI	3.75	
5	R.S. 100871		(0) 1-14-92				
		18	0	NO RECOVERY	NA	NA	
		12	0	NO RECOVERY	NA	NA	
6							

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Br Meter	85665	40-60
α Meter	NO METER at office	

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Est 586.5	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 3 OF 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BGM 1-14-92)
	1-9-92 0900 100872	12 1-14-92 BGM	6	HARD (10YR 7/4) very pale Brown Silty clay with Some Sand (very fine) No plasticity, DRY	Cl	4.5	HNU = Ø ppm Bγ = Ø cpm above Background
	1	13	6	A/A	Cl	4.5	
7		18	6	HARD (10YR 6/8) brownish yellow, Sandy-Silty Clay (Sand fine to very fine) No plasticity, DRY	Cl	4.5	
		9	0	No Recovery	NA	NA	
8	RS.100874 1-9-92	Shelby Tube	20	HARD (10YR 5/3) BROWN MODIE with (5YR 5/8) yellowish RED, silty Clay No plasticity, Slightly moist	Cl	4.5	HNU = ØPPM Bγ = Ø cpm above Background
9	0945 100873						Rig Down — Broken nipple on pump.
10							could only push Shelby ~~to 10.5~~ 2.5 feet. - from 8.0 to 10.5 ft
10.5	RS.100875						

NOTES: R.S.= Rad Screen A/A= As Above

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
α Meter	NO	

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon
Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Gd. 586.3	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 4 OF ~~10~~ 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BPM 1-14-92)
10.5	1-9-92 1352 100876	18	6	HARD (10YR 5/4) yellowish BROWN silty Clay with SOME SAND. TRACE of gravel, No Plasticity Slightly moist.	Cl	4.0	HNU = Ø PPM BY = Ø above Back ground.
11		18	6	A/A (10YR 5/3) BROWN.	Cl	4.5	END of weathering zone.
	1-9-92 1352 100877	24	6	VERY HARD (5Y 4/1) DARK gray, silty clay with SOME coarse gravel No plasticity, Slightly moist	Cl	4.5	
12		26	6	A/A	Cl	4.5	
	1-9-92 1358 100878	30	6	VERY HARD (5Y 4/1) DARK gray, silty-Sandy (VERY fine sand) clay No plasticity, Slightly moist (Lime stone cobble was at the end of split spoon)	Cl	4.5	HNU = Ø PPM BY = Ø above Back ground
13		34	2	A/A	Cl	4.5	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
α Meter	40	

Samples collected per ASTM Colors identified using Munsell Color Chart

001496

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Est 586.5	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 5 OF to 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BEM 6-14-92)
14		32	0	NO RECOVERY	NA	NA	
		32	0	NO RECOVERY	NA	NA	
	1-9-92 100879 1420 Total U Gamma Spec	22	6	VERY HARD (5Y 4/1) Dark gray, Silty Clay with Little Sand & gravel No plasticity, Slightly Moist	CI	4.5	HNU = Ø ppm βγ = Ø cpm above Background
15		26	6	A/A	CI	4.5	Archive 1 500 ML #100880 and send 1 500 ML to RSL Lab for Total U/Gamma Spec sample #100879
		28	6	A/A	CI	4.5	
16		32	6	HARD A/A	CI	3.75	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Serial #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO	

402-11-86

001497

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Est. 586.5	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 6 OF 10/12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DEM 1-14-92)
	1-9-92 100881 1430	22	6	HARD (5Y 4/1) DARK gray, silty clay with Traces of Sand & gravel, No Plasticity, Slightly moist.	Cl	3.5	HNU = Ø ppm βγ = Ø cpm above Back ground
17	RS 100885						
	100882 1430	27	6	A/A	Cl	3.5	
	R.S. 100886						
	100883 1430	38	6	VERY HARD A/A	Cl	4.5	
18	RS. 100887						
	100884 1430	38	6	A/A.	Cl	4.5	
	R.S. 100888						
	100889 1522 1-9-92	6	6	VERY HARD (5Y 4/1) Dark gray, Silty Clay with Little of Sand & gravel, No plasticity, slightly moist	Cl	4.5	HNU = Ø ppm βγ = Ø cpm above Back ground.
19							
	100889 1522 1-9-92	13	6	A/A	Cl	4.0	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO	

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: Gr. 586	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 7 OF ~~10~~ 12

DEM 1-14-92

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		14	2	A/A	CI	4.0	
20		21	0	NO RECOVERY	NA	NA	
		12	6	Limestone cobbles		NA	HNU = Ø ppm Bγ = Ø cpm above Background
21	1531 100889 1-9-92	36	6	HARD (5Y 4/1) Dark gray, Silty Clay, with Little Sand & gravel No plasticity, slightly moist.	CI	3.0	Put cobbles in waste Drum.
		28	0	NO RECOVERY	NA	NA	
22		28	0	NO RECOVERY	NA	NA	

NOTES: R.S.= Rad Screen A/A= As Above

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
α Meter	ND	

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: ~~[illegible]~~ 546.5'	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 8 OF ~~10~~ 12

1-14-92

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1600 1-9-92	23	0	NO RECOVERY	NA	NA	
23		22	0	NO RECOVERY	NA	NA	
		20	0	NO RECOVERY	NA	NA	
24		21	0	NO RECOVERY	NA	NA	
	1620 1-9-92 100890	24	6	Very soft (5Y 4/1) DARK GRAY, Clayey Sand, Slightly MOIST (VERY fine SAND)	SC ~~CL~~ CH 01/23/92	<.25 ~~<.25~~	HNU = Ø ppm BY = Ø cpm above Background.
25		34	1-14-92 6	A/A	SC CH 01/23/92	<.25 ~~<.25~~	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon, Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
∝ Meter	ND.	

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: 586.5 est	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 9 OF 10-12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (MEM 1-14-92)
		44	0	NO RECOVERY	NA	NA	
26		12	0	NO RECOVERY	NA	NA	
	1630 100890 1-9-92	4	6	VERY soft (5Y 4/1) Dark gray clayey SAND (SAND very fine)	SC	<.25 ~~.25~~ CH 01/23/92	HNU = Ø ppm BY = Ø cpm above Back ground
27		4	8 (MEM 1-14-92) 2	HARD SILTEM (5Y 4/1) Dark gray Silty Clay with a Little sand & gravel, Low Plasticity, moist	CL	3.0	
		12	0	NO RECOVERY	NA	NA	
28		18	0	NO RECOVERY	NA	NA	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
α Meter	ND.	

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1730	COORDINATES:	DATE 1-9-92
ELEVATION: est 590.15	GWL: Depth Date/Time	DATE STARTED: 1-9-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-9-92
DRILLING METHODS: AUGER		PAGE 10 OF 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1700 10089 RS100892	10	6	very Soft (5y 4/1) Dark gray Silty Clay with a Little sand and grave, MEDIUM plasticity very moist	CL	2.25	HNU = Ø ppm βγ = Ø cpm above Background
29		13	0	NO RECOVERY	NA	NA	
		15	0	NO RECOVERY	NA	NA	
30		18	0	NO RECOVERY	NA	NA	
				Bottom of Boring at 30.5 ft			
				Composite drum Sample 1x500ml & 1x40ml to RSI Lab. Sample # 100893 1x500ml to WEMCO sample NO. 100894			

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon
Kevin Myers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO	—

Sample Tech. Vern Larger

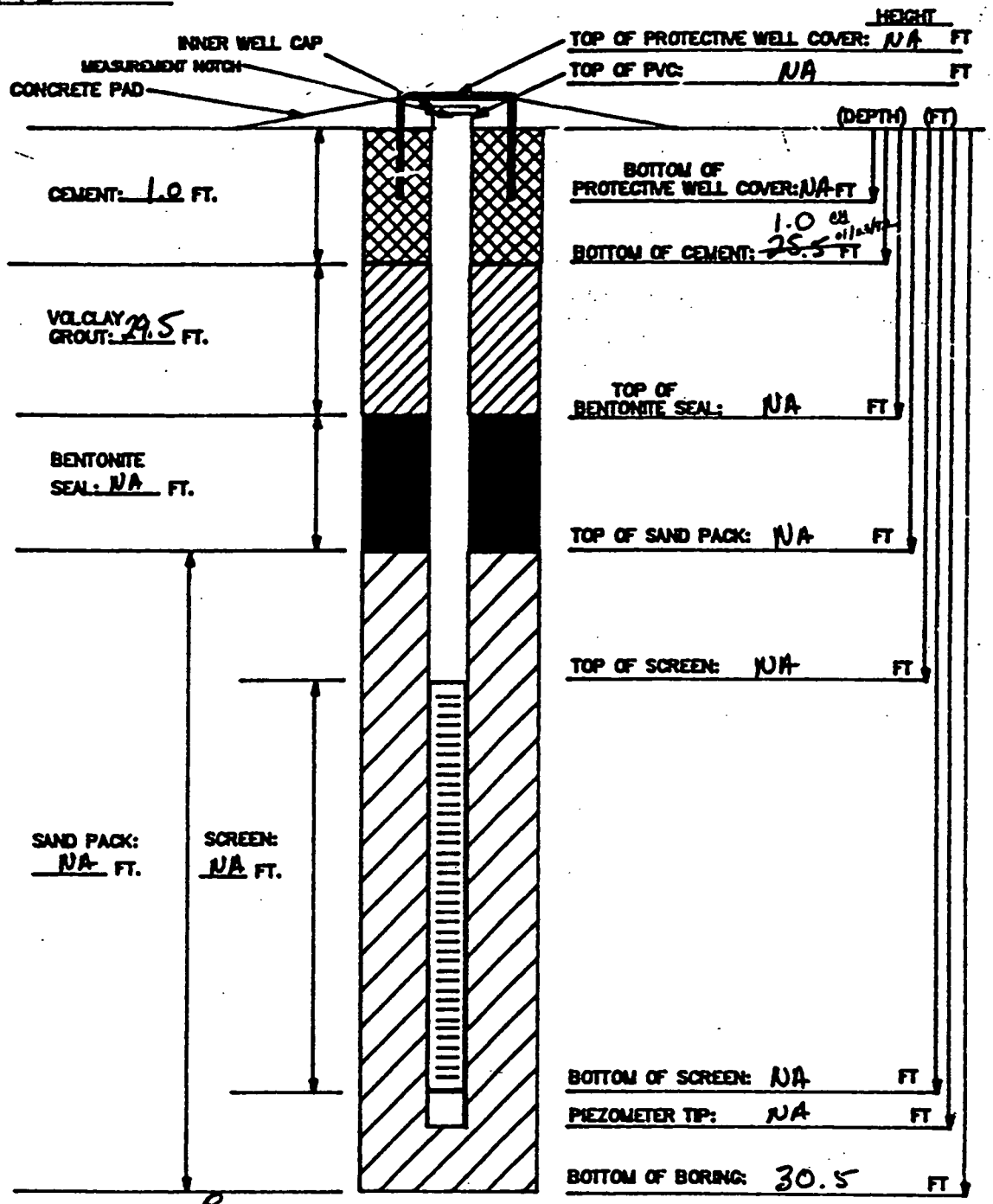
Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

INSTALLATION DATE: 1-9-92

INSTALLATION DIAGRAM
MONITORING WELL NO.
1730



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1.5 sa
AMOUNT OF CEMENT: .5 sa
AMOUNT OF WATER USED: 40 gals
OTHER: NONE

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22

GEOLOGIST/ENGINEER: M E Marshall

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. JE Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY C. Grube DATE 01/23/92
BORING NO. 1730
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger (Hollow) TYPE OF BIT Auger Bit.

DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 30.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	30.5			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1.0 ft cement from 0.0 to 1.0 ft

FERNALD
RI/FS

0711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: Temp RI/FS EWMF		
BORING NUMBER: 2731	COORDINATES:	DATE 1-8-92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-8-92	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED 1-8-92	
DRILLING METHODS: Cable Tool		PAGE 1	OF 9 8

S.A.A - Same As Above

N.R. No Recovery

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BH 1-15-92)
100549 100550	100550	4		V. stiff, dark brown (10yr 3/3) silty clay trace organics. Low plasticity, moist.			Hnu - 0 ppm
1	105	8	10		CL	3.25	Bd - 50 cpm
	1-8-92	10					α - 0 cpm
2	100550	5					Hnu - 0 ppm
	1020	10	12	S.A.A.	CL	3.25	Bd - 50 cpm
3	1-8-9	12					α - 0 cpm
	100550	10		V. stiff, dark yellowish brown, (10yr. 3/6) silty clay, trace gravel, moist.			Hnu - 0 ppm
4	1025	17	16		CL	3.0	Bd - 50 cpm
	1-8-92	22					α - 0 cpm
5	100551	3					Hnu - 0 ppm
	1030	6	13	S.A.A.	CL	3.0	Bd - 50 cpm
6	1-8-92	10					α - 0 cpm
	100552 1035 1-8-92	3	6	m. dense gray (10yr. 5/1) poorly graded angular gravel, wet. 6.25'	GP	NA	Hnu - 0 ppm
	100554 1035 1-8-92	6	6	Very stiff, yellowish brown, (10yr. 5/6) silty clay, low plast. moist 6.5'	CL	2.5	Bd - 50 cpm
7	100556 1035 1-8-92	9	4	Very stiff, dark yellowish brown, (10yr. 3/6) silty clay, low plastic, moist. 7.0'	CL	2.5	α - 0 cpm
				Stiff, yellowish brown, (10yr. 5/8) silty clay, mud to high plast. V. moist.	CL	1.0	

NOTES

Drilling Contractor - Penn Drilling
Drilling Equipment - Cyclone 43
Driller - Craig Coulter
Asst. - Gary Dye

100549 - Rad Screen - Geotech (Dirt)
100553 - " " Geochem 6.0-6.5 ft
100555 - " " Geochem 6.5-7.0 ft
100557 - " " Geochem 7.0-7.5 ft

Backgrounds
Hnu - 0 ppm
Bd - 50 cpm
α - 0 cpm

001505

FERNALD
RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.22	PROJECT NAME FCMP RI/FS EWMF	
BORING NUMBER 2731	COORDINATES	DATE 1-8-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-8-92
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED 1-13-92
DRILLING METHODS Cable Tool		PAGE 2 OF 8

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	100558 1035 1-8-92	13	0	N.R.	NA	NA	Hnu 0 BD 0 See page 1
9	100559 100560 100561 1130	No blow counts on Shelby Tube	30	Stiff, yellowish brown, (10yr, 5/6) silty clay, some gravel, Low plasticity, moist. ↓	CL	1.5	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
10							
11	1-8-92	NA	0	N.R.	NA	NA	
12	100562 1340 1-8-92	3 7 9	16	med dense, yellowish brown (10yr, 5/6) clayey silt, some sand, moist to wet. 12.0' laminar poorly graded sand wedge yellowish brown, (10yr 5/6) ~12.25 med dense, yellowish brown (10yr, 5/6). clayey silt, trace gravel, moist to wet.	ML SP ML	NA NA NA	Hnu - 0 ppm BD - 50 cpm α - 0 cpm
13	100563 1405	17 100/5	18	Dense, brown to yellowish brown, (10yr, 5/3) to (10yr 5/6) clayey silt, some gravel, slmoist to moist. Sandstone cobble sampled thru at 13.25'	ML	NA	Hnu - 0 ppm BD - 50 cpm
14	13.5' J.L 1-9-92 ~~100565~~ 1405 1-8-92	22		13.5' J.L 1-9-92 V. stiff, gray (10yr, 5/1) silty clay, Low plast. moist.	CL	1.75	α - 0 cpm
15	100564 1435 1-8-92	17 18	7	Dense, gray (10yr, 5/1) silt, some clay, Saturated	ML	NA	Hnu - 0 ppm BD - 50 cpm

NOTES
#100560 - Rad Screen Shelby 8.0'
100561 - " " Shelby 10.5'

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FERNALD RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS CWMF	
BORING NUMBER: 2731	COORDINATES:	DATE 1-8-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-8-92
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 1-13-92
DRILLING METHODS: Cable tool		PAGE 3 OF 8

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	See above 1-8-92	21	See above J.L. 1-28-92 7 Above	S.A.A.			α - 0 cpm
16	100565 1570 1-8-92	3	6	Stiff, gray, (10yr, 5/1) gray silty clay, trace gravel, moist.	CL	2.0	Hnu - 0 ppm
	100567 1570 J.L. 1-8-92	7	6 ~~12~~ J.L. 1-8-92	S.A.A	CL	2.0	Bb - 50 cpm
	100569 1570 1-8-92	13	0	N.R.	NA	NA	
17	100570 1570 1-8-92	18	0	N.R.	NA	NA	α - 0 cpm
18	100571 100572 1-9-92 1600	35	9	Stiff, gray, (10yr 5/1) ~~gray~~ J.L. 1-8-92 clay, some silt, med plasticity, v. moist.	CL	J.L. 1-9-92 2.0	Hnu - 0 ppm
		7					Bb - 50 cpm
	1-8-92	13	J.L. 1-9-92				J.L. 1-9-92 α - 0 cpm
19	100573 1-9-92	3	8	Soft, gray to grayish brown (10yr 5/1) to (10yr 5/2) clayey silt to silty clay, med to high plasticity. V. moist.	ml/cl	.5	Hnu - 0 ppm
	1615	7					Bb - 50 cpm
20	1-8-92	9					α - 0 cpm
21	100574 J.L. 1-8-92	17	5	Stiff dark grayish brown, (2.5y, 4/2) silty clay, some gravel, low plasticity, moist.	CL	1.5	Hnu - 0 ppm
	1625	19					Bb - 50 cpm
		50/5					α - 0 cpm
22	1-8-92						

NOTES

100566 - Rad Screen Geochem 15.5-16.0
100568 " " " 16.0-16.5

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FERNALD
RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.3.22	PROJECT NAME: Sampling Ecolm F	
BORING NUMBER 2731	COORDINATES:	DATE 1-8-92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-8-92
ENGINEER/GEOLOGIST J. Lear	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 4 OF 8

DEPTH (Ft.)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22	100574 1645 1-8-92	100/5 21 22	6 JL 1-9-92	S.A.A	CL	1.5	HNU - 0 ppm Bb - 50cpm α - 0cpm
23							
24	100576 JL 1-10-92 0900 1-9-92	No blow counts on Shelby tubes	O	Shelby tube pushed 1.0' No recovery	NA	NA	HNU - ↑ Bb - NA α - ↓
25	100577 JL 1-10-92 0940 1-9-92	35 65 50/3	4	V. stiff, gray to dark grayish brown. (10yr, 5/1) to (2.5Y, 4/2) silty clay, some gravel, moist. Low plasticity	CL	2.5	HNU - 0 ppm Bb - 50cpm α - 0cpm
26	100578 JL 1-10-92 0950 1-9-92	50 50/0	4	Hard, olive to gray (5Y, 4/3) to (10yr, 5/1) silty clay, some gravel, low plast. moist. 26.5 ~~N.R.~~ JL 1-28-92	CL	4.0	HNU - 0 ppm Bb - 50cpm α - 0cpm
27							
28	100579 100580 JL 1-10-92 1000 1-9-92	23 35 50/3	3	Hard, olive to gray (5Y, 4/3) to (10yr, 5/1) silty clay, some gravel, low plasticity, moist	CL	4.25	HNU - 0 ppm Bb - 50cpm α - 0cpm
29							

NOTES
#100575 - Red Screen, Disturbed - Geotech, 22.0-29.0

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.322	PROJECT NAME: Remp RI/FS EUMF		
BORING NUMBER: 2731	COORDINATES:	DATE 1-9-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 1-8-92	
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED 1-13-92	
DRILLING METHODS: Cable Tool		PAGE 5 OF 8	

DEPTH (Ft) 29	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100574 1000 1-9-92	100/0	0 ~~NA~~ 4.21-8-8	NA	NA	NA	NA
30				Bedrock believed to be hit - spoon refusal, drill to 30.5			
31				spoon refusal, drill to 31.5			
32	100576 1340 1-9-92	100/5	6	weathered calcareous shale			Hnu - 0 ppm BG - 50 cpm α - 0 cpm

NOTES
*100579 - Total U - Total Thorium Drum cutting
*100578 - Full HSL Full Rad Hand Auger
#100578 - Trip Field Blank

~~Page 2 of 8~~
pem
1-15-92
- 5711

FERNALD RI/FS

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 602.3.22 FIELD ENG./GEO. G. Marshall PAGE 6 OF 8
PROJECT NAME FERNALD RI/FS EWMP BORING NO. 2731
APPROX. ELEV. _____ CORE SIZE 2 DATE 1-13-91
DRILLING METHOD Cable Tool / AUGER DATE STARTED 1-8-92
COORDINATES _____ DATE COMPLETED 1-13-91

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
10"	32'	NA	—	—	—

RUN NUMBER	DEPTH (ft)	RECOVERY (in)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	MINIMUM	AVERAGE	REMARKS
1	32	6			VERY HARD (7.5 YR N 5/) gray, Limestone fossiliferous, BROKEN to slightly BROKEN, COARSELY crystalline, very Thinly BEDDED with Dark gray shale.	NA			~~No Sem~~ HNU = Ø ppm βγ = Ø cpm above Back ground
		6							
	33	6							
		6			A/A				
	34	6							
		6			A/A				
	35	6							
		6			A/A				
	36	6			HARD (7.5 YR N5/) gray, Limestone, MASSIVE, finly crystalline, Thinly Laminated with Dark gray shale.				
		6							
	37	4			NO RECOVERY				HNU Background = Ø ppm βγ " = ~~Ø cpm~~ 40-60 cpm
	37.5				Stop coring at 37.5' 14:15				

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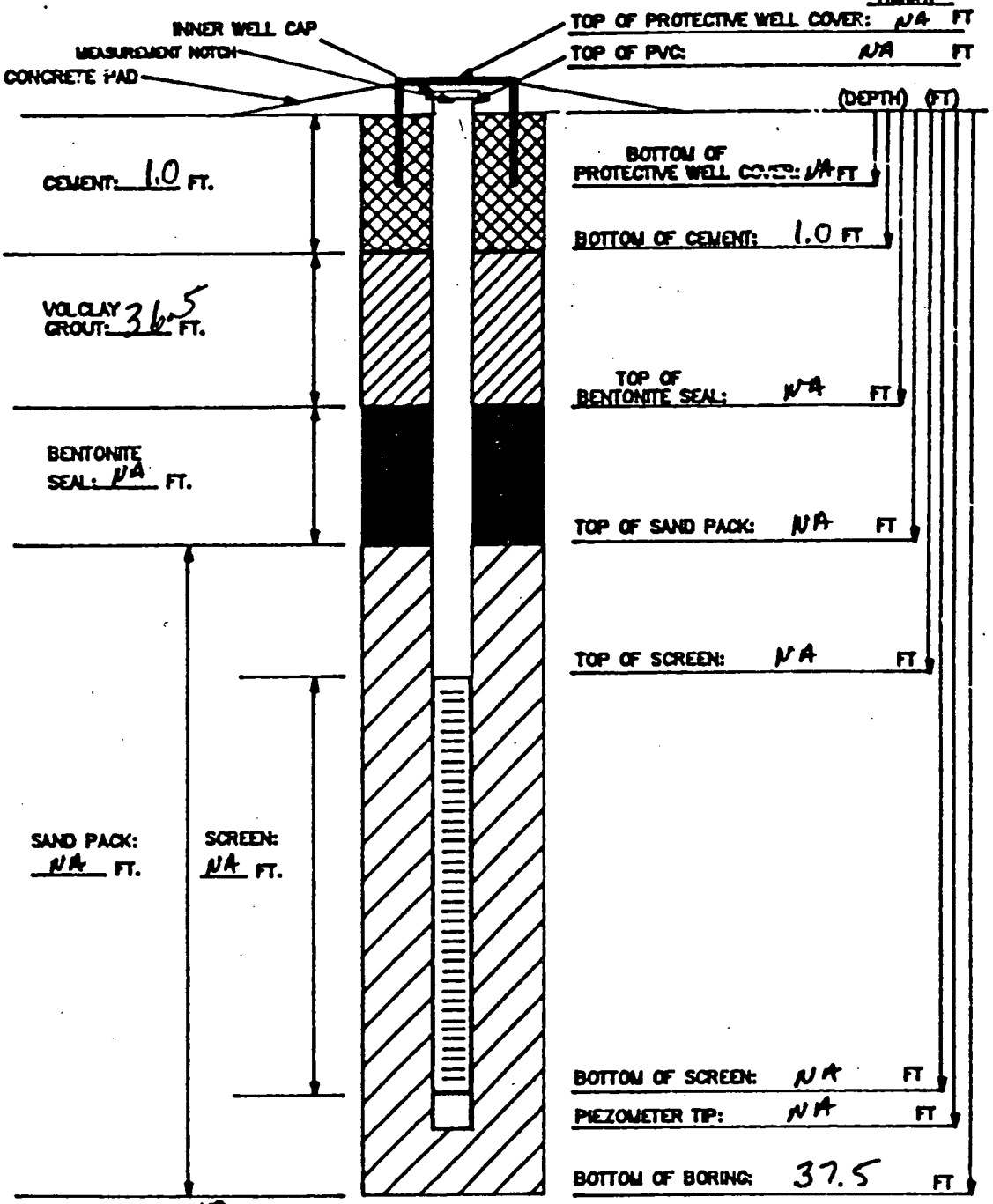
Page III of III
MEM
1-15-92

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
2731

INSTALLATION DATE: 1-8-92



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 50 gals.
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22

GEOLOGIST/ENGINEER: JE Marshall

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. H E Marshall DATE 1-15-92
PROJECT NO. 9602.3.22 CHECKED BY C Grule DATE 01/27/92
BORING NO. 2731
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD ~~Auger~~ Cable tool (HEM 1-15-92)	TYPE OF BIT ~~Auger Bit~~. Cable Tool / Core Bit. (HEM 1-15-92)
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 37.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	37.5			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1.0' of cement from 0.0 to 1.0'

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EU 7A		
BORING NUMBER: 1732	COORDINATES:	DATE 1/8/92	
ELEVATION: 592 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/9/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		2	6	Stiff. 10YR (4/2) Dark grayish brown. Clay High plasticity. Moist	CI	1.0	Hard Auger Stop 6" Sample 101385 Trip Blank 101386 (1500) 1/7/92 HNU=0 ppm BG=0 cpm
	101387 (1515) 1/8/92	4	6	Stiff. 10YR (4/2) Dark grayish brown. Clay. High plasticity. Moist.	CI	.75	
1		6	4	SAA	CI	1.0	
		7	0	No Recovery	NA	NA	
2	101388 (1526) 1/8/92	2	6	Very stiff. 10YR (5/4) Yellowish brown. Silty clay. Low plasticity, moist	CI	3.25	HNU=0 ppm BG=0 cpm
		4	6	SAA, Stiff	CI	2.75	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Clay Gardner
Don Jamison

Background
HNU=0 ppm
BG=40 cpm
Background subtracted out.

402-11-46

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FLUMP	DATE 1/8/92
BORING NUMBER: 1732	COORDINATES:	DATE STARTED 1/8/92
ELEVATION: 592 ft	GWL: Depth Date/Time	DATE COMPLETED: 1/9/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	PAGE 2 OF 9
DRILLING METHODS: Hollow Stem Auger		

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	0	No Recovery.	NA	NA	
		9	0	No Recovery.	NA	NA	
4 RAD	101339 101340 (1530) 1/8/92	11	6	Hard. 2.5Y(6/3) Light yellowish brown, gravelly clay. No plasticity, Dry	Cl	>4.5	HNU= 0 ppm BG= 0 cpm
RAD	101341 101342 (1530) 1/8/92	19	6	SAA	Cl	>4.5	
5 RAD	101343 101344 (1530) 1/8/92	18	6	SAA	Cl	>4.5	
		21	0	No Recovery.	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Clay Gardner
Doff Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 4602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1732	COORDINATES:	DATE 1/8/92	
ELEVATION: 592.84	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/9/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 89	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101392 (1530) 1/8/92	60	6	Hard. 2.5Y (6/3) Light yellowish brown. Gravelly clay, no plasticity, dry.	Cl	>4.5	HNU=0 ppm BZ=0 cpm
		45	0	No Recovery	NA	NA	
7		40	0	No Recovery	NA	NA	
		32	0	No Recovery	NA	NA	
8	101394 (1615) 1/8/92	10	6	Hard. 2.5Y (7/4) Pale yellow gravelly clay, no plasticity dry.	Cl	>4.5	HNU=0 ppm BZ=0 cpm
		11	6	SAA	Cl	>4.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller: Elay Gardner
Dave Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EU MF		
BORING NUMBER: 1732	COORDINATES:		DATE 1/8/92
ELEVATION: 592.84	GWL: Depth	Date/Time	DATE STARTED: 1/8/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 1/9/92
DRILLING METHODS: Hollow Stem Auger			PAGE 4 OF 89

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		13	4	Hand. 2.5Y (7/4) Pale yellow gravelly clay, no plasticity dry.	CL	>4.5	
		15	0	No Recovery	NA	NA	
10		13	0	No Recovery	NA	NA	
		17	0	No Recovery	NA	NA	
11		24	0	No Recovery	NA	NA	
		21	0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Elay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 1782	COORDINATES:	DATE 1/9/92	
ELEVATION: 592 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/9/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
—	101394 103301 1/8/92	11	6	Very stiff, 2.5 (7/4) Pale yellow, gravelly clay. No plasticity, dry.	CL	3.75	HNU = 0ppm BX = 0cpm
		31	6	Top 4" SAA. Bottom 2" Sand + gravel, wet	CL	3.75	
13		80	0	No Recovery.	NA	NA	
		36	0	No Recovery	NA	NA	
14 ~~[illegible]~~ 1/2/1/92	101397 ~~[illegible]~~ 1/8/92	17	6	Hard 2.5Y (6/3) Light yellowish brown clay, No plasticity, Dry.	CL	>4.5	HNU = 0ppm BX = 0cpm
		25	6	SAA	CL	>4.5	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Clay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1732	COORDINATES:	DATE 1/9/92	
ELEVATION: 592 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/9/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 6 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		50	4	Hard. 2.5 (6/3) Light yellowish brown. Clay, no plasticity dry	Cl	>45	
		6	0	No Recovery	NA	NA	
16	10 LSR 10905 1/9/92	31	6	Hard. 2.5Y (6/3) Light yellow brown. Clay with fossils. Dense, dry. Consistency of shale	Cl	>4.5	HNu=0ppm RX=0cpm
		48	6	SAA	Cl	>4.5	
17		60	6	SAA	Cl	>4.5	
			0	No Recovery	NA	NA	Refusal.

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller: Elay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF		
BORING NUMBER: 1732	COORDINATES:	DATE 1/9/92	
ELEVATION: 592 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/9/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101399 101400 (0945) 1/9/92	7	6	Soft. 2.5(7/3) Pale Yellow sandy clay, very wet.	Cl	<.25 <.25 0.50 1/9/92	HNU=0ppm RS=0cpm
	101401 101402 (0945) 1/9/92	27	6	SAA	Cl	<.25 <.25 0.50 1/9/92	
19	101403 101404 (0945) 1/9/92	37	6	SAA	Cl	<.25 0	
	101405 101406 (0945) 1/9/92	50	6	SAA	Cl	<.25	
20	101407 (0955) 1/9/92	24	6	Soft SAA 1/9/92	Cl	<.25	HNU=0ppm RS=0cpm
		60	6	SAA	Cl	<.25	Hit perched water at 21 ft. Stopped drilling

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Clay Gardner
Dan Jamison

402-11-86

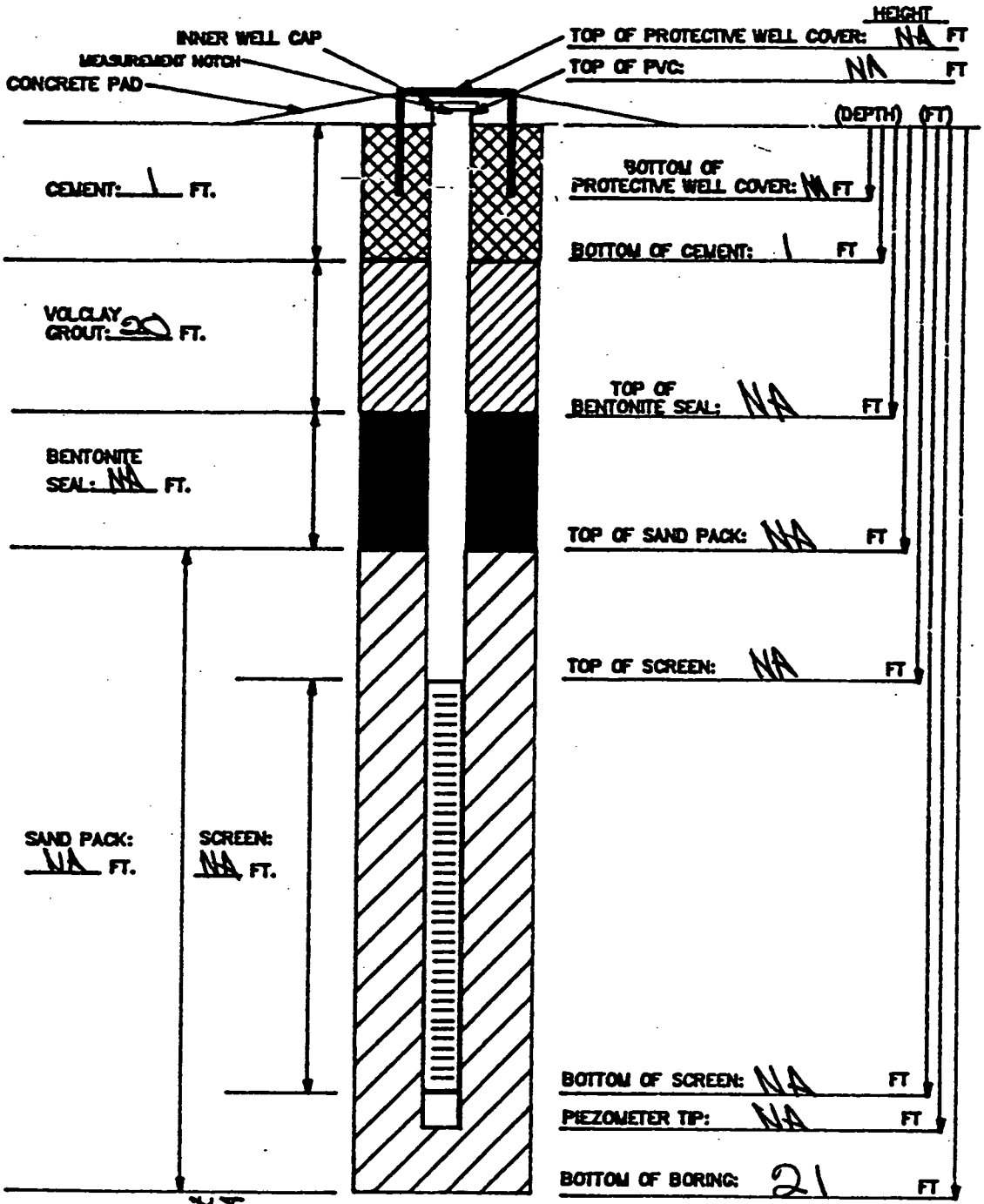
8019

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1732

INSTALLATION DATE: 1/9/92



BOREHOLE DIAMETER: 4.5 INCHES
DSO 1/21/92

MATERIALS USED:
SAND TYPE AND QUANTITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT: 1 bag grout
AMOUNT OF CEMENT: 1/2 bag cement
AMOUNT OF WATER USED:
OTHER: N/A

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

9019

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUME FIELD ENG./GEO. D. O'Brien DATE 1/9/92
PROJECT NO. 9602-3.22 CHECKED BY C. Grube DATE 01/16/92
BORING NO. 1732
PIEZOMETER NO. NA DATE OF INSTALLATION 1/9/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 21.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	21.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	DATE: 1-8-92
BORING NUMBER: 1733	COORDINATES:	DATE STARTED: 1-6-92
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED: 1-8-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	PAGE 1 OF ~~3~~ 1/23/92
DRILLING METHODS: CABLE TOOL		

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				REFER TO BORING LOGS ~~FOR~~ FROM WELL 2733 FOR WELL 1733. DESCRIPTIONS ~~NO SAMPLING WAS DONE FOR THIS WELL~~ CB 01/23/92			
5							
10							
15							
20							
25							
28	100360 1700 1-7-92			Bottom of Boring at 30.0 ft			
30							

NOTES: PENNSYLVANIA DRILLING
J. BARILE - DRILLER
M. REBOLD - HELPER

C. JOHNSON - SAMPLE TECH

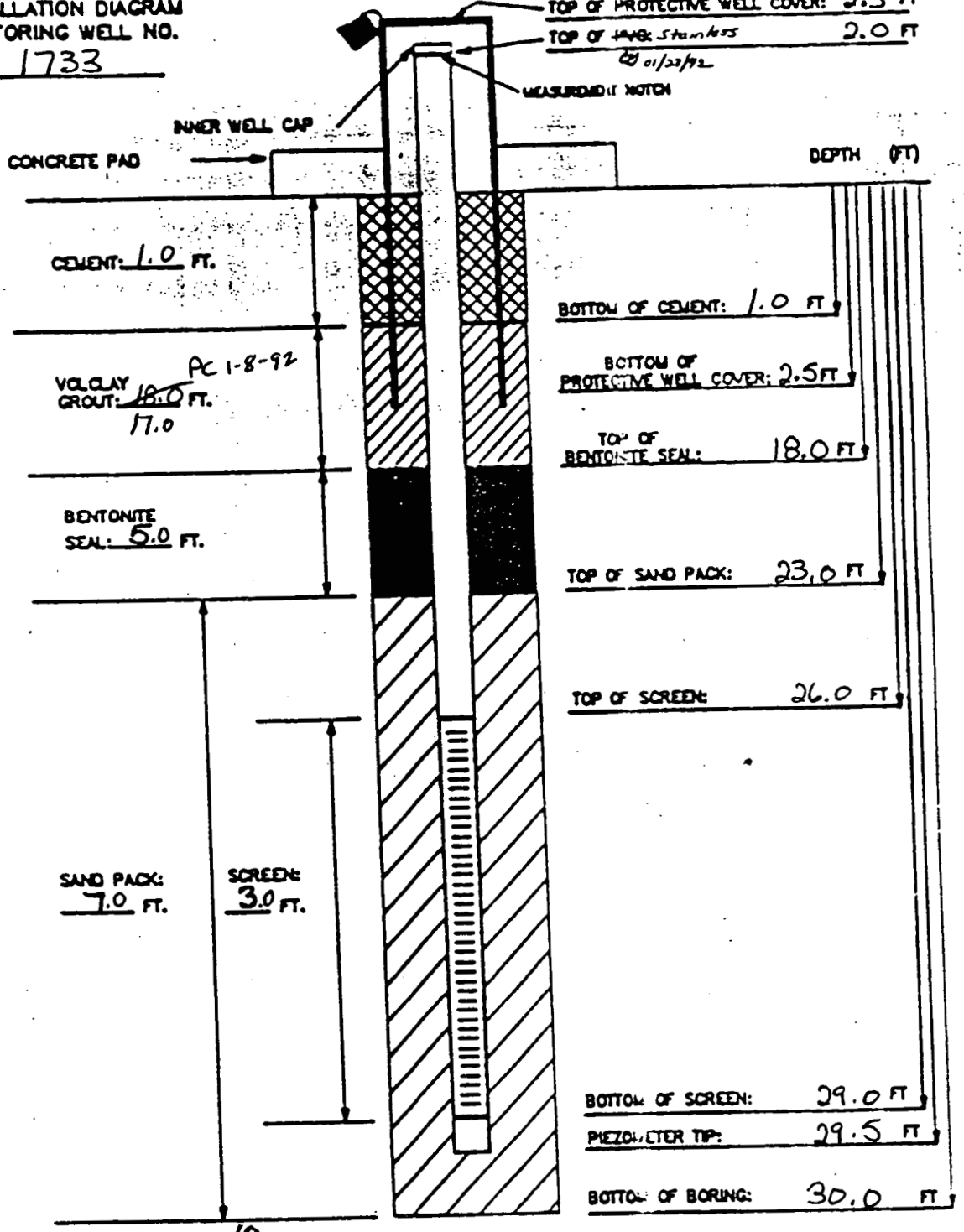
402-1-86

5711

INSTALLATION DATE: 1-8-92

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1733



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 7 sks of 10/20 sand
BENTONITE PELLETS (5-GALLON BUCKETS): 7
BAGS OF VOLCLAY GROUT: 6 sks of grout
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 100 gal
OTHER:

NOTES: 4 in 316 stainless 1/23/92
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40~~ 316 Stainless PVC PIPE WITH ~~0.020-INCH SLOTS~~ 0.010 slots
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

602.03.22
TASK: FEMP RI/FS EWMF GEOLOGIST/ENGINEER: R.P. Casseday

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602 3.22	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 2730 2733	COORDINATES:		DATE: 12.11.91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12.11.91
ENGINEER/GEOLOGIST: J WHEAT	Depth	Date/Time	DATE COMPLETED: 01-06-92
DRILLING METHODS: Cable tool			PAGE 1 OF 19

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100301 10:00 12:11.91	3	6	stiff, yellowish brn (10YR 5/4) silty clay dry moist low plasticity	CL	1.5	Archive
	"	12	6	S/A	CL	1.5	NA
1	"	17	4	S/A	CL	1.5	NA
	100302 11:00 12.11.91	26 17	6	HARD, (10YR 7/6), yellow, silty clay, dry	CL	>4.5	Archive
2	"	25 36	4	SAA	CL	>4.5	
	"	34 42	0	SAA No Recovery	~~CL~~ NA	NA	
3							

NOTES

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER. 602 3.22	PROJECT NAME. ENMF RI/FS FEMP		
BORING NUMBER: 2733 2430 1/13/92	COORDINATES:	DATE 12 11 91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12 11 91	
ENGINEER/GEOLOGIST. J. Wheat	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: Cable tool		PAGE 2 OF 19	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3	100303 1100 12/11/91	26	6	Very dense (10YR 8/6) yellow, clayey silt, ~~trace~~ sand, gravel, dry	ML	N/A	
	"	36	6	SAA	ML	N/A	
4	"	42	0	No ~~Sample~~ Recovery. CH 01/29/92	N/A	NA	
	100304 1100 12/11/91 100304A Roadscrap	55	6	~~Very dense~~ Hard (10YR 8/3) very pale brn, sandy clay, some sand and gravel, dry	~~CH~~ CL CH 1/29/92	>4.5	Dist. Geotech
5	"	54	6	SAA	CL	>4.5	
6	"	40	6	SAA	CL	>4.5	

NOTES: Sample # 100301 Archive 0-18"
Sample # 100302 " " 18-36"
" " 100303 " " 3-4.5
" " 100304 ~~"~~ 4.5-6 disturbed geotech
6-8

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602 3.22	PROJECT NAME: ENMF RI/FS FEMP		
BORING NUMBER: DES 1992 2730-2733	COORDINATES:	DATE 12-11-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-11-91	
ENGINEER/GEOLOGIST: J. Wheat	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: Cable tool		PAGE 3 OF 19	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	100309 11:00 12-11-91	42	6	HARD (10YR 8/6) yellow, silty clay, dry	CL	>4.5	dist. geotech
7	"	50/.2	2	SAA	CL	>4.5	
	"	NA	0	No Recovery	NA	NA	
8	100310 1630 12-11-91	11 10 ~~6~~ 6 ~~12~~ CY 01/30/92	6	HARD (10YR 8/8) yellow, silty clay with some sand and gravel, moist	CL	>4.5	disturbed geotech
	"	23 ~~2~~ CY 01/30/92	2 ~~23~~	SAA	CL	>4.5	
9	"	32 ~~0~~ CY 01/30/92	0 ~~32~~	No Recovery	NA	NA	

NOTES

-02-11-90

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.22	PROJECT NAME: ENMF RI/FS FEMP		371
BORING NUMBER: ~~2730~~ DES 11/13/92 2733	COORDINATES:	DATE: 12/11/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/1/91	
ENGINEER/GEOLOGIST: J. Wheat	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: Cable tool		PAGE 4 OF 19	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100345 1700 121191	5 ~~6~~ 01/20/92	6 ~~5~~	very stiff, 10YR 6/6, brownish yellow, silty clay, with sand and gravel, moist	CL	4.0	archive
	11	12 ~~6~~ 01/20/92	6 ~~2~~	SOA	CL	4.0	
10	11	20 ~~1~~ 01/20/92 01/20/92	1 ~~20~~	SOA	CL	4.0	
	100346 1700 121191	~~11~~ 3 ~~6~~ 01/20/92	6 ~~3~~	medium stiff, 10YR 6/6, gray, clay, with some sand & gravel, moist	CL	1.0	Archive
11	11	9 ~~6~~ 01/20/92	6 ~~9~~	SOA	CL	1.0	
12	11	18 ~~1~~ 01/20/92	1 ~~18~~	SOA	CL	1.0	

NOTES

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.22	PROJECT NAME: LWMF RI/FS FEMP		571
BORING NUMBER: 2730 2733	COORDINATES:	DATE: 12/12/91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/91	
ENGINEER/GEOLOGIST: J. Wheat	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: Cable tool		PAGE 5 OF 19	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12	100307 1600 121291 100309 1600 121291 RAD SCREEN	3	6	Very stiff, 10YR 5/1, gray clay, with some sand & gravel moist	CL	3.5	HNU 0 ppm BY 0 cpm Geochemical spoon
	100309 1600 121291 100310 1600 121291 RAD SCREEN	7	6	SAA	CL	3.00	
13	100311 1600 121291 100312 1600 121291 RAD SCREEN	13	6	SAA	CL	3.5	
		21	0	No Recovery	NA	NA	
14	100313 1600 121291	20	6	Stiff, 10YR 5/1, gray, clay with some sand and gravel, moist	CL	1.25	Shelby Tube pushed from 14.0 to 17.0 ft shelby tube
	100314 1600 121291 RAD SCREEN	10	6	SAA	CL	1.5	shelby tube
15							

Shelby

NOTES:

3 RAD screens
3 geochemical tubes

402-11-66

RI/FS

VISUAL CLASSIFICATION OF SOILS

5111

PROJECT NUMBER: 602 3.22	PROJECT NAME: LNMF	RI/FS: FEMP	
BORING NUMBER: 2730-2733	COORDINATES:		DATE: 12-12-91
ELEVATION:	GWL: Depth: Date/Time		DATE STARTED: 12-11-91
ENGINEER/GEOLOGIST: J. Wheat	Depth: Date/Time		DATE COMPLETED: 01-06-92
DRILLING METHODS: Cable tool			PAGE 6 OF 19

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15		Same		SAA	CL	NA	
		by	30"	SAA	CL	NA	
16		use		SAA	CL	NA	
	160305 1600 122491 2AD screen	↓		SAA	CL	NA	
17	100316 1600 121291	3	6	Very stiff, 10yr 5/1, gray clay some sand and gravel, moist	CL	2.5	Archive
18		13	4	SAA	CL	2.5	

NOTES

402-11-86

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602 3.22	PROJECT NAME: ENMF RI/FS FEMP		
BORING NUMBER: 2737 DOS	COORDINATES:	DATE: 12 12 91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12 11 91	
ENGINEER/GEOLOGIST: J. Wheat	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: Cable tool		PAGE 7 OF 19	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18	100316 1600 12-12-91	15	4	SA	CL	2.0	
18.5				Log continues on next page			

NOTES

602-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

071

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: ~~2730~~ 2733	COORDINATES:	DATE 12-18-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-11-91	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: CABLE TOOL		PAGE 8 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (*Readings are minus Background)
18.5	12-18 900 100315 PC 12-6 100320	4	6	HARD (2.5Y, N5/) GRAY CLAY WITH INTERMITTENT GRAVEL, SOME SILT. DRY, NOT VERY PLASTIC.	>4.0 CL		HNU = 0 ppm α = 0 cpm ßß = 0 cpm
19.0		8	6	SAA	>4.0 CL		HNU = 0 ppm α = 0 cpm ßß = 0 cpm
		12	2	SAA	>4.0 CL		HNU = 0 ppm α = 0 cpm ßß = 0 cpm
20.0	12-18 PC 1150 1115 100321	↑ SHELBY TUBE PUSHED	30	MEDIUM DENSE (2.5Y, N5/) GRAY CLAY WITH MINOR SILT, VERY PLASTIC, ALMOST FLOWS. WET.	~~7.0~~ CL	2.0	SHELBY TUBE PUSHED 20.0' – 23.0' – NO RECOVERY, PUSHED AGAIN AT NEW SPOT, SAME DEPTH, FULL RECOVERY
	RND SCREEN CAP 100322				~~NA~~ NA		ßß = 0 cpm α = 0 cpm HNU = 0 ppm
21.0	RND SCREEN BOTTOM 100323						
21.5 ~~20.5~~							

NOTES: PENN DRILL
DRILLER - J. BARILE
HELPER - J. STRAPPAZON

NOTE - PAUL CASSEDAY ASSUMED RESPONSIBILITY FOR WELL ~~2730~~ 2733 ON 12-18-91 AT DEPTH OF 18.5 FT AND ASSUMES NO RESPONSIBILITY FOR ANY LOGS NOTES OR SAMPLES FOR THIS WELL PRIOR TO 12/18/91

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH - C. JOHNSON, D. SOATTA

Paul Casseday

Background Readings
α = 0 cpm
ßß = 20-60 cpm
HNU = 0 ppm

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

57.11

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	DATE: 12-18-91
BORING NUMBER: W-~~2730~~ PC 2733	COORDINATES:	DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	PAGE 9 OF 19
DRILLING METHODS: CABLE TOOL		

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
21.5							
22.0		SHELBY TUBE PUSHED					
22.5				VERY ~~DENSE~~ STIFF (2.5Y, N5/) GRAY CLAY WITH SOME SILT AND SAND, GRAVEL LACKING. SLIGHTLY MOIST, NOT VERY PLASTIC	CL	2.0	
				~~AR~~ CJ 01/20/92			
23.0	100324 1510 12-18	3	6	SOFT (2.5Y, N5/) GRAY CLAY WITH GRAVEL AND SILT THROUGHOUT, WET AND PLASTIC	CL	0.30	TOOK GEOCHEM SAMPLE 23.0'-25.0' FULL RECOVERY IN EACH SLEEVE.
	100325 RAD SCREEN						
23.5	100326 1510 12-18	7	6	SAA	CL	0.25	
	100327 rad screen						
24.0	100328 1510 12-18	9	6	SAA	CL	0.25	
	100329 rad screen						
24.5							

NOTES: PENN DRILL
DRILLER - J. BARKE
HELPER - J. STRAPPAZON

NR - NO RECOVERY
NA - NOT APPLICABLE
SAA - SAME AS ABOVE

SAMPLE TECH - CHRIS JOHNSON, DAVE SRITTA

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.22	PROJECT NAME. FEMP RI/FS EWMF		DATE 12-18-91
BORING NUMBER: W-~~2230~~ 2414 2733	COORDINATES:		DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST. P. CASSEDAY	Depth	Date/Time	PAGE 10 OF 19
DRILLING METHODS: CABLE TOOL			

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
24.5	100330 1510 12-18 100331	14	6	MEDIUM STIFF, ~~MEDIUM DENSE~~ (2.5Y N5/) GRAY CLAY WITH MINOR PEBBLES AND SOME SILT, SLIGHTLY MOIST, SLIGHTLY PLASTIC. (LB 01/30/92)	CL	1.0	DECREASE IN MOISTURE TOP TO BOTTOM MAY BE FROM WATER USED TO DRIVE CASING. HNU=0 ppm α=0 cpm βγ=0 cpm
25.0	100332 12-18 1525	5	6	VERY SOFT, ~~MEDIUM DENSE~~ (2.5Y, N5/) GRAY CLAY WITH SOME PEBBLES, MINOR SILT THROUGHOUT WET, FLOWS. (LB 01/30/92)	CL	0.25	HNU=0 ppm α=0 cpm βγ=0 cpm VERY WET, EITHER FROM DRILL WATER OR perched water zone
		5	0	NR	NA		
26.0		7	0	NR	NA		
26.0'	12-18 1555	5	6	VERY STIFF, ~~MEDIUM DENSE~~ (2.5Y, N5/) GRAY CLAY WITH SOME SILT AND GRAVEL. SLIGHTLY MOIST, MINOR PLASTICITY. (LB 01/30/92)	CL	2.5	HNU=0ppm α=0 cpm βγ=0 cpm
27.0		7	6	SAA	CL	3.0	HNU=0 ppm α=0 cpm βγ=0 cpm
27.5							

NOTES: PENN DRILL
DRILLER - J. BARILE
HELPER - J. STRAPPAZON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH - C. JOHNSON, D. SPATTA

402-11-81

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMA	DATE: 12-18-91
BORING NUMBER: W-~~2730~~ PC-1-4 2733	COORDINATES:	DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	PAGE 11 OF 19
DRILLING METHODS: CABLE TOOL		

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	12-18 1535	15	6	CH 01/30/92 VERY STIFF, ~~MEDIUM DENSE~~ (2.5Y, N5/) GRAY CLAY WITH SOME GRAVEL SAND AND SILT, SLIGHTLY MOIST MINOR PLASTICITY.	CL	2.5	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
28.0	12-18 1550 100333	7	6	CH 01/30/92 ~~VERY SOFT~~, MEDIUM DENSE (2.5Y, N5/) GRAY CLAYEY SILT WITH SOME GRAVEL VERY WET, FLOWS.	ML ~~CL 75 ML~~ CH 01/30/92	NA	HNU = 0 ppm α = 0 cpm βγ = 0 cpm PERCHED WATER FULL RAD AND RAD SCREEN TAKEN
		11	0	NR	NA	NA	HNU = NA βγ = NA α = NA
29.0		14	0	NR	NA	NA	2 FT SPOON TAKEN DISREGARD LINE AT 29.5 HNU = NA βγ = NA α = NA
		7	0	CH 01/30/92 NR	NA	NA	HNU = NA βγ = NA α = NA
30.0				SEE TOP OF NEXT PAGE			

NOTES: PENN DRILL
DRILLER - J. BARILE
HELPER - J. STRAPPAZON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH - C. JOHNSON, D. SPATTA

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: LD 3.22 PC 1-4	PROJECT NAME: FEMP RI/FS EWMF		DATE: 12-19-91
BORING NUMBER: ~~2730~~ 2733	COORDINATES:		DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	PAGE 12 OF 19
DRILLING METHODS:			

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS βγ = 20 cpm background
30	12-19 920 100334	7	6	MEDIUM DENSE, ~~VERY SOFT~~ (2.5Y, N4) GRAVEL WITH INTERMIXED SILT AND SAND WET, FLOWING (CH 01/30/92)	PC GM	~~>2.5~~ ~~>0.25~~ NA	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
	100335 0920 12-19	13	6	MEDIUM DENSE, ~~VERY SOFT~~ (2.5Y, N5) GRAY CLAYEY SILT WITH LARGE GRAVEL CONTENT. (CH 01/30/92)	ML ~~GC~~ (CH 01/30/92)	NA ~~>.25~~	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
31		19	6	SAA	ML	NA ~~>2.5~~ (CH 01/30/92)	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
	100336 0920 12-19	18	6	MEDIUM ~~DENSE~~ STIFF (2.5Y, N5) GRAY CLAY WITH SILT. VERY MOIST, PLASTIC (CH 01/30/92)	CL ~~HC~~ (CH 01/30/92)	1.5	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
32	12-19 935 100337	9	6	MEDIUM DENSE, ~~VERY SOFT~~ (2.5Y N5/) GRAY GRAVEL AND CLAY MIX, VERY WET, FLOWS (CH 01/30/92)	GC	NA ~~>0.25~~ (CH 01/30/92)	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
	100338 0935 12-19	11	6	~~MEDIUM DENSE~~, MEDIUM STIFF (2.5Y, N5) GRAY CLAY WITH MINOR SILT, VERY PLASTIC, MOIST (CH 01/30/92)	CL	1.0	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
33							

NOTES:
PENN DRILL
DRILLER - J. BARILE
HELPER - J. STRAPPAZON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH - C. JOHNSON, D. SPATTA

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

- 5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		DATE 12-19-91
BORING NUMBER: W-~~2730~~ PC 1-9 2733	COORDINATES:		DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	PAGE 18 OF 19
DRILLING METHODS: CABLE TOOL			

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS βγ = 20 cpm (Background)
33	12-19 935 100338	11	6	CH 01/30/92 ~~MEDIUM DENSE~~, MEDIUM STIFF (2.5Y, N5/) GRAY CLAY WITH MINOR SILT, VERY PLASTIC, MOIST.	CL	1.0	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
		14	6	SAA	CL	0.5	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
34	12-19 945	10	0	NR	NA	NA	HNU = NA α = NA βγ = NA
		12	0	NR	NA	NA	HNU = NA α = NA βγ = NA
35	12-19 950 100339	13	0	NR (SAMPLE FLOWED FROM SLEEVE ONTO GROUND)	NA	NA	HNU NA α = NA βγ = NA
	100340 100341	26	6	CH 01/30/92 STIFF, ~~DENSE~~ (2.5Y, N5/) GRAY CLAY WITH MINOR SILT AND SOME GRAVEL AND SAND, WET	CL	2.0	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
36	100342 100343	22	6	CH 01/30/92 STIFF, ~~DENSE~~ (2.5Y, N5/) GRAY CLAY INTERMIXED WITH (10YR, 5/4) BROWN CLAY, SOME SILT AND SAND, GRADING TO ~~VERY DENSE~~ CH 01/30/92 DENSE (10YR, 5/4) YELLOWISH BROWN GRAVELLY SAND, WET.	CL/SM	1.5	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
BASE OF TILL	100344	31	0	NR	NA	NA	HNU = NA α = NA βγ = NA
37							

NOTES:

PENN DRILL
DRILLER: J. BARNE
HELPER: J. STRAPPAZON

BASE OF TILL ENCOUNTERED at 36.5 ft

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECHS: C. JOHNSON, D. SPATTA

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	DATE: 12-19-91
BORING NUMBER: W-2730 PC 1-4 2733	COORDINATES:	DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	PAGE 14 OF 19
DRILLING METHODS: CABLE TOOL		

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
~~37~~				Sample interval will			
38				Continue at 5.0 ft intervals			
39				in Aquifer			
40	12-19 100345 1030	7 6 11	8	CJ 1/30/92 ~~VERY LOOSE~~, MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN, GRAVELLY SAND, MINOR SILT AND CLAY, WET	SW ~~SM~~ CJ 01/30/92	NA ~~70.37~~	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
41							
42							
43							
44							
45	12-19 1300 100346	28 50/.3	18	CJ 01/30/92 ~~VERY LOOSE~~, VERY DENSE (10YR, 5/3) BROWN SAND AND GRAVEL. LITTLE TO NO SILT OR CLAY, WET	SW ~~SM~~ CJ 01/30/92	NA ~~70.55~~	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
46							
47							
48							
49							
50	12-19 1341 100347	32 42 44	18	CJ 01/30/92 ~~VERY LOOSE~~, VERY DENSE (10YR, 4/3) DARK BROWN INTERMIX OF SAND AND GRAVEL. NO GRADING PRESENT, POORLY SORTED DRY	SW to GW	NA	HNU = 0 ppm α = 0 cpm βγ = 0 cpm
51							
52							

NOTES: PENN DRILL
DRILLER: J. BARLE
HELPER: J. STRAPPAZON

NA - NOT APPLICABLE
SAA - SAME AS ABOVE
NR - NO RECOVERY

SAMPLE TECHS: C. JOHNSON, D. SPATTA

402-11-86

VISUAL CLASSIFICATION OF SOILS - 5711

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: ~~2730~~ PC 1-4 2733	COORDINATES:	DATE: 12-19-91	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 12-11-91	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth / Date/Time	DATE COMPLETED: 01-06-92	
DRILLING METHODS: CABLE TOOL		PAGE 15 OF 19	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS BØ = 20 ppm (background)
~~52~~ 53 54							
55 56	12-19 1605 100349	19 38 50/.3	9	CB 01-30-92 ~~LOOSE~~, VERY DENSE (10YR 4/3) DARK BROWN SAND WITH GRAVEL (SOME VERY COARSE) POORLY SORTED, ~~POORLY GRADED~~. VERY DRY CB 01/5/92	SW ~~SP~~	NA ~~<0.25~~ CB 1/30/92	HNU = 0 ppm α = 0 cpm BØ = 0 cpm
57 58 59							
60 61	12-19 1659 100350	6 15 19	18	PC 12-19 ~~LOOSE, VERY~~ DENSE (10YR, 5/3) BROWN SAND AND GRAVEL (SOME COARSE) POORLY SORTED, ~~POORLY GRADED~~, SLIGHTLY MOIST CB 01/5/92	SW ~~SP~~	NA ~~<0.25~~ CB 01/30/92	HNU = 0 ppm α = 0 cpm BØ = 0 cpm
62 63 64							
65 66	12-20 1010 100351	18 50/.4	10	CB 01/30/92 ~~LOOSE~~, VERY DENSE (10YR, 5/3) BROWN SAND CONTAINING COARSE GRAVEL, POORLY SORTED ~~POORLY GRADED~~, DRY. CB 01/5/92	SW ~~SP~~	NA ~~<0.25~~ CB 1-30-92	HNU = 0 ppm α = NA BØ = 0 cpm
67							

NOTES:
PENN DRILL
J. BARILE - DRILLER
J. STRAPPAZON - HELPER

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH. - CHRIS JOHNSON

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		DATE: 12-20-91
BORING NUMBER: ~~2730~~ PC 1-4 2733	COORDINATES:		DATE STARTED: 12-11-91
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 01-06-92
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	PAGE 16 OF 19
DRILLING METHODS: CABLE TOOL			

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67							
68							
69							
70	12-20 1045 100352	14 19 50/.4	12	CB 01/30/92 ~~LOOSE~~, VERY DENSE (10YR, 5/3) BROWN SAND WITH LENSES OF COARSE GRAVEL. LITTLE TO NO SILT OR CLAY. SLIGHTLY MOIST	SP	NA ~~<0.25~~ CB 01/30/92	HNU = 0 ppm α = NA. βγ = 0 cpm
71							
72							
73							
74							
75	12-20 1355 100353	20 50/.2	8	CB 01/30/92 ~~LOOSE~~, VERY DENSE (10YR, 4/3) VERY DARK BROWN SAND, POORLY SORTED. CONTAINS VARIOUS SIZED PEBBLES THROUGHOUT. LITTLE SILT OR CLAY SLIGHTLY MOIST	SW ~~SP~~	NA ~~<0.25~~ CB 01/30/92	HNU = 0 ppm α = NA. βγ = 0 cpm
76							
77							
78							
79							PENETRATED water table of AQUIFER
80	12-20 1425 100354	11 19 38	13	CB 01/30/92 Very ~~LOOSE~~ DENSE (10YR, 5/3) BROWN COARSE SAND AND GRAVEL. POORLY GRADED. LITTLE TO NO SILT OR CLAY. WET	SP	NA ~~<0.25~~ CB 1-30-92	HNU = 0 ppm α = NA βγ = 0 cpm
81							
82							

NOTES: PENN DRILL
J. BARKE - DRILLER
J. STRAPPAZON - HELPER

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

SAMPLE TECH. - CHRIS JOHNSON

402-1-1-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: ~~2730~~ AE 1-4 2733	COORDINATES:		DATE 12-20-91/12-21-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-11-91
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth	Date/Time	DATE COMPLETED: 01-06-92
DRILLING METHODS: CABLE TOOL			PAGE 17 OF 19

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
~~82~~							
83							
84							
85	12-20 1630 100355	50/.4	4	CH 01/30/92 ~~LOOSE~~, VERY DENSE (10YR, 5/3) BROWN GRAVEL WITH SOME SAND AND SILT. LITTLE TO NO CLAY. COARSE, POORLY SORTED. ~~GRAVEL~~ ANGULAR. WET	GW ~~GP~~ CH 01/30/92	NA ~~GCLS~~	HNu=0 ppm α=NA βγ=0 cpm
86							
87							
88							
89							
90	12-21 1255 100356	21 50/.3	9	CH 01/30/92 ~~LOOSE~~, VERY DENSE (10YR, 5/3) GRAYISH BROWN GRAVEL WITH SAND. MINOR SILT LITTLE TO NO CLAY. POORLY SORTED ~~AND GRADED~~. WET CH 01/30/92	GW ~~GP~~	~~LOOSE~~ CH 01/30/92	HNu=0 ppm α=NA βγ=0 cpm
91							
92							
93							
94				TOTAL DEPTH = 94.0 Ft.			
95							
96							
97							

NOTES: PENNSYLVANIA DRILLING
DRILLER - J. BARILE
HELPER - J. STRAPPAZON
SAMPLE TECHS - C. JOHNSON, D. SPATA

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

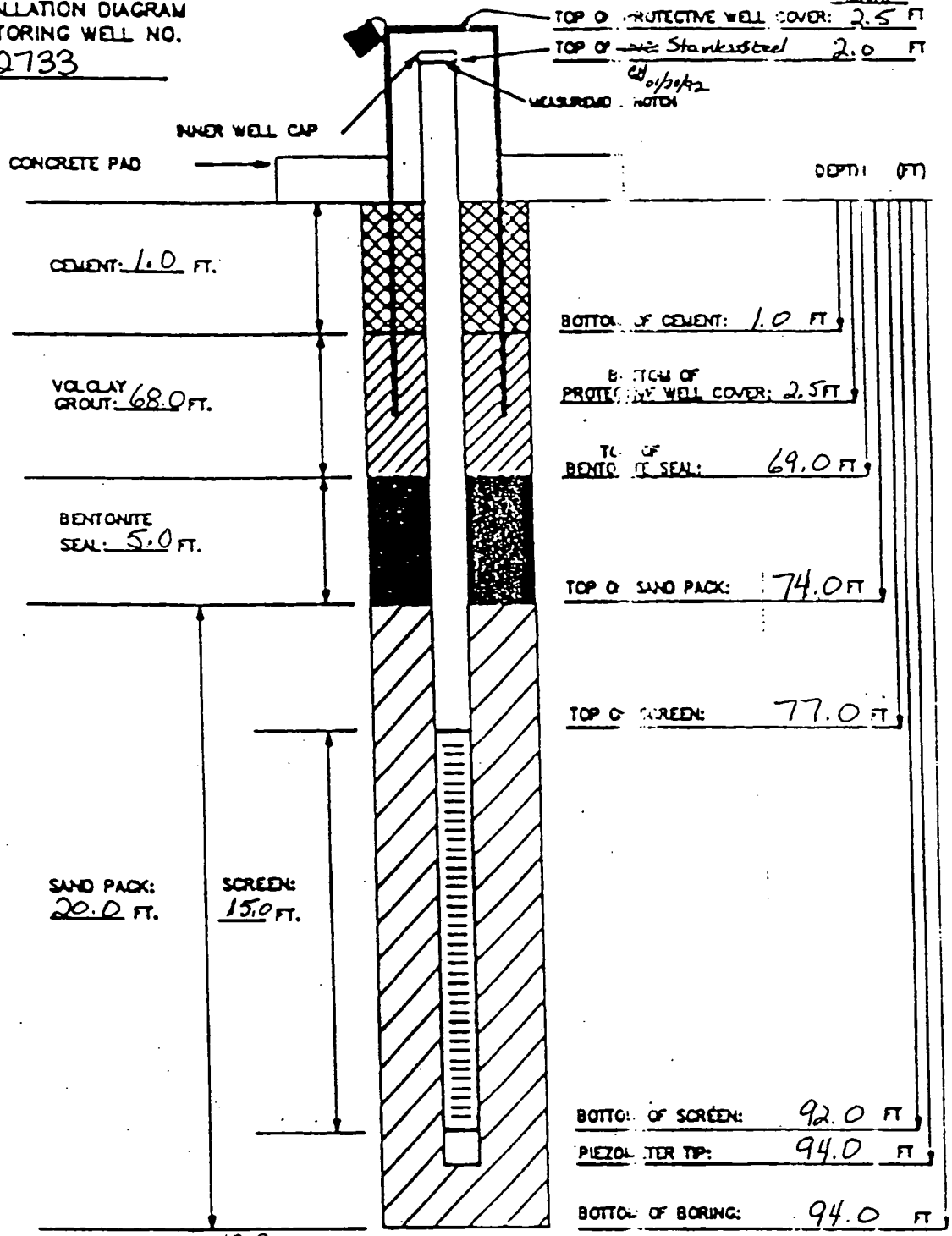
402-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
2733

INSTALLATION DATE: ~~12-21-91~~ 1-6-92 CB 01/30/92



MATERIALS USED:
SAND TYPE AND QUANTITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER:

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ 4 in 316 Stainless Steel CB 01/30/92 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~2-INCH LG. SCHEDULE 40~~ 4 in 316 Stainless Steel PVC PIPE WITH 0.010-INCH SLOTS. CB 01/30/92
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

602.03.22.
TASK: FEMP RI/FS EWMF GEOLOGIST/ENGINEER: R. P. GASSEDAY

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS EWMF
FIELD ENG./GEO. R.P. Cassday
DATE 1-6-92
PROJECT NO. 602.3.22
CHECKED BY
DATE
BORING NO. 2733
PIEZOMETER NO. 2733
DATE OF INSTALLATION 1-6-92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO 94.0
FLUID — FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 ft TO 94.0 ft
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 5-10 ft
JOINING METHOD Screwtype - Flushjoint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinge Locking Cap with Padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Volclay GROUT / ~~SLURRY~~ CEMENT	TOP 0.0 / 1.0	BOTTOM 1.0 / 69.0	TOP	BOTTOM
BENTONITE PELLETS	TOP 69.0	BOTTOM 74.0	TOP	BOTTOM
SAND - 10/20	TOP 74.0	BOTTOM 94.0	TOP	BOTTOM
GRAVEL - None used	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP ~~78.0~~ 77.0	BOTTOM 92.0	TOP	BOTTOM
PIEZOMETER TIP	94.0			
BOTTOM OF BOREHOLE	94.0			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

MARKS

409-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 3733	COORDINATES:	DATE 10/2/92	
ELEVATION: 604.5 MK	GWL: Depth 86.5 Date/Time 10/28/92	DATE STARTED: 10/2/92	
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time	DATE COMPLETED: ~~10/5/92~~	
DRILLING METHODS: Cable Tool		PAGE 1 OF ~~14~~ 13	

CB 11/4/93

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1545 104601 10/2/92	9 10 7	5	Soft 7.5 YR (5/3) Brown, silty clay, low plasticity, dry	OL	.25	HNU = 0 ppm αβ = 60 cpm
2	1530 104602 10/2/92	9 8 9	10	Firm 10 YR (6/6) brownish yellow silty clay, low plasticity, moist	CL	1.5	HNU = 0 ppm αβ = 60 cpm
3 4	1555 104603 10/2/92	4 5 8	12	Soft 10 YR (6/8) brownish yellow silty clay low plasticity, moist to silty clay, med plasticity, moist	CL	.5 to 4.0	HNU = 0 ppm αβ = 60 cpm
5 6	1600 104604 10/2/92	10 11 13	18	V. hard 10 YR (5/6) yellow brown silty clay w/ gravel, med. plasticity, moist	CL	4.5	HNU = 0 ppm αβ = 60 cpm
7	1630 104605 10/2/92	6 9 15	15	Hard 10 YR (5/4) yellowish brown, silty clay w/ gravel, med plasticity moist	CL	2.5	HNU = 0 ppm αβ = 60 cpm
8	1635 10/2/92	12 9 7	0	No Recovery	NA	NA	NA
9 10	1650 104606 10/2/92	9 21 17	17	Hard 10 YR (5/4) yellowish brown w/ gray 2.5 Y (5/1) streaks silty clay w/ fine - crse gravel, med plasticity, moist	CL	3.25	HNU = 0 ppm αβ = 60 cpm
11 12	1700 104607 10/2/92	9 18 28	18	Hard 5 YR (3/3) Dk brown and 5 YR (5/1) Gray silty clay w/ fine to crse gravel, med. plasticity, moist CB 11/4/92	CL	3.75	HNU = 0 ppm αβ = 60 cpm
13	1100 104609 10/5/92	7 35 33	14	Hard 2.5 Y (5/1) Gray silty clay w/ gravel, med. plasticity, moist By 11/4/92	CL	2.75	HNU = 0 ppm αβ = 60 cpm
14 15	1110 104610 10/5/92	7 21 25	16	Hard, 2.5 Y (5/1) Gray silty, gravelly clay. med. plasticity. moist	CL	2.5	HNU = 0 ppm αβ = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 35 Cyclone

Driller: Chris Coulter, David Holmes

SAA = Same as above

NA = Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 3733	COORDINATES:	DATE 10/5/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/2/92	
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time	DATE COMPLETED: ~~10/5/92~~	
DRILLING METHODS: Cable Tool		PAGE 2	OF ~~11~~ 13

CB 2/4/93

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16 / 16.5	1120 10/5/92	12 14 23	NA	No Recovery By 11/4/92	NA	NA	HNU = ~~0 ppm~~ NA αβ = ~~60 cpm~~ NA By 11/4/92
17 / 18	1130 104611 10/5/92	33 22 47	17	Very Dense 2.5YR(5/1) Gray silty sand, wet By 11/4/92	SM	NA	HNU - 0ppm αβ - 60 cpm
19	1310 104612 10/5/92	12 17 23	14	Hard 2.5YR(5/1) Gray, silty clay w/ gravel, med. plasticity, moist By 11/4/92	CL	2.0	HNU 0 ppm αβ - 60 cpm
20 / 21	1322 104613 10/5/92	6 22 36	9	Hard 2.5YR(5/1) Gray, silty gravelly clay, med. plasticity, moist	CL	3.0	HNU = 0 ppm αβ = 60 cpm
22	1335 104614 10/5/92	12 19 33	15	V. Dense 2.5YR(5/1) Gray, clayey silt, low plasticity, moist w/ gravel Hard 2.5YR(5/1) Gray, silty clay w/ gravel, med plasticity, moist	ML CL	NA 2.5	HNU = 0 ppm αβ = 60 cpm
23 / 24	1445 104615 10/5/92	8 12 14	12	SAA	ML CL	NA 2.5	HNU: 0ppm αβ = 60cpm
25	1500 10/5/92	6 15 19	0	No Recovery By 11/4/92	NA	NA	HNU: αβ: NA
26 / 27	1515 104616 10/5/92	2 5 9	13	Firm 2.5YR(5/1) Gray, silty, gravelly clay, med plasticity, moist By 11/4/92	CL	1.75	HNU = 0ppm αβ = 60 cpm
28	1530 104617 10/5/92	12 10 17	17	Firm 2.5YR(5/1) Gray, silty gravelly clay, med plasticity, moist	CL	1.25	HNU: 0ppm αβ: 60 cpm
29 / 30	1540 10/5/92	5 11 14	0	No recovery	NA	NA	HNU: NA αβ: NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 34 Cyclone

Driller: Chris Coulter

David Holmes

SAA = Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

407-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 3733	COORDINATES:	DATE 10/5/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/3/92	
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time	DATE COMPLETED: 10/6/92	
DRILLING METHODS: Cable Tool		PAGE 3 OF ~~11~~ 13	

LB 2/4/93

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	1550 104618 10/5/92	4 7 17	12	Firm 2.5Y(5/1) Gray, silty, gravelly clay, med plasticity, moist	CL	1.25	HNU 0ppm αβ 60 cpm
32 33	1655 104619 10/5/92	4 15 17	18	SAA	CL	1.75	HNU 0ppm αβ 60 cpm
34	1710 104620 10/5/92	4 9 17	18	SAA	CL	1.5	HNU 0ppm αβ 60cpm
35 36	1455 104622 104621	4 7 7	8	Stiff 2.5Y(5/1) Gray gravelly clay, low plasticity, moist	CL	1.5	HNU = 0ppm BS = 60 cpm
37	1010 10/6/92	10 14 18	0	No Recovery	NA	NA	
38 39	1025 104622 10/6/92	50/5	10	V. Stiff. 10YR5/6 Yellowish brown gravelly clay. Bottom inch coarse-med grained sand, moist	~~SP~~ 10/6/92 ~~SW~~ CL	2.0	HNU = 0ppm BS = 40 cpm
40	1050 104623 10/6/92	12 32 50/5	18	V. Dense 2.5Y(5/4) Light olive brown coarse sand with gravel, dry	SW	NA	HNU = 0ppm BS = 40 cpm
41				Begin 5ft. sampling			
42							
43							
44							
45							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 3" Cyclone

Driller: Chris Coulter

David Helmes

SAA = Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3733	COORDINATES		DATE 10/6/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 10/2/92
ENGINEER/GEOLOGIST B. Yeardley	Depth	Date/Time	DATE COMPLETED 10/27/92
DRILLING METHODS Cable Tool			PAGE 4 OF ~~14~~ 13

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46.5	1440 104621 10/6/92	50/5	4	V. Dense Light olive brown 2.5Y (5/4) crse. sand & gravel, well ~~sorted~~ graded, dry Bg 11/4/92	SW	NA	HNU = 0 ppm αβ = 60cpm
50							
51.5	1500 104625 10/6/92	35 24 35	15	SAA	SW	NA	HNU = 0 ppm αβ = 80cpm
55							
56.5	1620 10/6/92	50/5	0	No Recovery	NA	NA	NA

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
Dave Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

402-11-86

001546

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: ~~4424~~ 3733	COORDINATES:		DATE 10/1/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/2/92
ENGINEER/GEOLOGIST D. O'Brien	Depth	Date/Time	DATE COMPLETED: 10/7/92
DRILLING METHODS: Cable Tool			PAGE 13 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61.5	RB 104626 10/1/92	50/3"	8	V. Dense 2.5Y (5/4) Light olive brown coarse sand & gravel well ~~sorted~~ graded dry 08/14/93	SW	NA	HNU = 0ppm RB = 100ppm
65							
66.5	1345 104627 10/7/92	59/5	5	V. Dense 2.5Y (5/4) light olive brown med sand, poorly graded, dry. Bottom 2 in ~~poor~~ well graded, gravel	SP	NA	HNU = 0ppm αβ = 60ppm
70							
71.5	1405 104628 10/7/92	24 36 35	12	V Dense 2.5Y (6/4) light yellowish brown, coarse gravelly sand, well graded, dry	SW	NA	HNU = 0ppm αβ = 60ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 3 & 42 Cyclone

Driller: Craig Coulter, Kevin Myers, Chris Coulter, David Holmes

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 602.04.27	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 3733	COORDINATES:		DATE 10/7/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10/2/92
ENGINEER/GEOLOGIS B. Yeardley	Depth	Date/Time	DATE COMPLETED: 10/8/92
DRILLING METHODS: Cable Tool			PAGE 6 OF ~~11~~ 13

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76.5	1530 104629 10/7/92	23 27 24	5	V Dense 2.5Y (5/4) light olive brown coarse sand and gravel, well graded, moist 33y 10/7/92	SW	NA	HNU = 0 ppm αβ = 60 cpm
90							
81.5	1600 104630 10/7/92	50/5	5	SAA	SW	NA	HNU = 0 ppm αβ = 60 cpm
95							
95.5	0915 104631 10/5/92	50/5	5	V. Dense 10YR (5/6) yellowish brown, gravel w/ sand and clay, well graded, moist	GW	NA	HNU = 0 ppm αβ = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: ~~34~~ ~~42~~ Cyclone

Driller: Chris ~~Craig~~ Coulter

~~Kevin Myers~~ 10/5/92

David Holmes 33y

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3733	COORDINATES	DATE 10/9/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/12/92	
ENGINEER/GEOLOGIST B. Yeardley	Depth Date/Time	DATE COMPLETED: 10/27/92	
DRILLING METHODS Cable Tool		PAGE 7 OF 13	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	1003 104632 10/9/92	20 15 13	9	Med. Dense 2.5 Y (5/4) lt. olive brown fine to medium sand w/ gravel, well graded, wet	SW	NA	HNU = 0ppm αβ ~ 60cpm
91.5							Water table found at 87', hydro punch driven to 93.5 - sample #104633
95	1420 104634 10/9/92	26 15 5	8	Med. Dense 2.5Y (5/4) lt. olive brown medium to coar. gravelly sand, well graded, wet	SW	NA	HNU = 0 ppm αβ = 60cpm
96.5							
100	1525 104635 10/9/92	24 21 29	12	Dense 2.5Y (5/4) lt. olive brown, fine to coarse gravelly sand, well graded, wet	SW	NA	HNU = 0ppm αβ = 60cpm
101.5							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Carter
David Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3733	COORDINATES		DATE 10/9/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 10/9/92
ENGINEER/GEOLOGIST B. Yeardley	Depth	Date/Time	DATE COMPLETED 10/13/92
DRILLING METHODS Cable Tool			PAGE 8 OF 13

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105 106.5	1630 104636 10/9/92	17 24 35	14	V. Dense 2.5Y(5/4) lt. olive brown, med to coarse gravelly sand, well graded, wet	SW	NA	HNU = 0 ppm dB = 60 cpm
110 111.5	0955 104637 10/10/92	26 27 21	12	Dense 2.5Y(5/3) lt. olive brown, gravel w/ coarse sand, well graded, wet	GW	NA	HNU = 0 ppm dB = 60 cpm
115 116.5	1100 104638 10/13/92	17 19 21	18	Dense 2.5Y(5/3) lt. olive brown, fine to coarse sandy gravel, well graded, wet	GW	NA	HNU = 0 ppm dB = 60 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
Dave Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04.27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3733	COORDINATES	DATE 10/13/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/13/92	
ENGINEER/GEOLOGIST B Yeardley	Depth Date/Time	DATE COMPLETED 10/14/92	
DRILLING METHODS Cable Tool		PAGE 9 OF 13	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	1345 104634 104345	45 30 25	4	V. Dense 2.5 (5/3) fine to coarse sandy gravel, well graded, wet	GW	NA	HNU = 0 ppm dβ = 60 cpm
125							
125	1430 ~~104611~~ 101492	BJY 10/14/92	0	No Recovery	NA	NA	NA
126.5							
130	1515 104841 101492	17 21 21	14	Dense 2.5Y(5/3) lt olive brown med sand w/ fine to crse gravel, well graded, wet	SW	NA	HNU = 0 ppm dβ = 60 cpm
135							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 Cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

402-11-88

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 04 27	PROJECT NAME RCRA Phase I		
BORING NUMBER 3733	COORDINATES.	DATE 10/15/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 10/15/92	
ENGINEER/GEOLOGIST B Yeardley	Depth Date/Time	DATE COMPLETED: 10/16/92	
DRILLING METHODS Cable Tool		PAGE 10 OF ~~11~~ 13	

CB 2/4/93

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135.0	104642 0945 10/15/92	37 50/5	6	V. Dense 2.5Y (5/4) lite olive brown med - crse gravelly sand, well graded, wet	SW	NA	HNU = 0 ppm αβ = 600 cpm
136.5							
140	104643 1015 10/15/92	15 21 15	13	Dense 2.5Y (5/4) lite olive brown med. gravelly sand, poorly graded; wet	SP	NA	HNU = 0 ppm αβ = 600 cpm.
145							
145	1300 10/16/92	100/4	0	No Recovery	NA	NA	NA
146.5							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 38 cyclone
Driller Chris Coulter
David Holmes

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.0427	PROJECT NAME: RCRA Phase I		
BORING NUMBER: 3733	COORDINATES:	DATE 10/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10/14/92	
ENGINEER/GEOLOGIST: B. Yeardley	Depth Date/Time	DATE COMPLETED: 10/19/92	
DRILLING METHODS: Cable Tool		PAGE 11 OF 13	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	REC/VERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150.0	1345	16		Dense 2.5Y(5/4) light olive brown			HNU=0 ppm
151	104644 10/15/92	16 16	12	med. gravelly sand, well graded, wet	SW	NA	αβ=60cpm
152	1020 104646 10/14/92	50/6	5	V. Dense 2.5Y(5/4) light olive brown SAA	SW	NA	HNU=0 ppm αβ=40 cpm
153	1645	17		Dense 2.5Y(5/4) light olive brown			HNU=0ppm
154	10/17/92	15 5	3	med grained sand w/ crse gravel well graded, wet	SW	NA	αβ=40cpm Sample used for Sieve Analysis*
155	1115 104647 10/19/92	21 32 50/5	18	V Dense 2.5Y(5/4) light olive brown med grained gravelly sand, well graded, wet	SW	NA	HNU=0ppm αβ=40cpm
156	1340 104648 10/19/92	21 34 26	8	V. Dense 2.5Y(5/4) lt. olive brown, med gr. sand w/ coarse gravel, well graded, wet	SW	NA	HNU=0ppm αβ=40cpm
158	1405 104649 10/15/92	30 39 48	10	V. Dense 2.5Y(5/4) lt. olive brown, med. gravelly sand, ~~SAA~~, well graded, wet By 11/4/92	SW	NA	HNU=0ppm αβ=40cpm
159	1515 104650 10/19/92	50/4	5	V. Dense 2.5Y(5/4) SAA	SW	NA	HNU=0ppm αβ=40cpm
160							
161				(Drilled to 162.0)			
162							
163							
164							
165							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 38 cyclone

Driller: Chris Coulter

Daval Holmes

* Sieve Analysis Sample # 104651 from 158.0-160.0 ft

SAA = Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

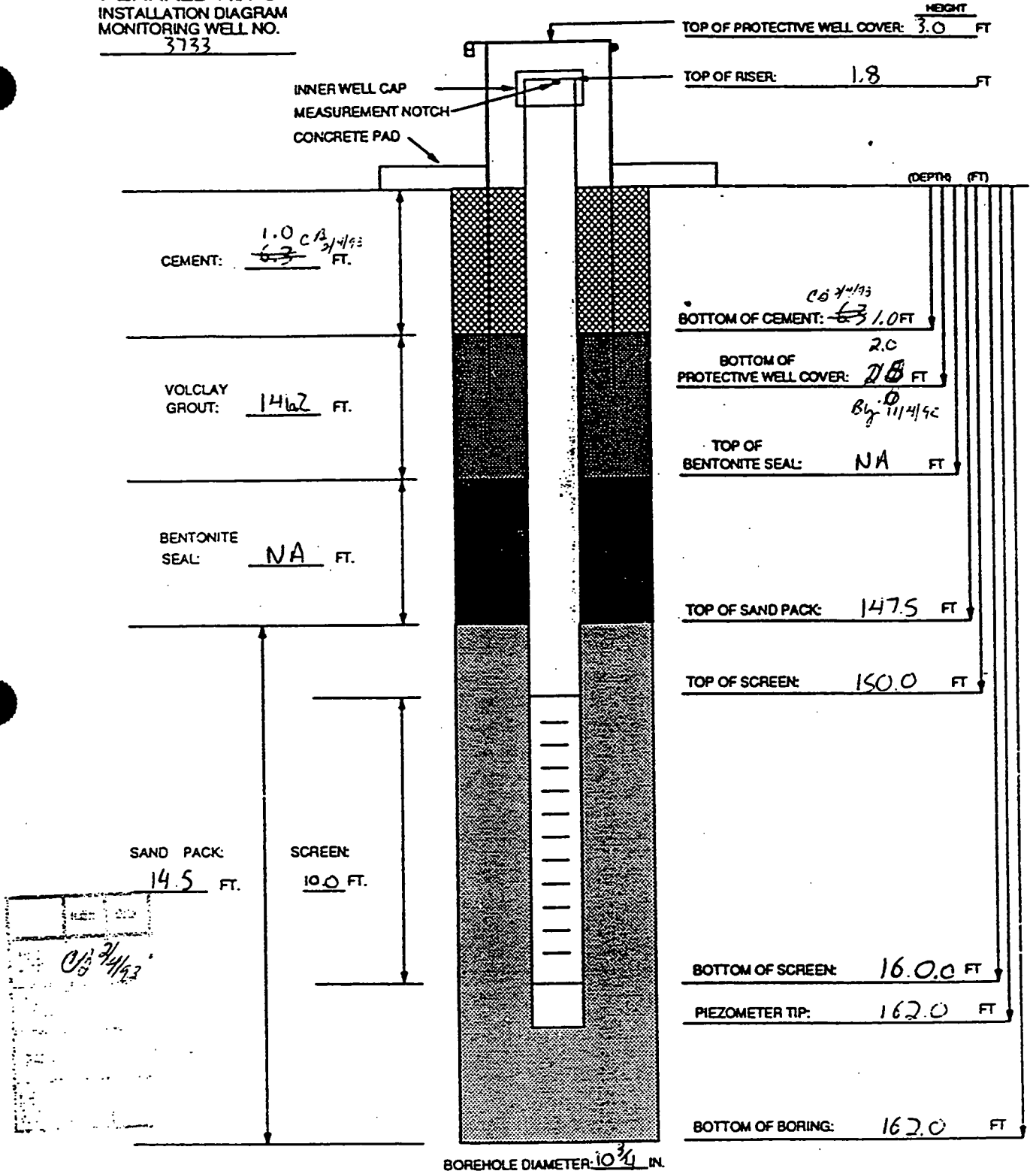
Colors identified using Munsell Color Chart

12 GS 13

5711

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3733

INSTALLATION DATE: 10/28/92



TOP OF PROTECTIVE WELL COVER: HEIGHT 3.0 FT

TOP OF RISER: 1.8 FT

CB 3/4/93

MATERIALS USED

SAND TYPE AND QUANTITY: 8 50lb bags of coarse
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 50 50lb bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1750 gal
OTHER: 26 barrels of soil 1 barrels water
TASK: 602 04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 20.5 FT. 10/29/92
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yearsley

ASI FORM 0157 REV. (0)

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I FIELD ENG./GEO. Brian Yearsley DATE 11/3/92
PROJECT NO. 602 04.27 CHECKED BY [illegible] DATE 2/4/93
BORING NO. 04 ~~2430~~ ~~2430~~ 3733
PIEZOMETER NO. ~~2430~~ ~~2430~~ 3733 DATE OF INSTALLATION 10/28/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 TO ~~162.0~~ 87.0 BY 11/4/92
FLUID NA FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.75 in ID FROM 0.0 TO 162.0 ft
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 in
TOTAL PERFORATED AREA 10.0 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 10.0 ft., 2 ft.
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in

OTHER PROTECTION Hinged locking cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ( )	
TOP OF RISER PIPE	1.8			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.0			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM ~~6.3~~ 1.0 By 11/4/92		
Volcky Cement GROUT / ~~SLURRY~~ By 11/3/92	TOP ~~6.3~~ 1.0 By 11/4/92	BOTTOM 147.5	TOP	BOTTOM
BENTONITE - NA	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 147.5	BOTTOM 162.0	TOP	BOTTOM
GRAVEL - N/A	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 150.0	BOTTOM 160.0	TOP	BOTTOM
PIEZOMETER TIP	162.0			
BOTTOM OF BOREHOLE	162.0			
GWL AFTER INSTALLATION	86.5 (from ground surface)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

MW - 3133

MATERIAL: _____ SAMPLE NUMBER: 921020 5781

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 147.5

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	44.96	30.5	30.5	78.7
20	27.35	18.5	49.0	33.5
40	30.82	20.9	69.9	16.7
60	17.94	12.2	82.1	9.8
100	10.95	7.4	89.5	5.9
200	8.03	5.4	94.9	3.0
Pan	6.62	4.5	99.4	

$$\frac{W_2 \times 100\%}{W_1} = R \qquad \left| \frac{\text{Original} - \text{Duplicate}}{\text{Average}} \right| \times 100\% = \text{RPD}$$

Analyzed by:	Checked by:	Date analyzed:

GRAIN SIZE 40% RETAINED 48 .001 inch

50% 32

90% 5

MW 3733

Methodology for sand pack and sieve determ
(from R. Scheper paper)

① WEMCO grain size
40% = .048 in
50% = .032 in
90% = .005 in

② 40% 90% Ratio (uniformity coefficient)
= 9.6 > 3 ∴ use 4 factor

③ 50% value × 4
.032 × 4 = 0.128

④ Look at distrabution curves. 0.128 falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in) screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE 1-8-92
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 1 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1-8-92 800 100841	2	6	FIRM (10YR 3/2) VERY DARK grayish BROWN (Silty clay, moist, Low plastic ity, with Root Lets.	CI	1.75	Trip field Blank 100842
	1-8-92 800 100843	4	6	HARD (10YR 2/2) VERY DARK BROWN, silty clay with Root Lets, Low Plasticity, moist.	CI	2.5	HNU = Ø PPM βγ = Ø above Background
1		6	0	No RECOVERY	NA	NA	
		7	0	No Recovery	NA	NA	
2	1-8-92 810 100843	4	6	HARD (10YR 3/2) VERY DARK grayish BROWN, silty clay slightly Moist Low Plasticity.	CI	2.75	HNU = Ø PPM βγ = Ø above Background
		7	6	A/A.	CI	2.75	

NOTES: R.S.= Rad Screen A/A= As Above.

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Instrument	Seriel #	Background
HNU Meter	711111	- Ø
βγ Meter	85665	40-60
α Meter	NO METER IN OFFICE	

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 2 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	0	NO RECOVERY	NA	NA	
		6	0	NO RECOVERY	NA	NA	
4	820 100844 RS. 100847	10	6	HARD (10YR 4/4) dark yellowish Brown, Silty clay, Low Plasticity, moist.	CI	2.5	HNU = Ø ppm βγ = Ø cpm above Background.
	100845 RS 100848	9	6	A/A	CI	2.75	
5			~~18~~ 1-14-92				
	100846 R.S 100849	9	6	A/A.	CI	2.25	
		6	0	NO RECOVERY	NA	NA	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

er: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO METER	IN OFFICE.

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 3 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (1-14-92)
6	1-8-92 830 100850	13	6	FIRM (10YR 4/3) DARK BROWN, Silty clay (with some Very fine Sand) Low plasticity, Slightly Moist.	Cl	1.5	HNU = Ø ppm BG = Ø cpm above Background.
		9	6	A/A	Cl	1.25	
7		9	6	A/A	Cl	2.0	
		6	0	NO RECOVERY	NA	NA	
8	1-8-92 900 100851	Shelby Tube	12	VERY HARD (10YR 5/4) yellowish Brn. Silty clay with gravel, Slightly moist, No plasticity.	Cl	4.5	HNU = Ø ppm BG = Ø cpm above Background. Sample was archived due to low recovery.
9				AUGER to 10' to By Pass Rock.			
10							

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

John Strapzzon

Kevin Myers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BG Meter	85665	40-60
α Meter	NO METER	IN OFFICE

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 4 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 Inches	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BGM 1-14-92)
10	1-8-92 945 100852	Shelby tube	12	VERY HARD (10YR 4/4) Dark yellowish Brown, Silty Clay with Traces of gravel, Low Plasticity, Slightly Moist.	Cl	4.5	HNU = Ø PPM BY = Ø CPM above Background Due to low recovery - Archive sample
12	1-8-92 955 100853	23	6	A/A	Cl	4.5	HNU = Ø PPM BY = Ø cpm above Background
		19	6	VERY HARD (10YR (4/4) Dark yellowish Brown modled with gray Silty Clay with some Sand (fine) and traces of gravel, Low Plasticity, Slightly moist.	Cl	4.5	END of weathering ZONE
13	1-8-92 955 100854	34	6	VERY HARD (5Y 4/1) Dark gray, silty Clay with Traces of Sand & gravel Low plasticity, Slightly moist.	Cl	4.5	
		29	6	A/A	Cl	4.5	
14	1-8-92 1100 ~~100855~~ 100859	5	6	HARD (5Y 4/1) DARK gray, silty Clay with Traces of Sand & gravel, Low plasticity, slightly moist	Cl	3.5	Total V sample Change Sample No. to 100859 + RS.

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon
Kevin Myers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
α Meter	NO METERS	IN OFFICE

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 5 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	1-8-92 1100 ~~100859~~ 100859	9 Total V/gamma spec.	5	A/A	CI	2.25	HNU = Ø ppm Bγ = Ø cpm above Back ground
		12	~~14~~ 1-14-92 1-0	No Recovery	NA	NA	
		14	0	No Recovery	NA	NA	
16	1-8-92 1115 100854	23	6	Very hard (5Y 4/1) Dark gray, silty clay with traces of sand & gravel, low plasticity, slightly moist.	CI	4.5	HNU = Ø ppm Bγ = Ø cpm above Back ground
		47	6 ~~24~~ 1-14-92	A/A	CI	4.5	
17		34	6	A/A	CI	4.5	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
α Meter	NO METER IN OFFICE	

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 6 OF ~~9~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BYA 1-14-92)
	1-8-92 1115 100854	29	6	A/A.	CI	4.5	
18	1-8-92 1130 100855 RS 100857	39	6	HARD (5Y 4/1) Dark gray, Silty Clay with Traces of Sand & gravel, Low plasticity, Slightly moist.	CI	3.5	HNU = Ø ppm BY = Ø cpm above Background
	1-8-92 1130 100856 RS 100858	45	6 (~~12~~ 14)	VERY HARD (5Y 4/1) Dark gray, Silty Clay with Sand & gravel, no Plasticity, Slightly moist.	CI	4.5	
19		50	0	NO RECOVERY	NA	NA	HAD Refusal on the split spoon Cobble stuck at the END of the split spoon.
		Split Spoon Refusal NA	0	Refusal of split spoon- NO RECOVERY	NA	NA	Total U sample # 100859 at 14-16ft
20	1-9-92 1500 100860	17	6	VERY Soft (5Y 4/1) Dary gray, Clayey Sand with TRACES Of gravel VERY MOIST. NO Plasticity.	SC	1-14-92 BYA ~~1.5~~ 2.5	HNU = Ø ppm BY = Ø cpm above Back GROUND Strap hole found, 6" Water in hole.

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
α Meter	NO METER IN OFFICE	

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)		
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992	
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992	
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992	
DRILLING METHODS: AUGER		PAGE 7 OF ~~8~~ 10	

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1-8-92 1500 10086	11	6 ~~12~~ 1-14-92	FIRM (5Y 4/1) Dark gray, silty Clay with some sand & gravel very moist, medium plasticity	Cl	~~.25~~ 1.5	
21		10	0	NO RECOVERY	NA	NA	
		6	0	No RECOVERY	NA	NA	
22	1-8-92 1525 10086	13	6	HARD (A/A)	Cl	2.5	HNU = Ø ppm Bγ = Ø cpm above Background
		15	~~24~~ 1-14-92 6	FIRM (A/A)	Cl	1.75	
23		19	6	A/A	Cl	.75	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	- Ø
Bγ Meter	85665	40-60
α Meter	No meter	w office

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1734	COORDINATES:	DATE JAN 08 1992
ELEVATION: Est. 590'0	GWL: Depth Date/Time	DATE STARTED: JAN 08 1992
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: JAN 08 1992
DRILLING METHODS: AUGER		PAGE 8 OF ~~8~~ 10

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 Inches)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JGA 1-14-92)
		16	6	A/A	CI	1.0	
24	1-8-92 1532 100861	5	6	VERY Soft (5Y 4/1) ~~Silty~~ Dark gray Silty Clay with some sand & gravel, wet to very moist, medium plasticity.	CI	.25	HNU = Ø PPM BY = Ø cpm above Back ground.
		6	~~12~~ 6	A/A.	CI	.25	water & sludge was send to Lab. Sample # 100862
25		5	~~N~~ 0	No Recovery	NA	NA	auger Rod had a water mark 8' up, water was Running out of spoon
		7	0	No Recovery	NA	NA	Stop boring because of perched water. Sending water and Soil to Lab Sample # 100862 + Rad Screen.
				Bottom of Boring 26.0 FT			
26				Composite Drum Sample Total U Total Th. R&I Lab sample # 100863 WEMCO Lab sample # 100864			Boring was halted due to hitting perched groundwater. at ≈ 20.0 FT

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Myers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

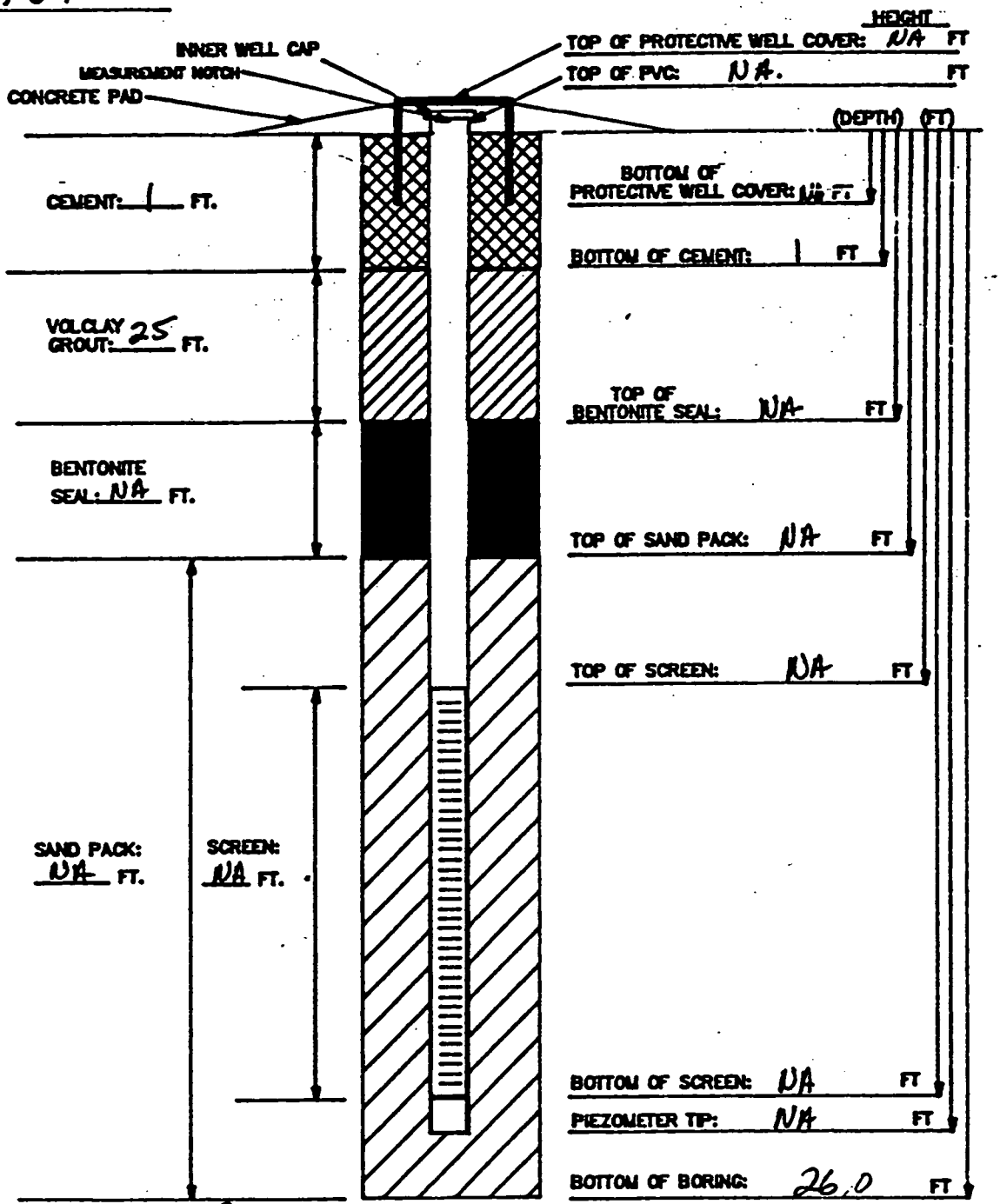
Instrument	Seriel #	Background
HNU Meter	711111	Ø
BY Meter	85665	40-60
α Meter	no meter in office	

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1734

INSTALLATION DATE: 1-8-92



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1.5 sks
AMOUNT OF CEMENT: 1.5 sks
AMOUNT OF WATER USED: 40 gals
OTHER: NA.

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22

GEOLOGIST/ENGINEER: Glen E Marshall

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. JE Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY C Grube DATE 01/23/92
BORING NO. 1734
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger Bit.
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0'			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 26	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	26			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1.0' of cement from 0.0 to 1.0'

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF	
BORING NUMBER: 1735	COORDINATES:	DATE: 1/8/92
ELEVATION: 594 ft.	GWL: Depth Date/Time	DATE STARTED: 1/8/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/8/92
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 7

DSO 1/21/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		2	6	Very stiff. 10YR (3/3) Dark brown. Silty clay. Low plasticity, moist	cl	2.0	Hand Auger 6" Sample 101372 Trip blank 101373 (0930) 1/7/92
	101374 101375 (0805) 1/8/92	4	6	Very stiff. 10YR (3/3) Dark brown. Silty clay. Low plasticity. Moist.	cl	2.5	HNU=0 ppm BX=0 cpm
1		7	0	No Recovery	NA	NA	
		8	0	No Recovery	NA	NA	
2		4	6	Very stiff. 10YR (3/3) Dark brown silty clay. Low plasticity, moist.	cl	2.25	HNU=0 ppm BX=0 cpm
		8	6	SAA	cl	3.25	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Don Jamison

Background
HNU=0 ppm
BX=40 cpm
Background has been subtracted out.

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		DATE 1/8/92
BORING NUMBER: 1735	COORDINATES:		DATE STARTED: 1/8/92
ELEVATION: 594ft	GWL: Depth	Date/Time	DATE COMPLETED: 1/8/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 2 OF 5
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3		10	4	Very stiff. 10YR(3/3) Dark brown silty clay. Low plasticity moist	cl	2.25	
		12	0	No Recovery	NA	NA	
4	101516 RAD 101517 (0815) 11[illegible]	4	6	Hard. 10YR(3/3) Dark brown. Silty clay. Low plasticity, moist	cl	4.0	HNU=0ppm RX=0cpm
	101518 RAD 101519 (0815) 11[illegible]	8	6	SAA, Very stiff.	cl	2.75	
5		10	0	No Recovery.	NA	NA	
		11	0	No Recovery.	NA	NA	
6							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF		DATE 1/8/92
BORING NUMBER: 1735	COORDINATES:		DATE STARTED: 1/8/92
ELEVATION: 594 ft	GWL: Depth	Date/Time	DATE COMPLETED: 1/8/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 3 OF 5
DRILLING METHODS: Hollow Stem Auger			

DOD 1/21/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	101380 (0835) 1/8/92	6	6	Stiff. 10YR (4/6) Dark yellowish brown mottled with gray silty clay low plasticity moist.	Cl	1.75	HNU = 0ppm BX = 0cpm
		8	6	Very stiff, SAA	Cl	2.0	
7		9	6	SAA	Cl	2.25	
		11	0	No Recovery	NA	NA	
8	101381 101382 (0900) 1/8/92	Shelby	33	Stiff. 10YR (5/6) Yellowish brown. Silty clay. Low plasticity, very wet	Cl	1.25	HNU = 0ppm BX = 0cpm Shelby Pushed from 8.0 - 11.0 FT
9							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EU MF		
BORING NUMBER: 1735	COORDINATES:	DATE 1/8/92	
ELEVATION: 594 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/8/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 5 7	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9		Shelby Tube					DSO 1/21/92
10							
RAD	101383 (0900) 1/8/92						
11	101384 101385 (0915) 1/8/92	3	6	Very soft. 10YR(5/4) yellowish brown, clayey sand. Very wet	DSO 1/21/92 ~~CL~~ SC	~~2.25~~ NA	HNU=0ppm RS=0cpm
		5	6	SAA	DSO 1/21/92 SC ~~CL~~	NA ~~1.25~~	
12							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller: Clay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 1735	COORDINATES:	DATE 1/8/92	
ELEVATION: 594 ft	GWL: Depth Date/Time	DATE STARTED: 1/8/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/8/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 57	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12		7	6	Very soft. 10YR (5/4) Yellowish brown clayey sand. Very wet.	DSO 1/28/92 ~~CL~~ SC	~~<.25~~ NA	DSO 1/21/92
		11	6	SAA	DSO 1/28/92 ~~CL~~ SC	~~<.25~~ NA	
13				Bottom of Boring 13.0 FT			Hit perched water zone abandoned hole
14							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner

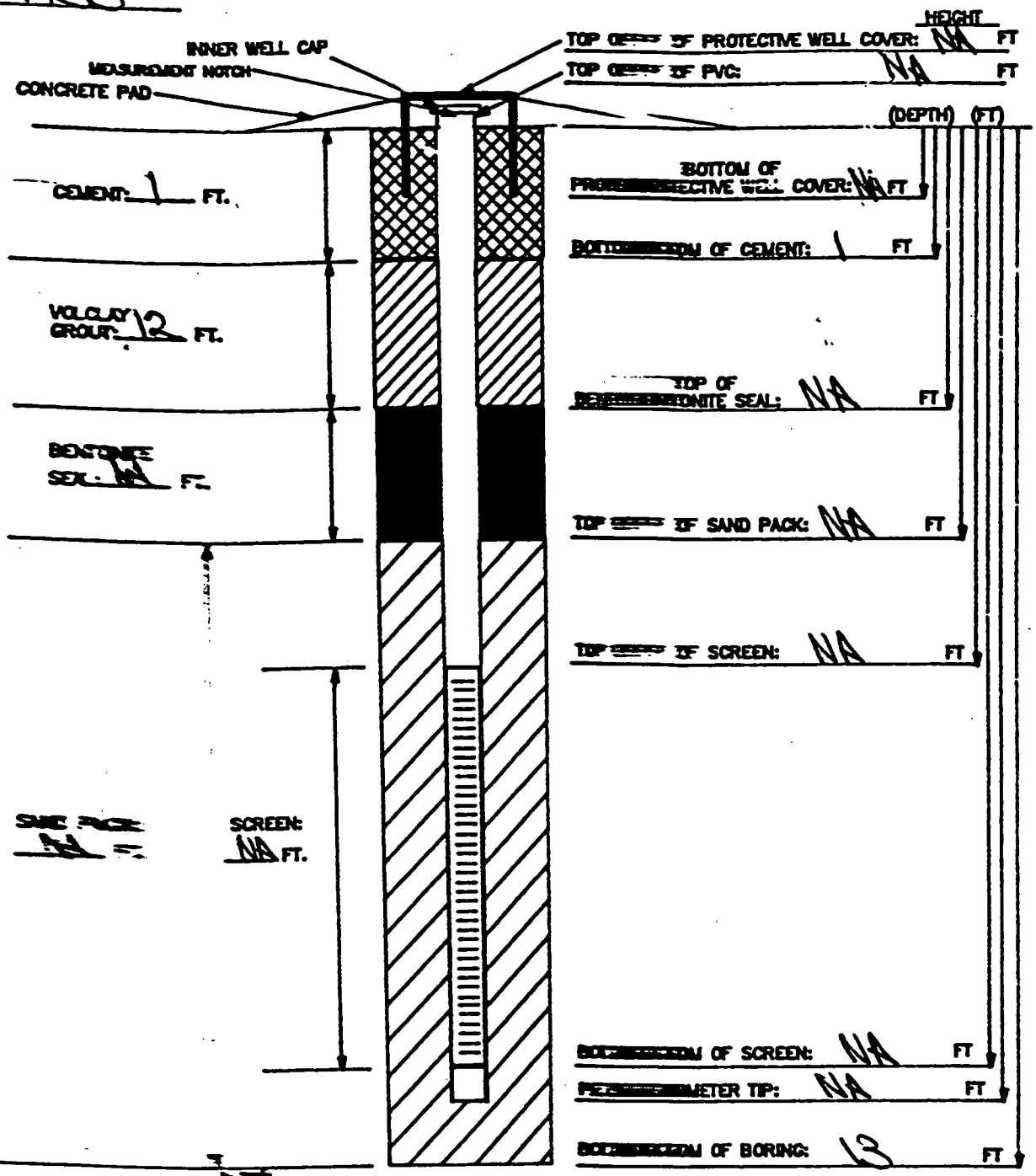
Don Jamison

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1735

INSTALLATION DATE: 1/8/92



BORING DIAMETER: 4.75 INCHES

MATERIALS USED:
TYPE AND BRAND OF BENTONITE PELLETS: [illegible] BUCKETS):
AMOUNT OF VOLCLAY GROUT: [illegible]
AMOUNT OF CEMENT GROUT: [illegible]
AMOUNT OF WATER USED: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED COUPLINGS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS EQUIPPED WITH AN END CAP OR THREADED PLUG.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

7017 5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FWMF FIELD ENG./GEO. D. O'Brien DATE 1/8/92
PROJECT NO. 9602-3.22 CHECKED BY C. Grube DATE 01/16/92
BORING NO. 1735
PIEZOMETER NO. NA DATE OF INSTALLATION 1/8/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 13.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: ~~1936~~ DEN 1736	COORDINATES: N 483,334 E 1,381,000	DATE 1-5-92
ELEVATION: Est. 605.0'	GWL: Depth Date/Time	DATE STARTED: 1-5-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-5-92
DRILLING METHODS: AUGER		PAGE 1 OF ~~7~~ 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100820 0845 1-5-92	2	6	FIRM (10YR 5/2) VERY DARK grayish BROWN, Silty clay, No plasticity, moist, Some Rootlets.	Cl	.75	TRIP/field Blank Sample # 100821 HNU = Ø ppm βγ = Ø cpm above Background
	100822 0845 1-5-92	2	6	HARD (10YR 3/4) DARK yellowish Brown Silty Clay, Low plasticity, Slightly moist.	Cl	2.25	
1		6	~~18~~ DEN 1-14-92 6	HARD (10YR 3/4) A/A	Cl	2.5	
		8	0	No Recovery	NA	NA	
2	100822 0900 1-5-92	7	6	A/A	Cl	2.5	HNU = Ø ppm βγ = Ø cpm above Background
		7	~~18~~ DEN 1-14-92 6	A/A	Cl	2.5	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon
Kevin Meyers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO METER IN OFFICE	

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: ~~1936~~ #49/736	COORDINATES: N 483,334 E 1,381,000	DATE: 1-5-92
ELEVATION: Est. 605.0'	GWL: Depth Date/Time	DATE STARTED: 1-5-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-5-92
DRILLING METHODS: AUGER		PAGE 2 OF ~~4~~ 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	900 100822 1-5-92	10	6	Soft (10YR 5/4) yellowish Brown silty clay, with some gravel & sand, Low Plasticity, slightly moist	Cl	.5	HNU = ∅ ppm Bγ = ∅ cpm above Background
		12	0	NO RECOVERY	NA	NA	
4	100823 930 RS 100827	15	6	Soft (10YR 5/4) yellowish Brown silty clay, Low plasticity, slightly moist.	Cl	.5	HNU = ∅ ppm Bγ = ∅ cpm above Background
	100824 RS 100828	15	6	A/A (HARD)	Cl	2.0	
5	100825 RS 100829	13	6	Firm (10YR 5/4) yellowish Brown, Sandy Clay, Low plasticity, slightly moist.	Cl	1.0	
	100826 RS 100830	16	3	VERY HARD (10YR 5/4) yellowish Brown Silty Clay with Traces of Sand and gravel, Low Plasticity, Slightly moist.	Cl	>4.5 ~~>4.5~~	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Meyers

Sample Tech. Vern Larger

Samples collected per ASTM

Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	6
Bγ Meter	85665	40-60
α Meter	NO METERS IN OFFICE	

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: ~~1936~~ 1736	COORDINATES: N 483,334 E 1,381,000	DATE 1-5-92
ELEVATION: Est. 605.0'	GWL: Depth Date/Time	DATE STARTED: 1-5-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-5-92
DRILLING METHODS: AUGER		PAGE 3 OF ~~4~~ 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	100831 1000 100832	17	6	VERY Soft (10YR 4/4) Dark yellowish Brown, clayey sand, no plasticity (sand very fine). wet.	ML	<.25 ~~.25~~ @1/22/92	HNU = Ø PPM βγ = Ø cpm above Background
				VERY HARD (10YR 5/4) yellowish Brown silty clay with Traces of sand & gravel, Low Plasticity, Slightly moist.	CL	@01/22/92 ~~>4.5~~ >4.5	
	1000 100832 1-5-92	23	6	A/A		@01/22/92 ~~>4.5~~ >4.5	
7	1000 100833 1-5-92	30	~~24~~ 1-14-92 6	HARD (10YR 5/4) yellowish Brown, Sandy clay, with Traces of gravel, No Plasticity, moist	CL	2.75	
	1000 100834 1-5-92	33	6	VERY HARD (10YR 5/4) yellowish Brown silty clay with Traces of sand & gravel Low Plasticity. Slightly moist.	CL	@01/22/92 ~~>4.5~~	END of weathering zone.
				VERY HARD (5Y 5/1) gray, silty clay, with Traces of gravel. No Plasticity, DRY.	CL	>4.5	
8 9	~~100~~ 1-5-92 100835	Shelby tube	6 ~~18~~	VERY HARD (5Y 5/1) gray, silty clay with Some gravel, No Plasticity DRY	CL	>4.5 @01/22/92 ~~>4.5~~	HNU = Ø PPM βγ = Ø cpm above Background. Hit Cobble at END of Tube. Remove sample from tube. Archive in 500ml JAR.
	~~RS 100830 & 100837 (Bottom)~~ RSm 1-5-92						
10				No Sample taken			AUGER DOWN to 10 feet To By pass Limestone cobble.
10.5	100836 1115 1-5-92	11	6	VERY HARD (5Y 5/1) gray, silty clay with some gravel, No Plasticity, DRY	CL	>4.5 ~~>4.5~~ @1/22/92	HNU = Ø PPM βγ = Ø cpm above Background

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Tier: John Strapzzon

Kevin Meyers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO METERS	in office

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: ~~1936~~ 1736	COORDINATES: N 483,334 E 1,381,000	DATE 1-5-92
ELEVATION: Est. 605.0'	GWL: Depth Date/Time	DATE STARTED: 1-5-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-5-92
DRILLING METHODS: AUGER		PAGE 4 OF 7

DEPTH 14.1 10.5	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS DER 1-14-92
	1115 1-5-92	15	6	(5Y 4/1) Dark gray Limestone Cobbles	NA	NA	HNU = Ø ppm βγ = Ø cpm above Background
11	1115 1-5-92 100837	21	~~18~~ 1-14-92 6	MEDIUM DENSE ~~VERY SOFT~~ (5Y 5/1) gray, clayey gravelly Sand, wet.	GC	NA ~~3.5~~ (B) 01-22-92	
		24	0	No Recovery	NA	NA	
12	100837 1330 1-5-92	9	6	LOOSE (5Y 5/1) gray, clayey gravelly sand, wet	GC	NA	HNU = Ø ppm βγ = Ø cpm above Back ground
	100837 1330 1-5-92	13	~~24~~ 1-14-92 6	MEDIUM DENSE (5Y 5/1) gray, clayey gravelly sand, wet	GC	NA	
13	100838 1330 1-5-92	14	6	HARD (5Y 4/1) Dark gray silty clay with some gravel, No plasticity, Slightly moist	CI	3.5	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon
Kevin Meyers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	no meters in office	

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: ~~1936~~ BEM 1736	COORDINATES: N 483,334 E 1,381,000	DATE 1-5-92
ELEVATION: Est. 605.0'	GWL: Depth Date/Time	DATE STARTED: 1-5-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-5-92
DRILLING METHODS: AUGER		PAGE 3 OF ~~4~~ 7

DEPTH 14 ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (PKA 1-14-92)
	100838 1330 1-5-92	17	6	VERY HARD (5Y 4/1) Dark gray, silty Clay w/some gravel, No Plasticity Slightly moist.	CL	4.5	
14	100839 1408 Full Rec	14	6	MEDIUM DENSE (5Y 5/1) gray, clayey gravelly Sand, wet	GC	NA	HNU = Ø ppm βγ = Ø cpm above Background
		19	6	A/A	GC	NA	Stop boring; perched water encountered ~~Stop boring at 14ft~~ Perched water 11ft Encountered at ~~14ft~~
15	100840 1408 1-5-92	25	6	HARD (5Y 4/1) Dark gray, ~~Eta Bem~~ Silty Clay with some gravel, No plasticity, slightly moist.	CL	3.5	
		17	0	NO RECOVERY	NA	NA	
16				Bottom of sampling 16.0 FT			Plug Hole used 1½ of Volclay grout & 30 gals of water.

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: John Strapzzon

Kevin Meyers

Sample Tech. Vern Larger

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60
α Meter	NO METER	IN OFFICE

Samples collected per ASTM Colors identified using Munsell Color Chart

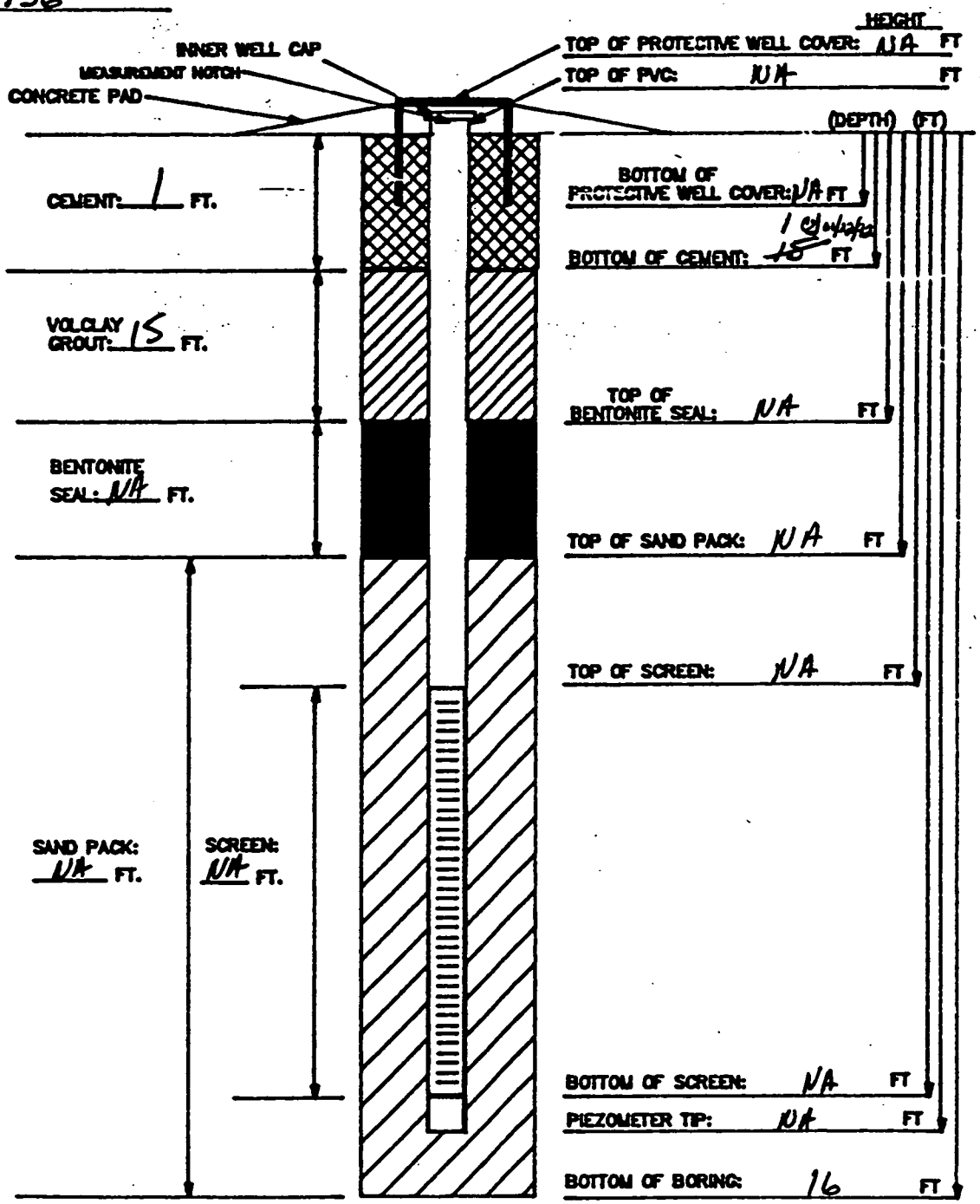
402-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1736

INSTALLATION DATE: 1-5-92



BOREHOLE DIAMETER: _____ INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 1/2 Bag
AMOUNT OF CEMENT: 1/2 Bag
AMOUNT OF WATER USED: 30 gals
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: AE Marshall

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. JE Marshall DATE 1-14-9[illegible]
PROJECT NO. 9602.3.22 CHECKED BY C. Grube DATE 01/22/92
BORING NO. 1736
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD AUGER	TYPE OF BIT AUGER BIT.
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 16	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	16			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1' of cement from 0.0 to 1.0

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EW MF		
BORING NUMBER: 1737	COORDINATES:	DATE 1/6/92	
ELEVATION: 606.54	GWL: Depth Date/Time	DATE STARTED 1/6/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/6/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 37	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	6	Disregard 1st 6". Used as hand auger sample Very stiff. 10YR(3/6) Dark yellowish brown. Silty clay, low plasticity moist	~~NA~~ CL	~~NA~~ 2.5	6" Hand Auger Sample 101358 (1120) 101359 trip blank HNu=0ppm BG=0cpm
	101360 (1440)	7	6	Very stiff. 10YR(3/6) Dark yellowish brown. Silty clay. ~~low~~ low plasticity moist	CL	2.5	
1		9	0	No Recovery	NA	NA	
		11	0	No Recovery	NA	NA	
2	101361 (1445)	3	6	Soft. 10YR(3/8) Yellowish brown. Silty ~~sandy~~ clay. Low plasticity. Moist	CL	.5	HNu=0ppm BG=0cpm
		4	2	Soft 10YR(3/8) Yellowish brown. Sandy clay. Low plasticity. Very moist	CL	.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner

Don Jamison

Background: HNu=0ppm BG=40cpm

Background subtracted out

SAA-same as above

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF		
BORING NUMBER: 1737	COORDINATES:	DATE: 1/6/92	
ELEVATION: 1086.5 ft	GWL: Depth Date/Time	DATE STARTED: 1/6/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/6/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 7	

DSO 2/3/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	0	No Recovery.	NA	NA	
		9	0	No Recovery.	NA	NA	
4	101362 101363 (1455)	3	6	Stiff. 10YR (5/8) Yellowish brown. Silty clay. No plasticity, moist	cl	1.25	HNU=0 ppm BX=0 cpm
	101364 101365 (1455)	4	6	Medium Stiff SAA	cl	.75	
5	101366 101367 (1455)	6	6	SAA	cl	1.0	
		8	0	No Recovery	NA	NA	

SAA - Same as above

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Don Jamison

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF	
BORING NUMBER: 1737	COORDINATES:	DATE 1/6/92
ELEVATION: 606.5 ft	GWL: Depth Date/Time	DATE STARTED: 1/6/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/6/92
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 57

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1012345 (1500) (Rad 0.150)	2	6	Soft. 10YR (5/8) Yellowish brown. Silty sandy clay, Low plasticity very moist	Cl	.25	HNu = 0 ppm BX = 0 cpm
		7	6	Very soft. 10YR (5/8) Yellowish brown. Silty sandy clay Low plasticity. wet	Cl	<.25	
7		7	6	SAA, soft	Cl	.25	
		11	6	SAA	Cl	.25	
8		7	6	SAA, very soft	Cl	<.25	HNu = 0 ppm BX = 0 cpm
		7	6	SAA, Stiff	Cl	1.75	

NOTES:

SAA - same as above

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner

Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF	DATE 1/6/92
BORING NUMBER: 1737	COORDINATES:	DATE STARTED: 1/6/92
ELEVATION: 1016.5	GWL: Depth Date/Time	DATE COMPLETED: 1/6/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	PAGE 4 OF 57
DRILLING METHODS: Hollow Stem Auger		

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101369 (1510)	11	6	SAA top 3", Very hard bottom 3" 5Y (5/1) Gray gravelly clay, low plasticity moist.	CL	~~1.0~~	DSO 2/3/92
		22	1	SAA, soft DB 2/5/92 Dense	CL	.5	DSO 2/3/92
10	101371 (1540)	1	6	~~Soft~~, 5Y (5/3) Olive. fine grained sand. Wet.	SW	NA ~~.75~~ DB 2/5/92	~~Archived~~ Full RAD of contents of Shelby Tube
		Shelby Tube	6	SAA	SW	NA ~~.5~~ DB 2/5/92	
11			4	SAA	SW	NA ~~.75~~ DB 2/5/92	
	DSO 2/3/92		0	~~SAA~~ No Recovery DB 1/6/92	NA	NA	

SAA - same as above

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombadier Mobile Drill

Elay Gardner

Dan Jamison

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1737	COORDINATES:	DATE 1/16/92	
ELEVATION: 606.54	GWL: Depth Date/Time	DATE STARTED: 1/16/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/16/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 57	

DSO 2/3/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby Tube	0	No Recovery	NA	NA	
		Shelby	0	No Recovery.	NA	NA	
13		2	6	Very soft. 5Y(5/1) Olive. Fine grained sands, wet.	SW	NA <.25 GH 2/5/92	HNU=0ppm BZ=0ppm
		4	6	SAA	SW	NA <.25 2/5/92	
14		7	0	No Recovery.	NA	NA	
		8	0	No Recovery	NA	NA	Perched water zone. Abandoned hole

NOTES:

SAA - same as above

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Logger: Elay Gardner
Don Samison

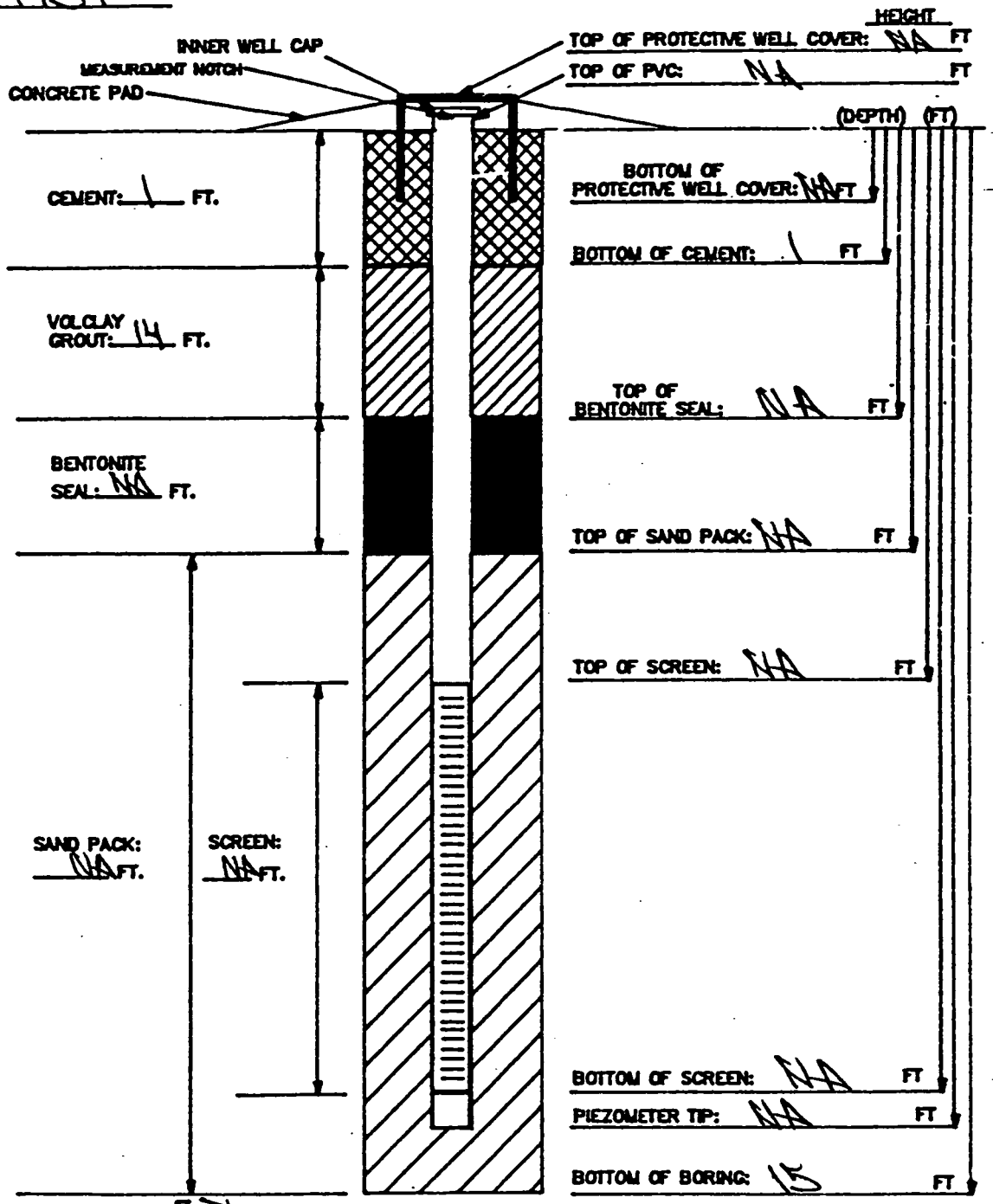
402-11-86

6047

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1737

INSTALLATION DATE: 1/6/92



BOREHOLE DIAMETER: 8 1/4 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED:
OTHER:

DSO 2/3/92

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

707

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUXX FIELD ENG./GEO. D. O'Brien DATE 1/6/92
PROJECT NO. 9602-3.22 CHECKED BY Clarke DATE 01/28/92
BORING NO. 1737
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 15.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)		DATE 1-2-92
BORING NUMBER: 1738	COORDINATES: N 483,539 E/[illegible],635		DATE STARTED: 1-2-92
ELEVATION: 616.5'	GWL: Depth	Date/Time	DATE COMPLETED: 1-4-92
ENGINEER/GEOLOGIST: G.MARSHALL	Depth	Date/Time	PAGE 1 OF 9-11
DRILLING METHODS: AUGER			

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1-2-92 100782 9:00	3	6	Stiff (10YR 3/2) Dark grayish brown Silty Clay, Low plasticity, [illegible], w Root Lets	Cl	1.5	#100783 TRIP Blank HNU Ø PPM BG Ø CPM above Back ground
	1-2-92 100784 9:30	2	6	Stiff (10YR 3/4) Dark yellowish Brown, Clay with traces of Sand, Low plasticity, Moist w Traces of Root Lets.	Cl	1.5	
1		4	18	A/A	Cl 2.0	2.0	
		5	0	No Recovery	NA	NA	
2	1-2-92 1000 100785	2	6	Stiff. (10YR 5/6) yellowish brown Sandy Clay, Low plasticity, Slightly moist.	Cl	1.75	HNU Ø PPM BG Ø CPM above. Back ground
		6	0	No Recovery	NA	NA	
3							

NOTES:

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: ~~BOBBY YOST~~ John Strapzzon

KEVIN MYERS

Sample Tech. VERN LARGER

HNU Background Ø PPM

BG Background 40-60 CPM

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	DATE 1-2-92
BORING NUMBER: 1738	COORDINATES: N 483,539 E 1,382,635	DATE STARTED: 1-2-92
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE COMPLETED: 1-4-92
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	PAGE 2 OF 9/11
DRILLING METHODS: AUGER		

DEPTH 4	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS BGR 1-14-92
		9	0	No Recovery	NA	NA	
		11	0	No Recovery	NA	NA	
4	1-2-92 1015 100786	13	6	Very stiff (10YR 5/4) yellowish Brown, gravelly to sandy Clay no plasticity, slightly moist.	Cl	3.0	HNU = Ø ppm BG = Ø cpm above Back ground.
	Rad SCREEN 100790						
	1-2-92 100787 1015	19	6 1-14-92 BGR 29	HARD (10YR 5/4) yellowish Brown gravelly to Sandy Clay, No plasticity, slightly moist	cl	4.5	
5	RS 100791						
	1-2-92 100788 1015	20	6	A/A	cl	4.5	
	RS 100792						
	1-2-92 100789 1015	26	6	A/A	cl	4.5	
6	RS 100793						

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: ~~BOBBY YOST~~ John Strapzzon

KEVIN MYERS

Sample Tech. VERN LARGER

A/A = As Above

*RS = Rad SCREEN

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	DATE 1-2-92
BORING NUMBER: 1738	COORDINATES: N 483,539 E 1,392,635	DATE STARTED: 1-2-92
ELEVATION: 616.51	GWL: Depth Date/Time	DATE COMPLETED: 1-4-92
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	PAGE 3 OF 8 11
DRILLING METHODS: AUGER		

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 12 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (YSR 1-14-92)
6	1-2-92 1027 100794	32	6	HARD (10YR 5/4) yellowish Brown gravelly Clay, No plasticity Slightly moist. mottled w/gray	Cl	4.5	HNU ∅ PPM Bx ∅ CPM above Back ground
	100795 1027 1-2-92 100796 1027 1-2-92	27	6	VERY LOOSE (10YR 5/4) yellowish Brown SAND (FINE - COARSE) moist	SW	NA ~~>4.5~~	CH 01/20/92
				HARD (10YR 5/4) yellowish Brown silty Clay, NO Plasticity. moist.	Cl	4.5	
7		31	6	HARD (10YR 5/4) yellowish Brown gravelly Clay, NO Plasticity Slightly moist w Limestone cobble.	Cl	4.5	Limestone cobble was at the end of spoon.
		39	0	No RECOVERY	NA	NA	
8	1-2-92 1100 100797 Archive	Shelby tube	12	HARD (10YR 5/4) yellowish Brown gravelly clay, Low Plasticity, Slightly moist w coarse gravel at the END of tube (Trace)	Cl	4.5	Could only push Shelby tube ~~from~~ down to 10.5' HNU ∅ PPM Bx ∅ CPM above Back ground
9							Archive Sample in 1000 ml Jar.
10							

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: ~~BOBBY YOST~~ John Strapazzon KEVIN MYERS

Sample Tech. VERN LARGER

402-91-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)		
BORING NUMBER: 1238	COORDINATES: N483,539 E 1,392,235	DATE 1-2-92	
ELEVATION: 616.51	GWL: Depth Date/Time	DATE STARTED: 1-2-92	
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 1-4-92	
DRILLING METHODS: AUGER		PAGE 4 OF 9 11	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BPM 1-19-92)
10.5		Shelby Tube					
	1-2-92 1300 100798	11	6	HARD (10YR 5/4) yellowish Brown Gravelly clay, Low plasticity, slightly moist w TRACE of COARSE GRAVEL.	Cl	4.5	HNU = Ø ppm Bg = Ø cpm above Background
11		15	6 (BPM 1-19-92)	A/A	Cl	4.5	*Pushed 3" split Spoon w 18" of Recovery.
		18	6	Stiff (10YR 5/4) yellowish Brown Sandy clay (Sand VERY fine) Low plasticity, moist. Lower 1" with gray clay	Cl	1.5	~~END OF WEATHERING ZONE.~~ (BPM 01/23/92)
12	1-2-92 1330 100799	RS 100800 Shelby tube	18 (18)	(10YR 5/1) gray, Clay, High plasticity moist.	Cl	NA	HNU = Ø PPM Bg = Ø CPM above Background
13							
14				Firm (10YR 5/4) yellowish Brown, Sandy Clay (sand very fine) Low Plasticity, moist			
15	RS 100801				Cl	2.0	

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: ~~BOBBY YOST~~ John Strapezon

KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1738	COORDINATES: N 483,539 E/382,685	DATE 1-4-92
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE STARTED: 1-2-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-4-92
DRILLING METHODS: AUGER		PAGE 5 OF 8/1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DCK 1-14-92)
	1-4-92 830 100802 Total U	3	6	Very soft (10YR 5/4) yellowish Brown Sandy clay (sand very fine) Low plasticity, moist.	CI	<.25 ~~<.25~~ 01/22/92	NNU = Ø PPM Bγ = Ø CPM above Background
		5	6	Firm (A/A)	CI	1.5	Archive 1-500 mL Sample #100803
16		5	6	Firm (5Y 4/1) Dark gray, clay with some sand & gravel, High plasticity, moist	CI	1.0	16.0 FT End of weathering zone
		9	6	A/A	CI	1.5	
17	1-4-92 847 100803	7 5	6	Soft (5Y 4/1) Dark gray clay with some sand & gravel, High plasticity, moist.	CI	.5	NNU = Ø PPM Bγ = Ø CPM above Background
		7	4	A/A	CI	.5	Archive sample. 1-500 mL
19							

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: ~~Bobby Yost~~ John Strapazzon

Kevin Meyers

Sample Tech. Vern Larger

Instrument	Seriel #	Background
HNU Meter	711111	Ø PPM
Bγ Meter	85665	40-60 CPM
α Meter	No meter at office	

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1738	COORDINATES: N483,539 E1,382,636	DATE 1-4-92
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE STARTED: 1-2-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-4-92
DRILLING METHODS: AUGER		PAGE 6 OF 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	0	NO RECOVERY	NA	NA	
		9	0	NO RECOVERY	NA	NA	
19	1-4-92 855 100803	7	6	VERY soft (5y 4/1) Dark gray clay with Some Sand & gravel, High Plasticity, moist.	CI	<.25 ~~.25~~ CH 01/22/92	HNU = Ø ppm βγ = Ø cpm above Background
		9	6	A/A.	CI	.5	Archive 1-500 ml sample # 100803.
20		9	0	NO RECOVERY	NA	NA	
		10	0	NO RECOVERY	NA	NA	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: ~~Bobby Yost~~ John Strapazzon

Kevin Meyers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
βγ Meter	85665	40-60 cpm
α Meter	NA	—

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)		
ORING NUMBER: 1738	COORDINATES: N 483,539 E/387,63	DATE 1-4-92	
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE STARTED: 1-2-92	
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-4-92	
DRILLING METHODS: AUGER		PAGE 7 OF 9 11	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BPM 1-14-92)
21	1-4-92 915 100804 RS 100805	3	6	VERY Soft (5Y 5/1) gray; Clay with Some Sand & gravel, High plasticity moist.	CI	.5	NNU = Ø ppm Bγ = Ø cpm above Background
		3	0		NA	NA	
22		9	0	NO RECOVERY NO RECOVERY	NA	NA	
		13	0	NO RECOVERY	NA	NA	
23	1-4-92 930 100806 RS 100807	Shelby Tube ↑	28	HARD (5Y 5/1) gray, gravelly clay with some sand, High plasticity, moist.	CI	3.25	NNU = Ø ppm Bγ = Ø cpm above Background
24							
25							
26	RS 100808						

NOTES: R.S.= Rad Screen A/A= As Above

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
R Meter	NA	—

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

iller: ~~Bobby Yost~~ BPM John Strapczon

Kevin Meyers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1738	COORDINATES: N 483,539 E 1,382,635	DATE 1-4-92
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE STARTED: 1-2-92
ENGINEER/GEOLOGIST: G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-4-92
DRILLING METHODS: AUGER		PAGE 8 OF 9 11

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
26	1-4-92 1100 100808 RS 100810	15	6	VERY Soft (5Y 4/1) Dark gray Clayey Sand (very fine sand) medium plasticity, moist.	SC	~~.25~~ <.25	HNU = Ø ppm Bγ = Ø cpm above Background.
		10	6	A/A	SC	~~.25~~ <.25	
27		12	6	A/A	SC	~~.25~~ <.25	
	1-4-92 1100 100811 Archive	7	6	very Soft (5Y 4/1) Dark gray clay w/ Some Sand (very fine) and gravel, medium plasticity moist.	Cl	.5	
28	1-4-92 1130	12	6	A/A	Cl	.5	HNU = Ø ppm Bγ = Ø cpm above Background
	1-4-92 1130 100812 RS 100815	11	6	very Soft (5Y 4/1) Dark gray, Clay w Some Sand (very fine) and gravel, medium plasticity moist.	Cl	~~.25~~ <.25	

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: ~~Bobby Yost~~ Strapczon

Kevin Meyers

Instrument	Seriel #	Background
HNU Meter	711111	Ø
Bγ Meter	85665	40-60
α Meter	NA	

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1738	COORDINATES: N 483,539 E/ 382,635	DATE 1-4-92
ELEVATION: 616.5'	GWL: Depth Date/Time	DATE STARTED: 1-2-92
ENGINEER/GEOLOGIST. G.E.Marshall	Depth Date/Time	DATE COMPLETED: 1-4-92
DRILLING METHODS: AUGER		PAGE 9 OF 9 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (NEM 1-14-92)
	1-4-92 1130 100813 RS 100816	13	6	very soft (5Y 4/1) Dark gray, Clay w/ some sand (very fine) and gravel, medium plasticity, moist.	cl	<.25 ~~.25~~ CEJ 01/22/93	HNU = Ø ppm BT = Ø cpm above background
	1-4-92 1130 100814 RS 100817	15	2	A/A	cl	<.25 ~~.25~~ CEJ 01/22/93	
30							

NOTES: R.S.= Rad Screen A/A= As Above

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: ~~Bobby Yost~~ John Strapzzon

Kevin Meyers

Sample Tech. Vern Larger

Samples collected per ASTM Colors identified using Munsell Color Chart

Instrument	Seriel #	Background
HNU Meter	711111	Ø
BT Meter	85665	40-60
α Meter	NA	

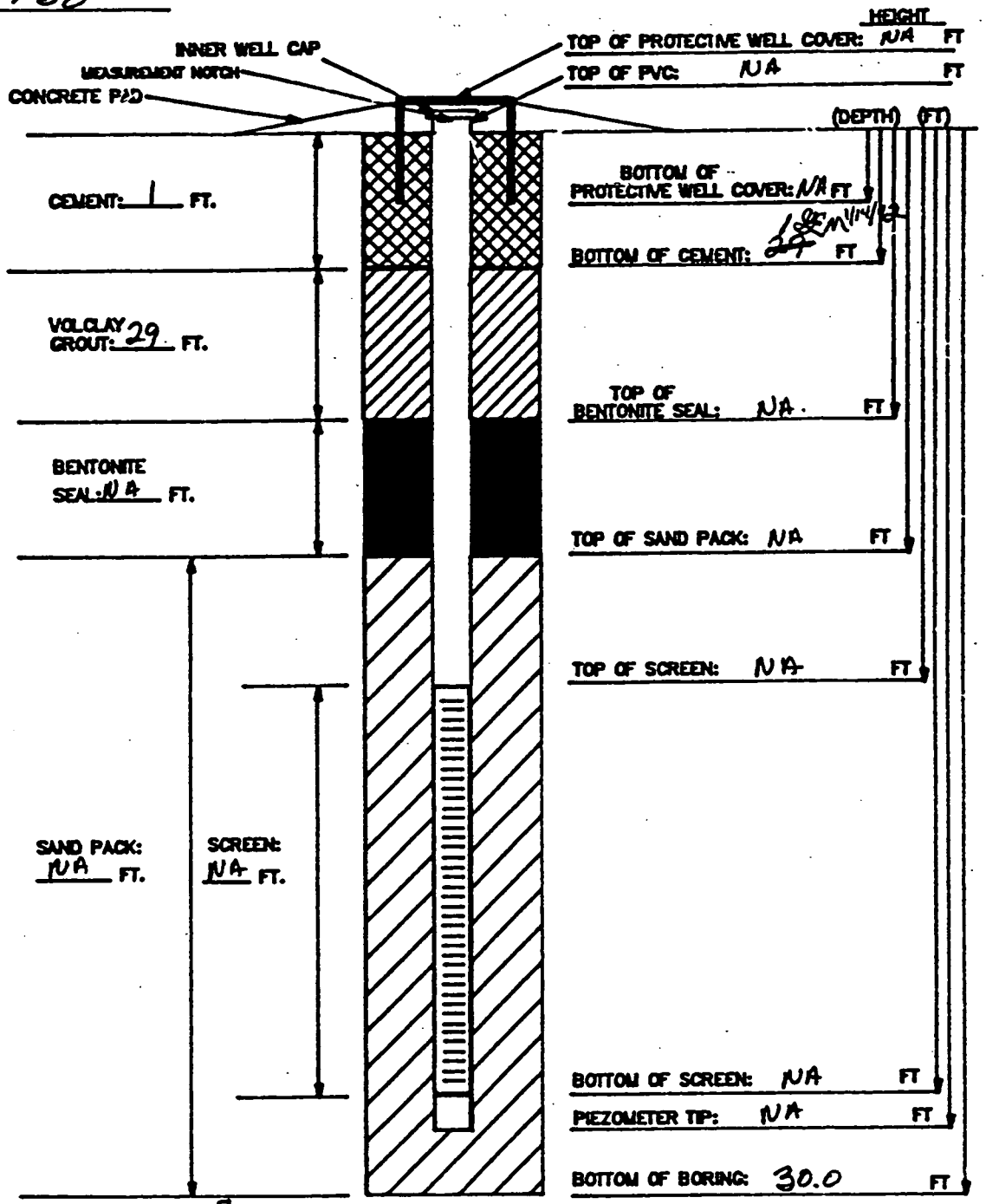
402-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1738

INSTALLATION DATE: 1-4-92



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 30 gals
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: G. Marshall

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. HE Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY _____ DATE _____
BORING NO. 1738
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger Bit.
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 30	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	30			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1.0 foot of cement from 0.0 to 1.0 ft.

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1739	COORDINATES:	DATE: 1/2/92	
ELEVATION: 617 ft	GWL: Depth / Date/Time	DATE STARTED: 1/2/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 1/4/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		2	0	No Recovery.	NA	NA	0-1" hand auger sample 101334 (0930) 101335
		6	0	No Recovery	NA	NA	
1		7	0	No Recovery	NA	NA	
	101336 (0945) 1/6/92	10	6	Very stiff. 10YR (5/4) Yellowish brown. Silty clay with sand & gravel. Low plasticity Moist.	CL	2.25	
2		7	0	No Recovery	NA	NA	HNU=0ppm BG=0cpm
		9	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner, Dan Jamison

Background HNU=0ppm BG=30cpm

Background subtracted out.

402-11-86

FE RNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EW MF		DATE 1/2/92
RING NUMBER: 1739	COORDINATES:		DATE STARTED: 1/2/92
ELEVATION: 617 ft	GWL: Depth	Date/Time	DATE COMPLETED: 1/4/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 2 OF 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	10133 (0945) 1/2/92	18	6	Very Stiff 10YR (5/4) yellowish brown mottled w/ gray. Silty clay some gravel. No plasticity Moist Slightly	CL	2.5	
		25	6	SAA	CL	2.75	
4		3	0	No Recovery	NA	NA	Rock was found in bottom of spoon.
		4	0	No Recovery	NA	NA	
5		7	0	No Recovery	NA	NA	
		9	0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
er: Elay Gardner
Dan Jamison

001601

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EU MF		
BORING NUMBER: 1739	COORDINATES:	DATE: 1/2/92	
ELEVATION: 617.77	GWL: Depth / Date/Time	DATE STARTED: 1/2/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 1/4/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	6	Very stiff. 10YR(5/4) Yellowish brown. Silty clay, w/gravel. Some plasticity, MOIST	CL	2.5	HNU = 0ppm RX = 0cpm
101"	101335 1015 1/2/92	8	6	Stiff. 5Y(5/1) Very dark gray. Clay. Medium plasticity, MOIST	CL	1.5	
7		10	6	SAA, Very Stiff.	CL	2.5	
		13	6	Stiff. 5Y(5/1) Gray. Clay with gravel. Low plasticity, MOIST	CL	2.0	
8 RAD	101339 101340 1030 1/2/92	8	6	SAA	CL	2.0	HNU = 0ppm RX = 0cpm
RAD	101341 101342 1030 1/2/92	10	6	SAA	CL	2.0	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Clay Gardner, Dan Jamison

SAA = Same As Above

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
RING NUMBER: 1739	COORDINATES:	DATE 1/2/92	
ELEVATION: 617 ft	GWL: Depth Date/Time	DATE STARTED: 1/2/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/4/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
RAD	10:00 10:37 11:00 12:00	11	6	Stiff, Dy (5/1) Gray clay with gravel. Low plasticity moist	CL	2.5	
		13	0	No Recovery	~~CL~~ NA	~~1.5~~ NA	
10			0	No Recovery	NA	NA	Augured down to 12' after crushing shelby
			0	No Recovery	NA	NA	
11			0	No Recovery	NA	NA	
			0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
er: Clay Gardner
Dan Jamison

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF	
BORING NUMBER: 1739	COORDINATES:	DATE: 1/4/92
ELEVATION: 617 ft.	GWL: Depth Date/Time	DATE STARTED: 1/2/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/4/92
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 10

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
			0	No Recovery			Pushed Shelby at 12', crushed the tube at 13'
			0	No Recovery			
13	10 (1345) (1330) 9 (1320) 1/4/92	17	6	Very stiff. 5Y (5/1) Gray mottled w/ yellowish brown 10YR 5/4 Gravelly clay, 1/2" zone of sand. Low plasticity wet.	CL	2.5	HNU=0ppm BZ=0cpm
		13	2	Very stiff. SAA	CL	2.25	
14		15	0	No Recovery	NA	NA	
		20	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller: Elay Gardner
Dan Jamison

402-12-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		DATE 1/4/92
BORING NUMBER: 1739	COORDINATES:		DATE STARTED: 1/2/92
ELEVATION: 617 ft.	GWL: Depth	Date/Time	DATE COMPLETED: 1/4/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 6 OF 10
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	10846 (1355) 1/4/92	4	6	Stiff. 5Y (5/1) Gray. mottled w/ yellowish brown. Gravelly clay. Low plasticity wet.	CI	1.5	HNU=0ppm BZ=0ppm
		4	6	Very Stiff. SAA	CI	2.0	
16		8	6	SAA	CI	2.75	
		10	4	SAA	CI	3.25	
17	10848 (1410) 1/4/92	17	6	SAA	CI	3.0	HNU=0ppm BZ=0ppm
		18	6	SAA	CI	3.25	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
r: Elay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1739	COORDINATES:	DATE: 1/4/92	
ELEVATION: 417 ft.	GWL: Depth Date/Time	DATE STARTED: 1/2/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 1/4/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		20	4	Very stiff. 5Y (5/1) Gray mottled with yellowish brown Gravelly clay. Low plasticity wet	CL	3.75	
		25	0	No Recovery	NA	NA	
19	101345 RAD 101346 (HEG) 1/4/92		34"	Very stiff. 5Y (5/1) Gray gravelly clay. Low plasticity, very moist.	Cl	2.5	HNU = 0ppm BZ = 0cpm
		Shelby Tube					Shelby tube pushed from 19.0 ft to 22.0 ft.
20							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1739	COORDINATES:	DATE: 11/4/92	
ELEVATION: 617 ft	GWL: Depth / Date/Time	DATE STARTED: 11/2/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 11/4/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 18	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Tube					
	Screen Ref 10380 (1400) 11/4/92	Shelby					
22	10135 (1300) 11/4/92	7	6	Stiff. 5Y (5/1) Gray. gravelly clay. Low plasticity moist.	CL	1.25	HNU=0ppm BZ=0ppm
		11	6	SAA	CL	1.25	
23		12	0	No Recovery	NA	NA	
		14	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner

Don Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF	DATE: 1/4/92
BORING NUMBER: 1739	COORDINATES:	DATE STARTED: 1/2/92
ELEVATION: 117 ft.	GWL: Depth Date/Time	DATE COMPLETED: 1/4/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	PAGE 9 OF 12
DRILLING METHODS: Hollow Stem Auger		

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		7	0	No Recovery	NA	NA	Rock in base of spoon
		9	0	No Recovery	NA	NA	
25		14	0	No Recovery	NA	NA	
		24	0	No Recovery	NA	NA	
26		4	0	No Recovery	NA	NA	Rock jammed in spoon
		11	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elgy Gardner

Don Jamison

402-11-86

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

ECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EW MF		DATE 1/4/92
NG NUMBER: 1739	COORDINATES:		DATE STARTED: 1/2/92
ELEVATION: 617 ft	GWL: Depth	Date/Time	DATE COMPLETED: 1/4/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 10 OF 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		12	0	No Recovery	NA	NA	
		11	0	No Recovery	NA	NA	
25	101352 101353 (1545) 1/4/92	10	6	Stiff. 5Y (5/1) Gray gravelly clay. Low plasticity. moist.	cl	1.25	HNU=0ppm BX=0cpm
	101354 101355 (1545) 1/4/92	72	6	SAA	cl	1.5	
29	101356 101357 (1545) 1/4/92	26	6	SAA	cl	1.25	
		36	0	No Recovery	NA	NA	
30							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner

Don Jamison

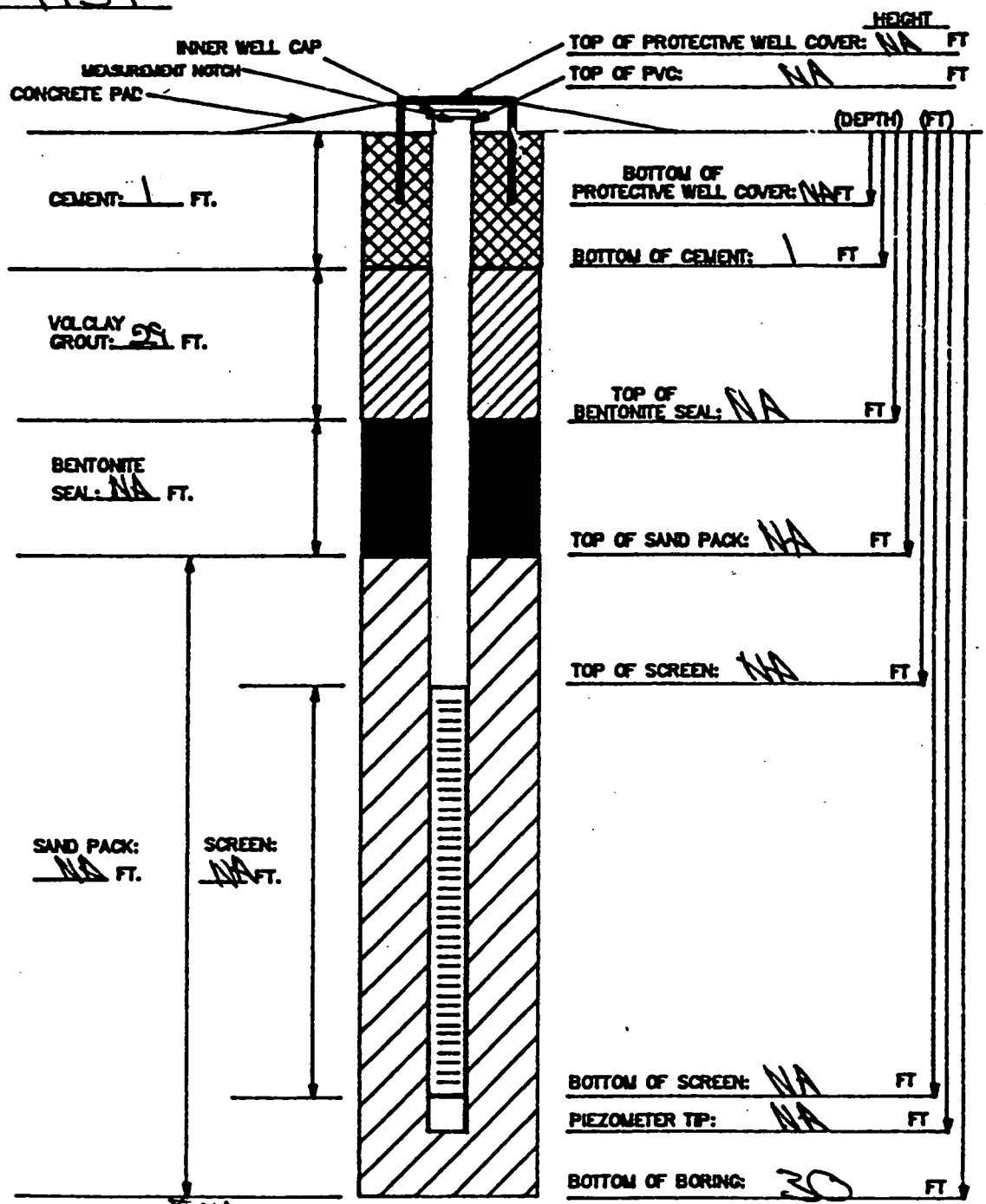
402-11-86

11 of 12 5711

FERNALD RI/FS 3.22

INSTALLATION DATE: 1/5/92

INSTALLATION DIAGRAM
MONITORING WELL NO.
1739



BOREHOLE DIAMETER: 8 1/4 INCHES
DDB 1/5/92

MATERIALS USED:
SAND TYPE AND QUANTITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT: 2 bag
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED:
OTHER: N/A

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: N/A
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

120/12

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUME FIELD ENG./GEO. D. O'Brien DATE 1/15/92
PROJECT NO. 9602-3.22 CHECKED BY C. Grube DATE 01/17/92
BORING NO. 1789
PIEZOMETER NO. NA DATE OF INSTALLATION

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 30.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

001611

409-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N481,800 E 1,383,000	DATE 12-21-91
ELEVATION: est. 603	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12-21-91
DRILLING METHODS: AUGER		PAGE 1 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100753 830 12-21-91	2	6	Firm (10YR 3/2) very dark grayish Brn. Silty Clay, w Root Lets. No Plasticity, moist.	Cl	.75	TRIP/field Blank 100754 HNU = Ø PPM Bγ = Ø cpm above Background.
	100755 930 12-21-91	3	6 (12) ~~BEG~~ 1-14-92	Firm (10YR. 5/6) yellowish Brn. silty clay, No plasticity, ~~moist~~ DRY.	Cl	1.75	
1		4	0	NO RECOVERY	NA	NA	
		9	0	A/A	NA	NA	
2	~~BEG~~ 950 100756 12-21-91	8	6	HARD (10YR 5/4) yellowish Brn, gravelly Silty clay, No Plasticity DRY	Cl	1-14-92 <4.5 ~~BEG~~ >4.5	HNU = Ø PPM Bγ = Ø cpm above Background.
		16	(12) ~~BEG~~ 1-14-92 6	A/A.	Cl	~~BEG~~ 1-14-92 <4.5 >4.5	
3							HNU = Ø PPM Bγ = 20-40 cpm Background

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

A/A - As Above

001612

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N 481,800 E 1,383,000	DATE: 12-21-91
ELEVATION: est 603	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12-21-91
DRILLING METHODS: AUGER		PAGE 2 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		18	0	NO RECOVERY	NA	NA	
		18	0	A/A	NA	NA	
4	100756 10 00 12-21-91	32	6	HARD (10YR 5/4) yellowish BRN. gravelly silty Clay, with Rock. (Limestone) No plasticity, DRY	CI	375	HNU = Ø PPM BK = Ø CPM above Background.
		26	6	A/A	CI	375	
5		20	5	A/A.	CI	3.75	
		18	0	NO RECOVERY	NA	NA	

NOTES:
Drilling Contractor PENN DRILLING
Drilling Equipment MOBIL DRILLING RIG 80
Driller: BOBBY YOST
KEVIN MYERS
Sample Tech. VERN LARGER

001613

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N 481,800 E 1,393,00	DATE: 12/21/91
ELEVATION: Est 602	GWL: Depth Date/Time	DATE STARTED: 12/21/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/21/91
DRILLING METHODS: AUGER		PAGE 3 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	100757 1012 12-21-91 Red	13 100761	6	HARD (2.5Y 4/4) olive Brown, gravelly Clay, Low plasticity. Moist. w Traces of Large Pebbles	Cl	3.5	HNU = Ø PPM BK = Ø CPM ABOVE Background.
7	100758 Red	18 100762	6 (24) DEM 1-14-92	A/A	Cl	2.5	
	100759 Red	20 100763	6	A/A	Cl	2.75	
8	100760 Red	21 100764	6	Firm (2.5Y 4/4) olive Brown, gravelly clay, Low plasticity, moist w Large pebbles. (TRACE)	Cl	1.75	
9	100765 100758 1100 12-21-91 Red 100766	Shelby Tube	DEM 1-14-92 (24) (21)	Firm (2.5Y 4/3) olive brown, gravelly clay, Low plasticity, moist w/ Large pebbles.	Cl	2.0	HNU = Ø PPM BK = Ø CPM above background.
10							

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

001614

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N 481,800 E 1,383,00	DATE 12-21-91
ELEVATION: Est 602	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST. G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12-21-91
DRILLING METHODS: AUGER		PAGE 4 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby tube					
11	Rad 100767						
	100768 1117 12-21-91	8	6	HARD (2.5y 5/4) Light olive brown, gravelly Clay, Low Plasticity, Moist.	Cl	3.0	HNU = ø ppm BY = ø cpm above Background.
		15	6	A/A	Cl	2.5	
12			20 DEM 1-14-92				
		18	6	A/A w Limestone Rock in the Last 2 inches of the spoon.	Cl	2.75	
		23	2	A/A	Cl	2.75	
13	100768 1120	15	6	HARD (2.5y 5/4) Light olive brown gravelly clay, Low plasticity, moist.	Cl	2.0	
	100769 1120			Firm – HARD (5y 4/1) Dark gray gravelly Clay with some sand, Low plasticity, Moist	Cl	2.0	13.3 weathering zone.

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST
KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N 481,800 E 1,388,000	DATE 12-21-91
ELEVATION: Est 602	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12-21-91
DRILLING METHODS: AUGER		PAGE 5 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100769 N20 12-21-91	20	6	~~HARD~~ (5Y 4/1) DARK gray gravelly Clay, with some sand, Low Plasticity, moist	CL	2.25	HNU = Ø PPM BK = Ø CPM above Background.
14		23	6	A/A	CL	3.25	
		20	6	A/A.	CL	2.0	
15	100770 1315 12-21-91 Total V Screen	25	6	Firm (5Y 4/1) Dark gray, Clay w/ Some sand, High plasticity, moist.	CL	1.0	HNU = Ø PPM BK = Ø CPM above Background.
		25	6	~~A/A~~ Soft (5Y 4/1) Dark gray, clay w some sand, High plasticity, moist	CL	.5	
16		23	6	Firm (5Y 4/1) Dark gray, gravelly clay w/ some sand, Low plasticity moist.	CL	2.0	

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST
KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	DATE 12-21-91
BORING NUMBER: 1720	COORDINATES: N 481,800 E 1,383,000	DATE STARTED: 12-21-91
ELEVATION: Est 602	GWL: Depth Date/Time	DATE COMPLETED: 12-21-91
ENGINEER/GEOLOGIST. G.MARSHALL	Depth Date/Time	PAGE 6 OF 9
DRILLING METHODS: AUGER		

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		27	4	A/A	CL	1.25	
17	100771 1330 12-21-91 Rad	21	6	Firm (5y 4/1) Dark gray, Clay with some sand, High plasticity moist (very)	CL	1.0	HNU = Ø PPM Bg = Ø CPM above Back ground
	100772 Rad	23 100776	6	A/A	CL	.75	
18	100773 Rad	32 100777	6	Soft - Firm (5y 4/1) Dark gray, Clay with some sand, High plasticity moist (very)	CL	.5	
	100774 Rad	37 100778	6	Hard (5y 4/1) Dark gray, Clay w some sand & gravel, Low Plasticity, moist.	CL	3.0	
19	12-21-91 100779 1456	shelby TUBE	13	Hard (5y 4/1) Dark gray, Clayey sand w Large cobbles, wet.	SC	2.75	HNU = Ø PPM Bg = Ø CPM above Back ground Pushed Tube 36 inches with 13 inches of Recovery
20							

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST
KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602 3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1740	COORDINATES: N481,800 E 383,000	DATE 12-21-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-21-91
DRILLING METHODS: AUGER		PAGE 1 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
21	100774 1456 12-21-91	Shelby Tube	see previous page 13	NO RECOVERY			Archive Sample. 100779
22	12-21-91 100777 ~~1500~~ 1506 Foil Rod 100781	9	6	VERY Soft (5Y 4/1) Dark gray, Clayey Sand, wet	SC	~~.25~~ .25 <.25	HNU = ØPPM BK = Øcpm above Background. Hit Perched Water Plug hole at 24ft.
	100780 1506	13	6	FIRM (5Y 4/1) Dark gray, Clay w/ Some Sand & gravel, Medium plasticity, moist (very)	CL	1.5	
23		21	~~22~~ 6	A/A	CL	1.5	
24		26	4	~~A/A~~ HARD (5Y 4/1) Dark gray, Clay w/ Some Sand & gravel Medium plasticity, moist	CL	4.0	

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobil Drilling Rig 80

Driller: Bobby Yost
Kevin Myers

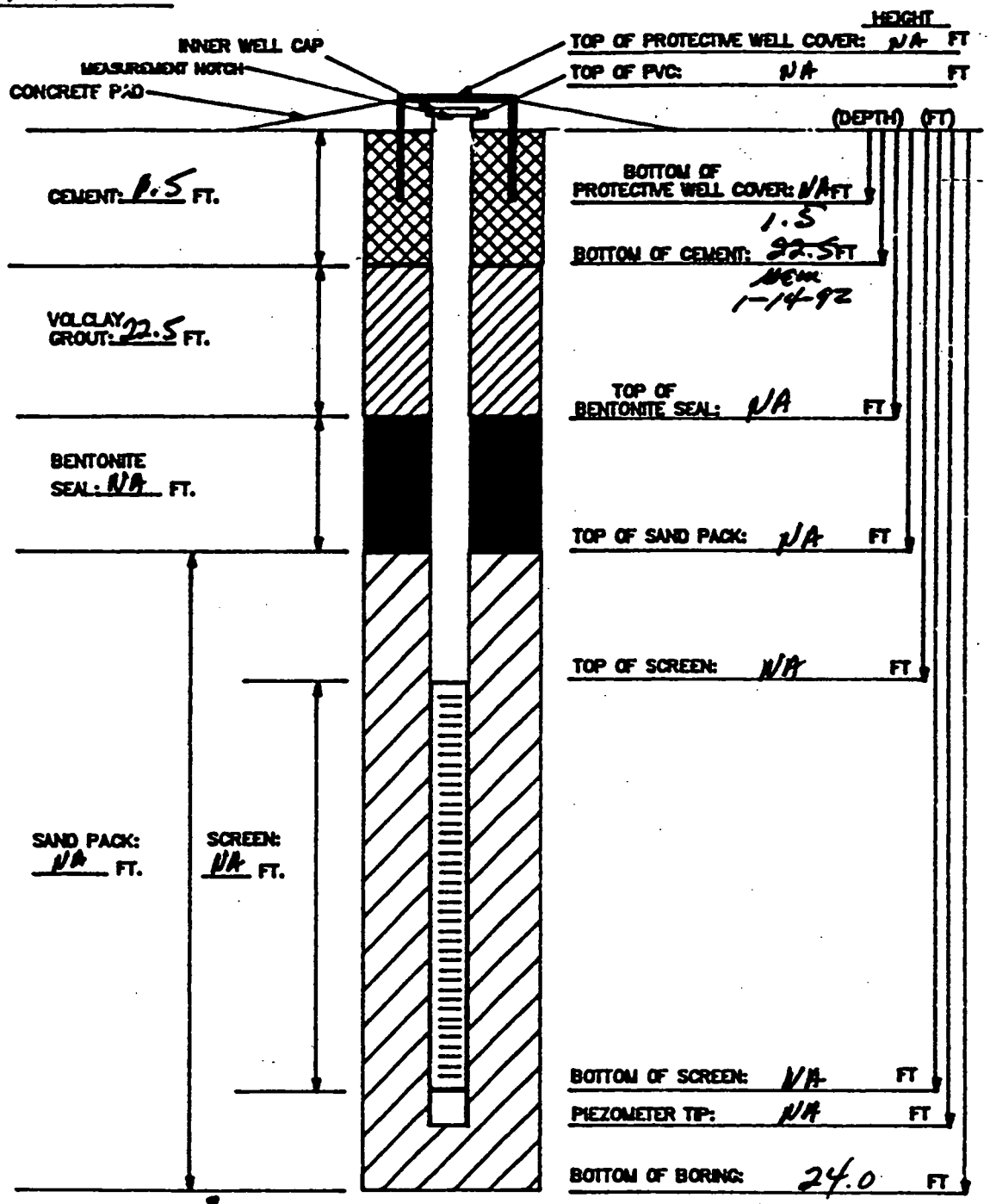
Sample Tech. Vern Larger.

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1740

INSTALLATION DATE: 12-21-91



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 50 gals.
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: G. Marshall

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. D.E. Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY C. Gruber DATE 01-15-92
BORING NO. 1740
PIEZOMETER NO. NA DATE OF INSTALLATION NA.

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger Bit.
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.5	BOTTOM 24.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	24.0			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Put 1.5 ft of cement from 0.0 to 1.5 feet.

001620

409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF		
BORING NUMBER: 1741	COORDINATES:	DATE 12/20/91	
ELEVATION: 598.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/20/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/21/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 1	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1	6	Stiff. 10YR (5/4) Yellowish brown, silty clay. Low plasticity, moist	CL	1.25	HNU = 0 ppm BG = 0 cpm Disregard top 6 inches, sampled by hand auger.
	101312 (1010) 12/20/91	2	6	Stiff. 10YR (5/4) Yellowish brown, silty clay. Low plasticity, moist	CL	1.25	
1		4	6	SAA	CL	2.0	
		7	0	No Recovery	NA	NA	
2	101313 (1015) 12/20/91	5	6	Hard. 10YR (6/8) Brownish yellow silty clay with organics. No plasticity dry	CL	>4.5	HNU = 0 ppm BG = 0 cpm
		7	6	SAA	CL	>4.5	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Dan Jamison

Background:
HNU = 0 ppm
BG = 40 cpm
Background has been subtracted out.

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		DATE 12/20/91
BORING NUMBER: 1741	COORDINATES:		DATE STARTED: 12/20/91
ELEVATION: 595.5	GWL: Depth	Date/Time	DATE COMPLETED: 12/21/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 2 OF 102
DRILLING METHODS: Hollow Stem Auger			

DSO 12/19/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		9	0	No Recovery.	NA	NA	
		14	0	No Recovery	NA	NA	
4 RAD 2	101314 101315 (1040) 12/20/91	4	6	Hard. 10YR (6/8) Yellowish brown. Silty clay with gravel. No plasticity. Dry	CL	>4.5	HNU=0 ppm RS=0 cpm
DSO 2/4/92	101458 101358 101316 (1040) 12/20/91	8	6	SAA	CL	>4.5	
5	101317 101318 (1040) 12/20/91	12	6	SAA	CL	>4.5	
		14	0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Logger: Elay Gardner
Dan Jamison

001622

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		DATE 12/20/91
BORING NUMBER: 1741	COORDINATES:		DATE STARTED 12/20/91
ELEVATION: 595.5 ft	GWL: Depth	Date/Time	DATE COMPLETED: 12/21/91
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 3 OF ~~10~~ 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101319 (1100) 12hdf	9	6	Hard. 10YR (5/4) Yellowish brown. Silty clay with sand & gravel. Low plasticity moist.	CL	>4.5	HNU=0 ppm BZ=0 ppm
		11	6	SAA	CL	>4.5	
7		13	6	SAA	CL	4.0	
		15	6	SAA, very stiff	CL	3.0	
8		20	6	Backfill, no recovery	NA	NA	
		26	0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Elgy Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1741	COORDINATES:	DATE 12/20/91	
ELEVATION: 595.3 ft	GWL: Depth Date/Time	DATE STARTED: 12/20/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/21/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF ~~10~~ 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		25	0	No Recovery.	NA	NA	
		28	0	No Recovery	NA	NA	
10		14	6	Very stiff. 10YR (5/4) Yellowish brown. Gravelly clay. No plasticity. Slightly moist	CL	3.0	HNU=0ppm BZ=0cpm
		16	6	SAA	CL	3.0	
11		14	6	SAA, hard	CL	4.0	
		18	6	SAA, hard	CL	>4.5	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF	
BORING NUMBER: 1741	COORDINATES:	DATE: 12/20/91
ELEVATION: 593.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/20/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/21/91
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF ~~13~~ 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
RAD→	101330 (1400) 12/20/91	4	6	Hard. 10YR (5/4) Yellowish brown gravelly clay. Low plasticity, slightly moist	CL	1.45	HNU=0ppm BG=0cpm
		7	6	SAA, very stiff.	CL	3.75	
13		8	0	No Recovery.	NA	NA	
		12	0	No Recovery.	NA	NA	
14	101321 101322 (1440) 12/20/91	2	6	Stiff. 5Y (5/1) Gray. Gravelly clay, low plasticity. Moist	CL	1.25	HNU=0ppm BG=0cpm
		4	6	SAA	CL	1.25	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Logger: Clay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

571 1

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		DATE: 12/20/91
BORING NUMBER: 1741	COORDINATES:		DATE STARTED: 12/20/91
ELEVATION: 595.5	GWL: Depth	Date/Time	DATE COMPLETED: 12/21/91
ENGINEER/GEOLOGIST: D. O'Brian	Depth	Date/Time	PAGE 1 OF ~~2~~ 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		7	4	Stiff. 5Y(5/1) Gray. Gravelly clay, low plasticity, moist.	CL	1.25	
		8	0	No Recovery.	NA	NA	
16		9	6	Stiff. 5Y(5/1) Gray Gravelly clay, low plasticity, moist.	CL	1.0	HNU=0ppm BZ=0cpm
		6	2	SAA	CL	1.25	
17		9	0	No Recovery	NA	NA	
		14	0	No Recovery.	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EW MF		DATE: 12/20/91
BORING NUMBER: 1741	COORDINATES:		DATE STARTED: 12/20/91
ELEVATION: 595.5 ft	GWL: Depth	Date/Time	DATE COMPLETED: 12/21/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 7 OF 12
DRILLING METHODS: Hollow Stem Auger			

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
RAD→	101323 101324 (15/15) 12/20/91	4	6	Stiff. 5Y(5/1) Gray. Gravelly clay. Low plasticity, moist.	cl	1.0	HNU=0ppm BX=0cpm
		6	0	No Recovery	NA	NA	
19		6	0	No Recovery.	NA	NA	
		12	0	No Recovery	NA	NA	
20 RAD→	101325 101326 (16/15) 12/20/91	Shelby Tube	27	Stiff. 5Y(5/1) Gray. Gravelly clay. Low plasticity, moist.	cl	1.0	HNU=0ppm BX=0cpm Shelby tube pushed from 20.0 to 23.0 ft
					~~NA~~ DSO 1/27/92	~~NA~~	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Elay Gardner
Dan Jamison

001627

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 1741	COORDINATES:	DATE 12/20/91	
ELEVATION: 595.54	GWL: Depth Date/Time	DATE STARTED 12/20/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/21/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF ~~10~~ 12	

CB 9/5/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Tube					
22		Shelby					
	RAD→ 101325 (1615) 12/20/91	↓					
23	101328 (0900) 12/21/91	5	6	Stiff. BY (5/1) Gray. Gravelly Clay. Low plasticity, wet.	Cl	1.5	HNU=0ppm BZ=0cpm
		7	6	SAA	Cl	1.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Logger: Clay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		DATE 12/21/91
BORING NUMBER: 1741	COORDINATES:		DATE STARTED 12/20/91
ELEVATION: 595.5 ft	GWL: Depth	Date/Time	DATE COMPLETED: 12/21/91
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	PAGE 9 OF ~~10~~ 12
DRILLING METHODS: Hollow Stem Auger			

DJO 1/22/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		11	0	No Recovery	NA	NA	
	10 13 25 (09 10) 12/21/91	7	6	Stiff. 5Y (5/1) Gray. Gravelly clay. Low plasticity moist.	CL	1.0	HNU = 0 ppm BG = 0 cpm
25		12	6	SAA	CL	1.5	
		15	6	SAA	CL	1.5	
26		6	6	Very Stiff. 5Y (5/1) Gray. Gravelly clay. Low Plasticity, moist.	CL	3.25	HNU = 0 ppm BG = 0 cpm
		9	6	SAA,	CL	2.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Driller: Elay Gardner
Dave Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1741	COORDINATES:	DATE 12/21/91	
ELEVATION: 595.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/20/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/21/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 10 OF ~~10~~ 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		12	0	No Recovery	NA	NA	
		12	0	No Recovery	NA	NA	
28 RAD→	101328 101329 (0910) 12/21/91	12	6	Stiff. 5Y (5/1) Gray. Gravelly clay. Low plasticity Moist.	CL	1.5	HNU = 0 ppm RX = 0 cpm
RAD→	101331 101332 (0915) 12/21/91	16	6	SAA	CL	1.25	
29		20	0	No Recovery.	NA	NA	
		28	0	No Recovery	NA	NA	

Bottom of Boring 30.0 FT

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Bombardier Mobile Drill
Driller: Elay Gardner
Don Jamison

CH 2/5/92

357 IH4FS
303

402-11-86

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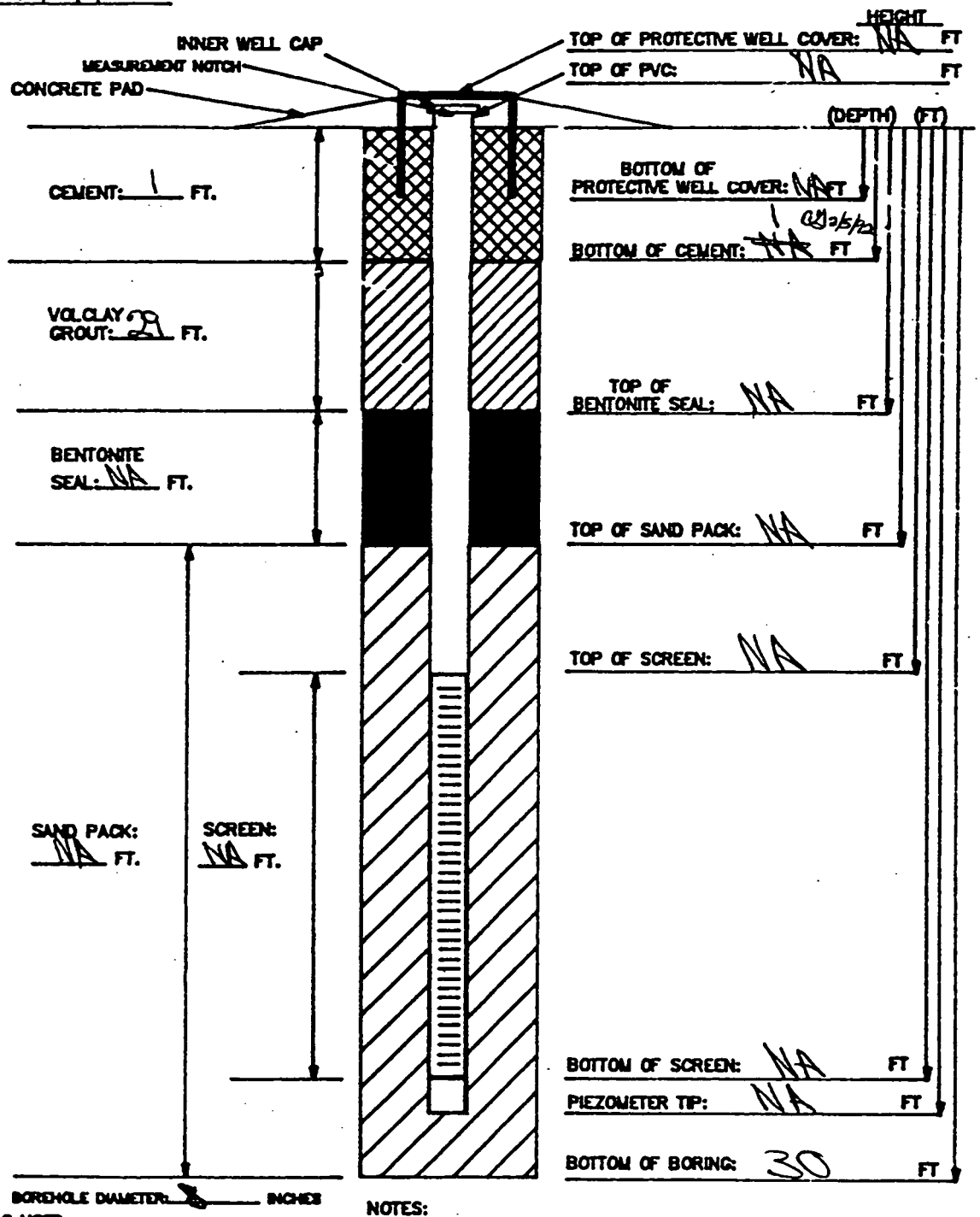
FERNALD RI/FS

INSTALLATION DATE: 12/21/91

INSTALLATION DIAGRAM
MONITORING WELL NO.
1741



MATERIALS USED:
SAND TYPE AND QUANITITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT: 2 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED:
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
RI/FS

12 of 12

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUME FIELD ENG./GEO. D. O'Brien DATE 12/21/91
PROJECT NO. 9602-3.22 CHECKED BY [illegible] DATE 02/05/92
BORING NO. 1741
PIEZOMETER NO. NA DATE OF INSTALLATION 12/21/91

BOREHOLE DRILLING

CSO 12/21/91

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT ~~NA~~ Hollow Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 30.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91
ELEVATION: Est. 594	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST. G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 1 OF ~~9~~ 11

CB 01/22/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100715 1100 12-18-91	3	6	MEDIUM stiff (10YR ~~Darken~~ 3/6) Dark yellowish Brown, Silty Clay, with Root Lets, Low Plasticity, Moist.	CI	1.0	HNU = Ø PPM ~~BY = Ø cpm Above Below Background~~ Trip Blank sample #100716
	100717 1100 12-18-91	4	6 ~~12~~ CB 01/22/92	Very stiff (10YR 4/4) Dark yellowish Brown, Silty Clay, Medium Plasticity, Moist.	CI	3.0	BY = 240 cpm above Background at 0 to 6 inches
1		6	0	No Recovery	NA	NA	
	100717 1105 12-18-91	8	6	HARD (10YR 5/8) yellowish brown silty clay with traces of gravel No plasticity, DRY	CI	74.5 ~~4.5~~ CB 01/22/92	HNU = Ø PPM BY = Ø cpm above Background
2		14	CB 01/22/92 ~~12~~ 6	HARD (10YR 5/8) yellowish Brown silty clay with traces of gravel, No plasticity, DRY. Traces of Fossils	CI	4.0	
		14	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST
KEVIN MYERS

Sample Tech. VERN LARGER

HNU = Ø ppm Background
BY = 60 cpm Background
Nos meter at office.

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE: 12/18/91
ELEVATION: Est 594	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 2 OF 11

CW 01/22/92

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1110 12-18-91	15	0	NO RECOVERY	NA	NA	HNU = Ø PPM βγ = Ø cpm above background
		16	0	NO RECOVERY	NA	NA	
4		19	0	NO RECOVERY	NA	NA	
	100718 1125 12-18-91	13	6	HARD (10YR 5/6) yellowish brown gravelly Clay, low plasticity, slightly moist.	CI	4.25	HNU = Ø PPM βγ = Ø cpm above background
5	Rad Screen 100722						
	100719 1125 12-18-91	13	6	A/A	CI	3.25	
	Rad screen 100723						
	100720 1125 12-18-91	13	6	A/A	CI	3.25	
	Rad Screen 100724						

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST
KEVIN MYERS

Sample Tech. VERN LARGER

A/A - As Above

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91
ELEVATION: Est 594'	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 3 OF ~~8~~ 11

CB 01/22/92

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100721 1125 12-18-91	20	6 ~~20~~ DCM	A/A	CI	>4.5 ~~4.5~~ CB 01/22/92	
	Rad Screen 100725						
	100722 1406 12-18-91	19	6	HARD (2.5Y 5/3) Light olive brown, gravelly clay, Low Plasticity, moist.	CI	4.0	HNU = ∅ PPM BK - ∅ cpm above Back ground
7	100726 1406 12-18-91	20	CB 01/22/92 ~~12~~ 6	A/A.	CI	4.0	
		19	0	No RECOVERY	NA	NA	
8	100727 1450 12-18-91	Shelby Tube.	6	very stiff (2.5Y 4/3) olive brown gravelly clay, Low plasticity moist.	CI	3.5	HNU = ∅ PPM BK = ∅ cpm above Back ground
9			CB 01/22/92 ~~9.5~~ 3.5	A/A	CI	3.5	*Not Enough Recovery = Sample was Archived
10							

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91
ELEVATION: Est. 594'	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 4 OF 9/11

CB 01/22/92

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby	0	No Recovery	NA	NA	
11	100728 1500 12-18-91 Rad SCREEN 100729	No Blow count - see remarks ~~#14~~ SCM	6	HARD (2.5 4/3) olive brown, gravelly Clay, Low plasticity, Moist	CL	4.0	HNU = Ø PPM BY = Ø CPM above Back GROUND
	100728 1500 12-18-91	SCM ~~#4~~ 14	6 ~~24~~ CB 01/22/92	A/A	CL	>4.5 ~~<4.5~~ CB 01/22/92	*Drill helper miss Counting on blows. 24 inches of Recovery on Split Spoon.
12	100728 1500 12-18-91	SCM ~~#4~~ 24	6	A/A	CL	>4.5 ~~<4.5~~ CB 01/22/92	- Disturbed Geo tech. Sample 100728 SEND Rad SCREEN 100729
	100728 1500 12-18-91	27	6	very stiff (2.5 4/3) olive brown gravelly clay, Low plasticity, Moist	CL	3.5	
13	1559 12-18-91	5	0	No Recovery	NA	NA	HNU = NA. BY = Ø CPM above Back GROUND.

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91
ELEVATION: est 594'	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 5 OF 9/11

CH 01/22/92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6(")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
14		9	0	NO RECOVERY	NA	NA	
		15	0	NO RECOVERY	NA	NA	
15	100730 1607 12-18-91	13	6	VERY stiff (5Y 5/1) gray, gravelly Clay, MEDIUM plasticity, moist	CI	3.25	NNU = ∅ ppm ~~CPM~~ rem BY = ∅ CPM above background.
		15	6	A/A	CI	3.25	
		21	6	A/A	CI	2.75	
16	100731 1620 12-18-91 Rad SCREEN 100735	22	6	VERY Stiff (5Y 4/1) dark gray gravelly Clay, MEDIUM plasticity moist.	CI	2.75	HNU = ∅ ppm BY = ∅ CPM above Background.

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

001637

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91 12/19/91
ELEVATION: Est. 594'	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST. G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 6 OF 9 11

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100732 1620 12-18-91	24	6	A/A	Cl	3.0	HNU = Ø PPM BγC = Ø CPM above Background.
17	Rad Screen 100736						
	100733 1620 12-18-91	24	~~24~~ 6	A/A	Cl	2.75	
	Rad Screen 100737						
	100734 1620 12-18-91	29	6	A/A	Cl	2.25	
18	Rad Screen 100738			VERY Stiff ~~HARD~~ (5Y 4/1) Dark gray, gravelly Clay, medium plasticity, moist			HNU = Ø PPM BγC = Ø CPM above Background
	100739 Tube Rad Screen 100740 939 12-19-91	Shelby tube	24	A/A	Cl	3.5	There was 12" of wet, gravelly Clay in the tube. Remove it from the tube.
19							
20							
21	Rad Screen 100741						

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

12-19-91 HNU = Ø PPM BγC = 40-60 CPM Back Ground

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,583,000	DATE 12/19/91
ELEVATION: Est 594	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 7 OF ~~9~~ 11

CB 01/22/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100742 950 12-19-91	9	6	VERY stiff (5Y 4/1) DARK GRAY gravelly clay, medium plasticity moist.	CL	3.0	NWU = Ø PPM BR = Ø CPM above Background
		15	CB 1/22/92 ~~12~~ 6	VERY stiff (5Y 4/1) DARK GRAY gravelly clay, medium plasticity moist with wood in the last 2" of the spoon.	CL	3.5	
22		19	0	NO RECOVERY	NA	NA	
	100742 1000 12-19-91	50	6	VERY stiff (5Y 4/1) DARK GRAY, gravelly clay, medium plasticity moist. Large cobble in the end of the spoon. Could only drive spoon 6"	CL	2.75	NWU = Ø PPM BR = Ø CPM above Background
23		26	0	NO RECOVERY	NA	NA	Reinsert spoon into hole. Drove spoon 12 more inches with No Recovery. Auger down to 24'
		21	0	NO RECOVERY	NA	NA	

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602.3.22	PROJECT NAME. FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1383,000	DATE 12-19-91
ELEVATION: Est. 594	GWL: Depth Date/Time	DATE STARTED: 12-18-91
ENGINEER/GEOLOGIST. G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12-20-91
DRILLING METHODS: AUGER		PAGE 8 OF ~~9~~ 11

CB 01/22/92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100743 1440 12-18-91	10	6	Soft (5Y 4/1) Dark gray, gravelly Clay, medium plasticity, wet. with Limestone Rock.	Cl	~~.75~~ ~~.25~~ <.25 CB 01/22/92	HNU = Ø ppm. BR = Ø cpm. above Background.
		24	3 ~~9~~ CB 01/22/92	HARD (5Y 5/1) gray, Limestone		NA	
25		14	0	NO RECOVERY	NA	NA	
	100744 1448 12-18-91	19	6	Stiff. (5Y 4/1) Dark gray, gravelly Clay, medium plasticity, wet. w Some Rock (Limestone)	Cl	1.75	HNU = Ø PPM BR = Ø CPM above Back ground
26		22	6 ~~10~~ CB 1/22/92	HARD (5Y 4/1) Dark gray, gravelly Clay, Low plasticity sl. moist.	Cl	4.5	
		28	4	HARD (5Y 4/1) Dark gray, gravelly Clay, Low plasticity, sl. moist.	Cl	4.5	

NOTES:

Drilling Contractor PENN DRILLING

Drilling Equipment MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

Sample Tech. VERN LARGER

001640

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1742	COORDINATES: N 480,210 E 1,383,000	DATE 12/18/91
ELEVATION: Est 594	GWL: Depth Date/Time	DATE STARTED: 12/18/91
ENGINEER/GEOLOGIST: G.MARSHALL	Depth Date/Time	DATE COMPLETED: 12/20/91
DRILLING METHODS: AUGER		PAGE 9 OF 11

CB 01/22/92

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100745 1515 R.S. 100749	60	6	HARD (5Y 5/1) gray, gravelly clay Low plasticity, ~~Dry~~ moist	Cl	~~SPM 60~~ 4.5	HNU = Ø PPM BG = Ø cpm above Background
	100746 1515 RS 100750	100	6 (CB 1/22/92 ~~24~~)	HARD (5Y 5/1) gray, gravelly clay Low plasticity, moist with Rock (Limstone)	Cl	~~SPM 100~~ 4.5	
28	100747 1515 R.S 100751	50	6	HARD (5Y 5/1) gray, sandy clay with gravel, No plasticity, Dry	Cl	~~SPM 50~~ 4.5	
	100748 1515 RS. 100752	42	6	HARD (5Y 5/1) gray, Sandy clay. with gravel, No plasticity, Dry.	Cl	~~SPM 42~~ 4.5	
29							

NOTES: R.S. = Rad screen

Drilling Contractor: PENN DRILLING

Drilling Equipment: MOBIL DRILLING RIG 80

Driller: BOBBY YOST

KEVIN MYERS

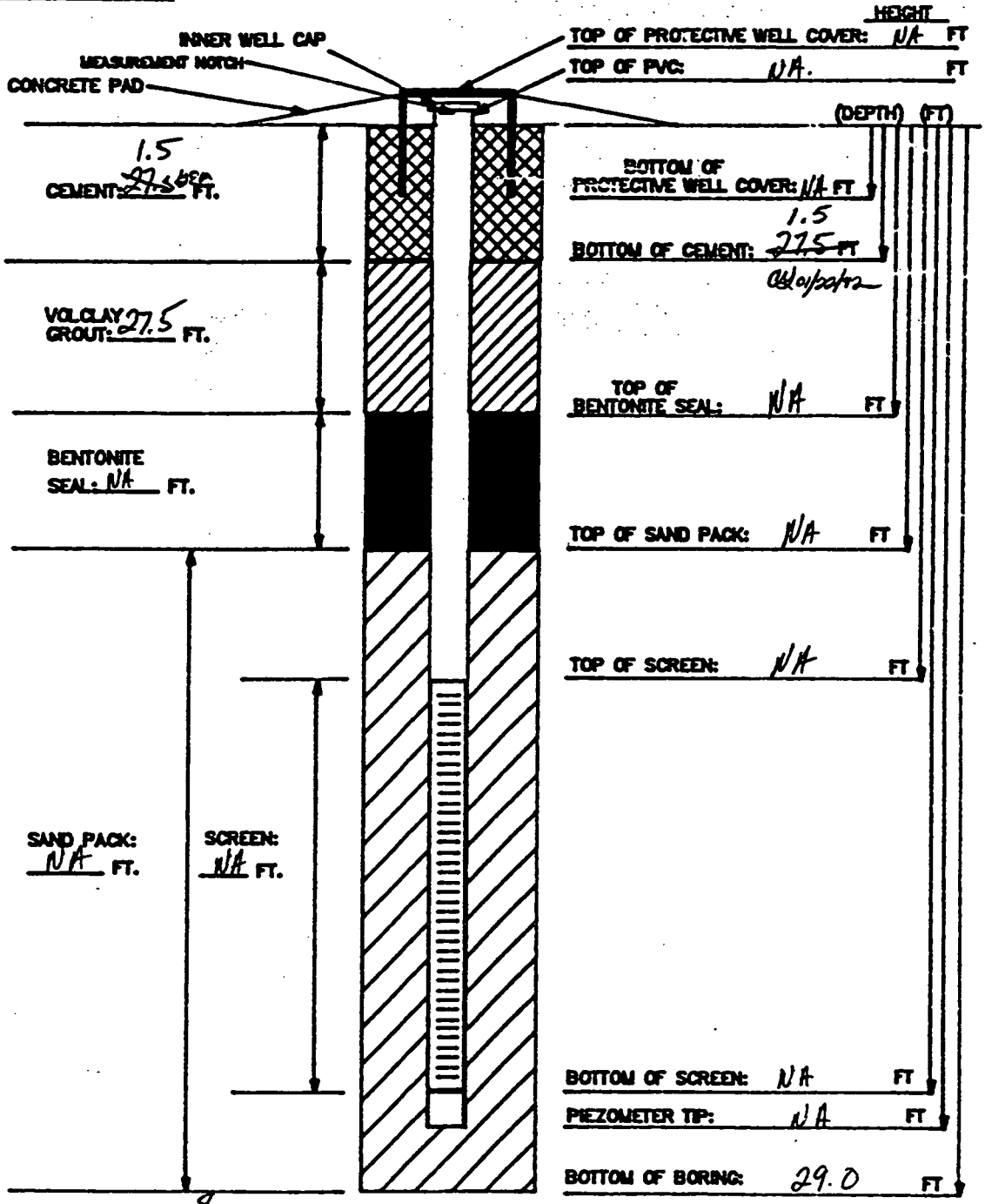
Sample Tech.: VERN LARGER

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1742

INSTALLATION DATE: ~~1742~~ 12-20-91



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 50
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22. GEOLOGIST/ENGINEER: D. Marshall

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. G. Marshall DATE 12-20-91
PROJECT NO. 602.03.22 CHECKED BY C. Gruber DATE 01/02/92
BORING NO. 1742
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT Auger
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	Top 0.0 TOP 1.5	Bottom 1.5 BOTTOM 29.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA.	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	29.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

001843

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS FEMP		
DRILLING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF ~~8~~ 10	

CW 01/14/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	101 2&4 (13 15) 12-18	2	6	Stiff. 10YR(5/4) Yellowish brown, Silty clay, Low Plasticity, moist.	CI	1.0	HNU=0 ppm BG=0 cpm
		4	6	SAA	CI	1.75	
1		5	1	SAA	CI	1.0	
		6	0	No Recovery.	NA	NA	
2		4	6	Stiff. 10YR (5/4) Yellowish brown. Silty clay with gravel & traces of fossil. Low plasticity, slightly moist.	CI	1.5	HNU= 0ppm BG= 0cpm
		7	6	SAA	CI	>4.5	
3							

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment Bombardier Mobile Drill

Eloy Gardner

Don Samson

Background: HNU = 0 ppm
BG = 40cpm

Background subtracted out.

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9102-3.22	PROJECT NAME. Fernald RI/FS ELUMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 8/10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3		9	6	Hard. ~~Stiff~~. 10YR (5/4) Yellowish brown. Silty clay with gravel and fossil thacis. Low plasticity, slightly moist.	CL	>4.5	
		14	0	No Recovery.	NA	NA	
4 101285 101286 (1400) 18		6	6	Very stiff. 10YR (5/4) Yellowish brown. Silty clay with sand & gravel. Low plasticity slightly moist.	CL	3.5	HNU = 0 ppm BX = 0 cpm
101287 101288 (1400) 12-18		8	6	SAA	CL	3.75	
5		9	2	Backfill, No Recovery	NA	NA	
		14	0	No Recovery	NA	NA	
6							

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment Bombardier, Mobile Drill

er: Clay Gardner

Don Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.54	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Augers		PAGE 3 OF X/10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	101228 1430 12-18		24	Hard. 10YR (5/4) Yellowish brown. Silty clay with sand & gravel. Low plasticity slightly moist.	Cl	>4.5	HNU = 0 ppm RX = 0 cpm
7	SHELBY TUBE						
8							
9							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Bombardier Mobile Drill

Elay Gardner

Don Jamison

Shelby Tube pushed from 6 FT to 9 FT

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS FCWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.5	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF ~~8~~ 10	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9	101292 (1520) 101301 12-18 RAD→	7	6	Very stiff, 10YR(5/4) Yellowish brown. Silty clay with gravel and coarse sand. Low plasticity Moist	CL	3.5	HNU=0 ppm βγ=0 cpm
		10	6	SAA	CL	3.75	
10		18	5	Hard. 10YR(5/4) Yellowish brown. Silty clay with gravel & coarse sand. Low plasticity Moist.	CL	<4.5	
		20	4	SAA	CL	<4.5	
11		16	6	Stiff, 10YR(5/4) Yellowish brown. Silty clay with gravel & coarse sand. Low plasticity Moist	CL	1.0	HNU=0 ppm βγ=0 cpm
		21	6	Hard. 10YR(5/4) Yellowish brown. Silty clay with gravel & coarse sand. Low plasticity Moist	CL	<4.5	
12							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Bombardier Mobile Drill

Driller: Elay Gardner
Don Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS Elutr		
BORING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.5 ft	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Augers		PAGE 5 OF ~~8~~ 10	

CH 01-15-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12	101293 (1545) 12-18	22	6	Hard. 5Y (5/3) Olive. Silty clay with large limestone pieces, gravel. Low plasticity, slightly moist	CL	>4.5	
		26	6	Very stiff. 5Y (5/3) Olive. Silty clay with large limestone pieces, gravel. Low plasticity slightly moist	CL	2.75	
13	101294 (1555) 12-18	5	6	SAA	CL	2.75	HNU = 0 ppm BX = 0 cpm
		9	6	SAA	CL	2.75	
14 RAD	101295 101296 (1630) 12-18	14	6	Very stiff. 5Y (5/3) Olive. Silty, gravelly clay. Low Plasticity. Slightly moist.	CL	3.5	HNU = 0 ppm BX = 0 cpm
RAD	101297 101298 (1630) 12-18	15	6	SAA	CL	3.5	
15							

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment Bombacher Mobile Drill

Driller: Elay Gardner

Scott Jamison

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS Elutr		
BORING NUMBER: 1743	COORDINATES:	DATE 12/18/91	
ELEVATION: 589.5	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 11 OF ~~8~~ 10	

CY 01-15-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	101299 101300 (1633) 12-18	18	6	Very stiff. 5Y (5/3) Olive. Silty, gravelly clay. Low plasticity, slightly moist.	CL	3.0	
		21	0		NA	NA	
16		Shelby Tube	8in	Very stiff. 5Y (5/3) Olive. Silty clay with gravel & large limestone pieces. Low plasticity. Slightly moist.	CL	3.75	Not enough recovery; Archive sample 101302 (0950) HNU=0ppm 12/19/91 RX=0cpm
17							
18							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Bombadier Mobile Drill

Driller: Clay Gardner, Dan Jamison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/19/91	
ELEVATION: 589.5	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 8 10	

CB 01-15-92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18							
19	101303 101304 (0026) 12-19 RAD → DSP 11/13/92		34	Very stiff. 5Y(5/3) Olive. Silty clay with large limestone pieces + gravel. Low plasticity. Slightly moist.	CI	3.5	HNU=0ppm BG=0cpm
19							
		Shelby Tube					
20							
21							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Elay Gardner
Dan Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/19/91	
ELEVATION: 589.5ft	GWL: Depth Date/Time	DATE STARTED: 12/18/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/19/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby Tube					
		Shelby Tube					
22	101306 RAD→101307 (1055) 12-19	7	6	Stiff. BY(5/3) Olive silty clay with gravel. Low plasticity & moist	CI	1.5	HNU = 0ppm BZ = 0cpm
	101308 RAD→101309 (1055) 12-19	14	4	SAA	CI	1.5	
23		17					
		20					
24							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bombardier Mobile Drill

Y: Elgy Gardner
Don Samison

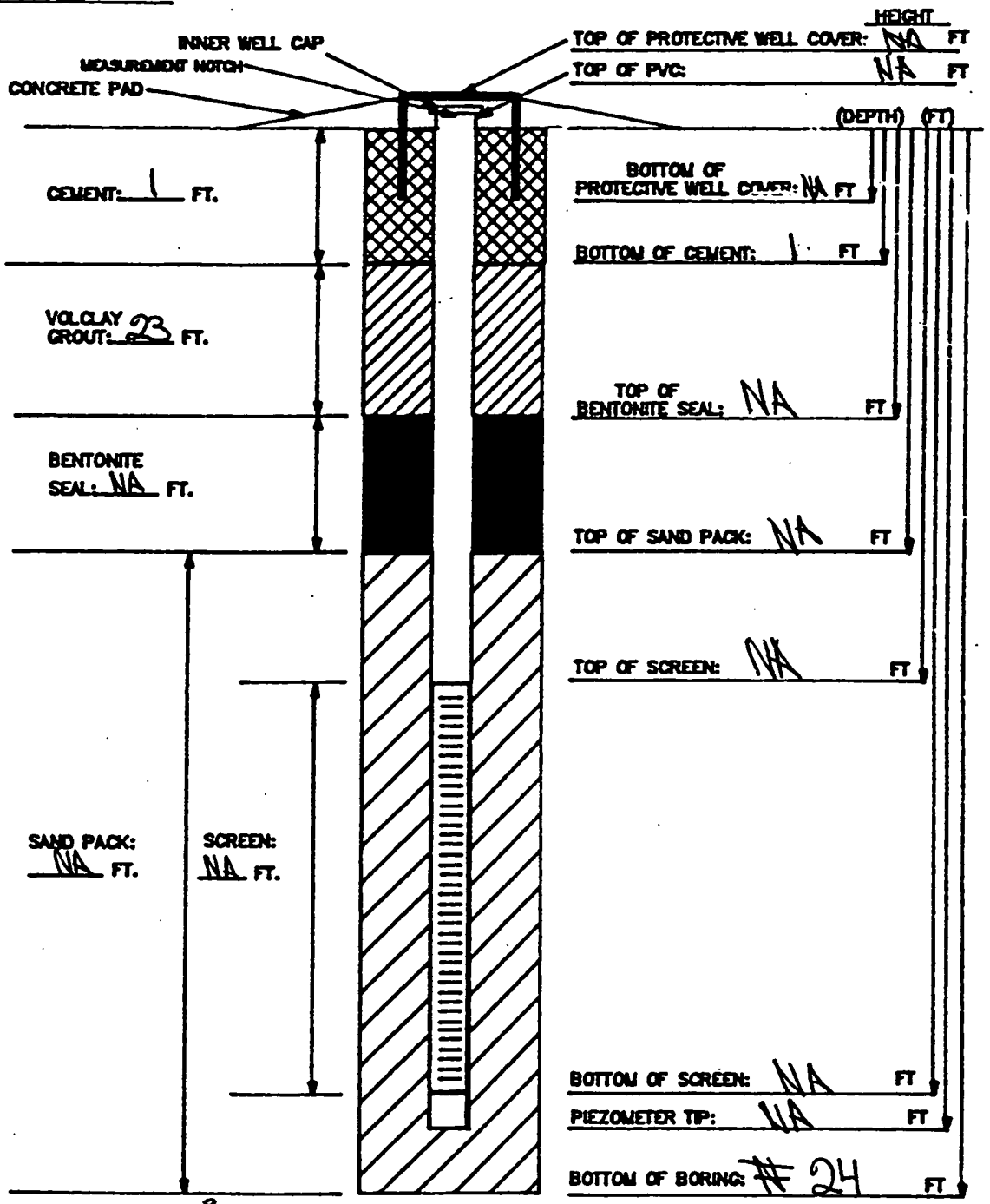
402-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1743

INSTALLATION DATE: 12/19/91



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 bags
AMOUNT OF CEMENT: ½ sk
AMOUNT OF WATER USED:
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUME FIELD ENG./GEO. D. O'Brien DATE 12/19/9
PROJECT NO. 9602-3.22 CHECKED BY C. Grube DATE 01-15-92
BORING NO. 1743
PIEZOMETER NO. NA DATE OF INSTALLATION 12/19/91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP ~~0.0~~ 1.0 (12/19/91)	BOTTOM 24.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	24.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602 3.22	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: 1744	COORDINATES: N 478,500 E 1,383,000	DATE 12-17-91
ELEVATION: Est 592'	GWL: Depth Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-17-91
DRILLING METHODS: AUGER		PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (JEH 1-14-92)
	100701 1023 12-17-91	2	6	Firm (10YR 3/6) Dark yellowish Brown Silty Clay, with Rootlets Low Plasticity, Moist.	CL	1.25	HNU = Ø PPM BG = Ø CPM above Back GROUND.
		5	9 (JEH 1-14-92) 3	A/A	CL	1.25	Trip/Field Blank 100702
1		5	0	NO RECOVERY	NA	NA	
	100702 1028 12-17-91	6	6	HARD (10YR 5/8) yellowish brown Silty Clay, No plasticity, Dry	CL	2.75	HNU = Ø PPM BG = Ø CPM above Back GROUND
2		9	10 (JEH 1-14-92) 4	A/A	CL	2.75	
		12	0	NO RECOVERY	NA	NA	
3							

NOTES:
Drilling Contractor: Penn Drilling
Drilling Equipment: Mobil Drilling Rig #80
Driller: Bobby Yost
Kevin Myers
Sample tech. Vern Larger

A/A = as above

Back ground
HNU = Ø ppm
BG = 40-50
No OVA meter at office

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602 3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1744	COORDINATES: N 478,000 E 1,383,000	DATE 12-19-91
ELEVATION: Est. 592'	GWL: Depth Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-17-91
DRILLING METHODS: AUGER		PAGE 2 OF ~~4~~ 6

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DLM 1-14-92)
3	100703 1030 12-17-91	8	6	VERY Stiff (10YR 6/8) brownish yellow, Silty Clay, No plasticity DRY.	CL	4.25	HNU = Ø ppm BG - Ø cpm above Back ground
		13	6 (12) DLM 1-14-92	HARD (10YR 6/8) brownish yellow, Silty Clay, No plasticity DRY.	CL	4.0	
4		11	0	No Recovery	NA	NA	
	1038 12-17-91 100704 Rad 100707	13	6	HARD (10YR 5/4) yellowish brown Clay, No plasticity, DRY	CL	4.5	HNU = Ø ppm BG = Ø cpm above Background
5	100705 Rad 100709	18	6 (18) DLM 1-14-92	HARD (10YR 5/4) yellowish brown Clay No plasticity, DRY.	CL	4.5	
	100706 Rad 100709	20	6	HARD (10YR 5/4) yellowish brown Clay, No plasticity, DRY (Limestone Rock was Jammed in the end of split spoon)	CL	4.5	

NOTES:
Drilling Contractor Refer to Page 1.
Drilling Equipment
iller:

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602 3.22	PROJECT NAME: Fernald RI/FS EWMF	
BORING NUMBER: 1744	COORDINATES: N:478,500 E 1,383,000	DATE 12-17-91
ELEVATION: Est 592'	GWL: Depth Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST G. Marshall	Depth Date/Time	DATE COMPLETED: 12-17-91
DRILLING METHODS: AUGER		PAGE 3 OF ~~4~~ 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		25	0	NO RECOVERY	NA	NA	
	100710 1043 12-17-91	10	6	HARD (2.5Y 5/3) light olive brown Clay, with TRACES of fine gravel No plasticity, DRY	CL	4.0	HNU = Ø ppm BK = Ø cpm above Background.
7		16	4 ~~10~~ DEM 1-14-92	A/A	CL	DEM ~~4.5~~ 1-14-92	
		16	0	NO RECOVERY	NA	NA	
8	100711 1115 12-17-91 ARCHIVE	Shelby tube	12	VERY stiff (2.5Y 5/3) Light olive brown, Modled with (2.5 N5/) GRAY, gravelly Clay with Cobbles, Low plasticity, Moist.	CL	3.0	HNU = ØPPM BK = Ø cpm above Background
9							DROVE Shelby tube 1 foot hit Rock Will TRY to AUGER PASS it. Tube CRUSHED 6in. ON THE END.
10				No Sample taken			

NOTES:

Drilling Contractor Refer to Page 1.

Drilling Equipment

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 9602.3.22	PROJECT NAME. FERNALD RI/FS EWMF	
JRING NUMBER: 1744	COORDINATES: N: 478,500 E 1,383,000	DATE 12-17-91
ELEVATION: Est. 592'	GWL: Depth Date/Time	DATE STARTED: 12-17-91
ENGINEER/GEOLOGIST. G. Marshall	Depth Date/Time	DATE COMPLETED: 12-17-91
DRILLING METHODS: AUGER		PAGE 4 OF ~~4~~ 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BPM 1-14-92)
10				No Sample taken			Augering pass Rocks. found Large Cobble in the Auger.
11	1330 100712 12-17-91	Shelby Tube		HARD (2.5y 5/4) Light olive Brown, gravelly Clay, Low Plasticity, Moist	CL	4.5	HNU = Ø ppm BY = Ø cpm above Background. Could only push tube 1 foot.
	1330 100713 12-17-91			Very Soft (2.5 4/3) olive brown Clayey Gravels w Traces of Cobbles. wet	GC	~~2~~ .25 (BPM 1-14-92)	Hit Perched water ---- Plug Boring
12	1340 100714 12-17-91 & Rad	24 SCREEN	6	MEDIUM DENSE (2.5 4.3) olive brown Clayey Gravels increase in the amount of fines. WET.	GC	NA	HNU = Ø ppm BY = Ø cpm above Background
		32	6 ~~15~~ (BPM 1-14-92)	A/A	GC	NA	END of ← weathering Zone.
BPM		20	3	HARD (5y 5/1) gray, Clay No plasticity. DRY. ~~No Recovery~~ (BPM 1-14-92)	CL	~~2~~ 4.5 (BPM 1-14-92)	Total Depth of Boring 13.5' Plug Boring after Hitting Perched water

NOTES:

Drilling Contractor Refer to Page 1

Drilling Equipment

iller:

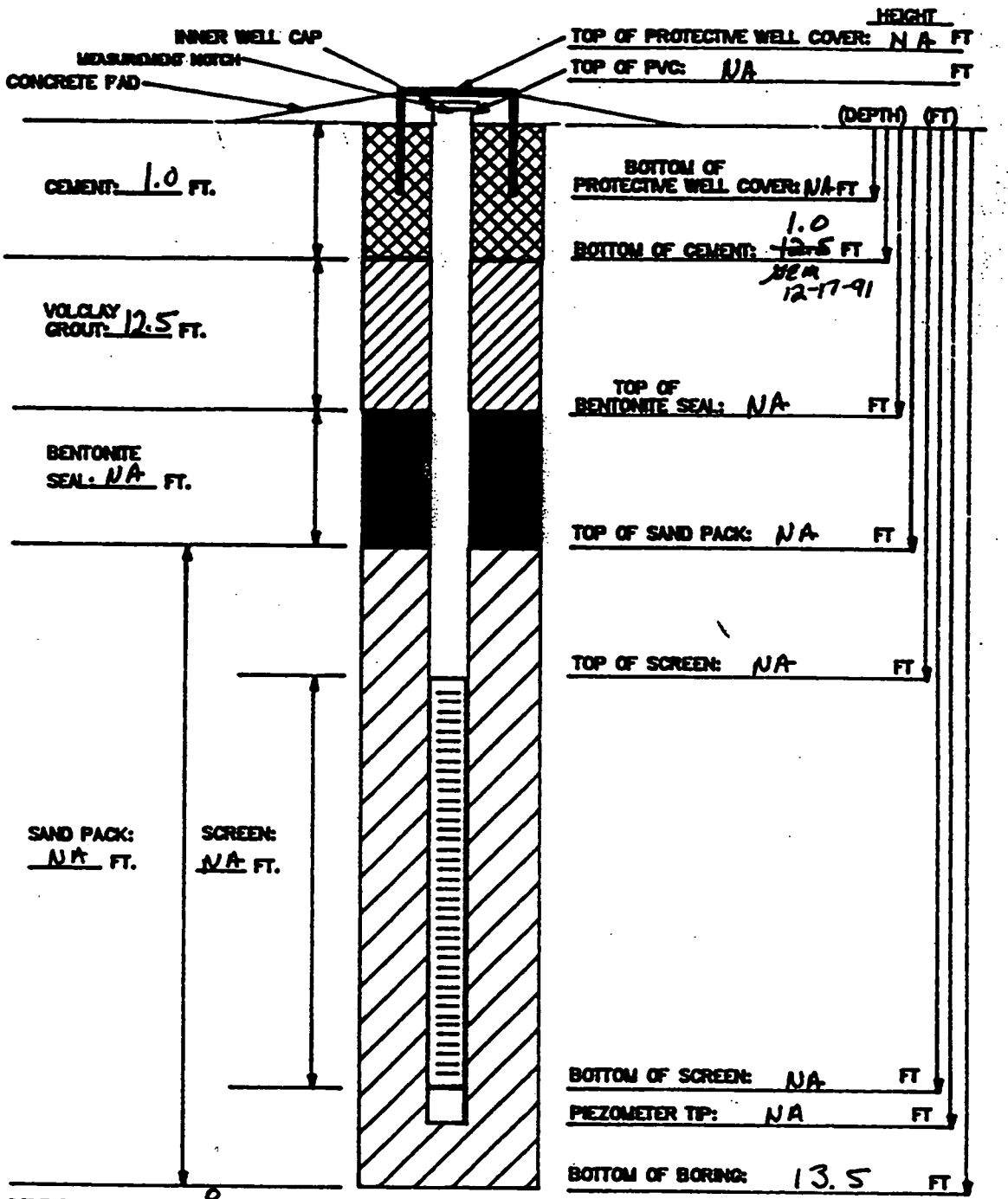
USED 1 Bag of Volclay
25 gals of water
1 Bag Cement.

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1744

INSTALLATION DATE: 12-17-91



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 25 gallons
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: G. MARSHALL

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/FS EWMF
FIELD ENG./GEO. DE Marshall DATE 1-14-92
PROJECT NO. 9602 3.22
CHECKED BY CGruber DATE 01-15-92
BORING NO. ~~1748~~ DEM 1-14-92 1744
PIEZOMETER NO. NA
DATE OF INSTALLATION NA.

BOREHOLE DRILLING

DRILLING METHOD AUGER	TYPE OF BIT AUGER BIT.
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 13.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 1.0' of cement from 0.0 to 1.0

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9102-3.22	PROJECT NAME: Fernald RI/FS EWMF	
BORING NUMBER: 1745	COORDINATES:	DATE: 12/16/91
ELEVATION: 586 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	101253 (1330) 12-16	5	6	Stiff. 10YR (5/4) Yellowish brown. Silty clay. Low Plasticity. Moist	CI	1.0	HNu = 0ppm BX = 0cpm
		5	5	SAA	CI	1.0	
1		7	0	No Recovery.	NA	NA	
		8	0	No Recovery.	NA	NA	
2		5	6	Very Stiff. 10YR (5/4) Yellowish brown. Silty clay. Low Plasticity. Moist.	CI	2.75	HNu = 0 ppm BX = 0 ppm
		11	6	SAA	CI	2.75	
3							

NOTES:

Drilling Contractor: Pinn Drill

Drilling Equipment:

Driller: Elay Gardner
Dan Jameson

Background
HNu = 0 ppm
BX = 40 ppm

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9102-S.22	PROJECT NAME. Fernald RI/FS FCUMF		
BORING NUMBER: 1745	COORDINATES:	DATE 12/16/91	
ELEVATION: 586 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 9 11	

DEPTH 1 ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3		14	1	Hard. 10YR(5/4) Yellowish brown. Silty Clay. Low Plasticity. Moist	Cl	4.5	
		17	0	No Recovery.	NA	NA	
4		8	0	No Recovery.	NA	NA	HNu=0ppm BX=0cpm
RAD→	101254 101255 (1400) 12-16	16	4	Stiff. 10YR(5/4) Yellowish brown. Silty clay with sand & gravel. Low Plasticity Moist	Cl	2.0	
5 RAD→	101256 101257 12-16	18	6	Hard. 10YR(5/4) Yellowish brown. Silty clay with sand & gravel. Moist.	Cl	>4.5	
RAD→	101258 101259 12-16	20	6	SAA	Cl	4.5	
6							

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment

Iler: Eloy Gardner

Dan Tomson

001881

402-11-86

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9402-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1745	COORDINATES:	DATE: 12/16/91	
ELEVATION: 586 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Augs		PAGE 3 OF 9 11	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6 Shelby RAD	101260 101261 (1580) 12-16		30"	Stiff. 10YR (5/4) Yellowish brown. Silty Clay with some sand. Low Plasticity Moist.	Cl	1.75	HNu=0 ppm BX=0 cpm
		Shelby					
7							
		Tube					
8							
RAD 9	101262 (1580) 12-16						

NOTES:
Drilling Contractor: Penn Drill
Drilling Equipment:
Driller: Elay Gardner, Dan Jameson

Shelby tube pushed from 6.0-8.0 FT

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9102-3.22	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1745	COORDINATES:	DATE 12/17/91	
ELEVATION: 5816 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 9 11	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9	10-12 (0900) 12-17	11	6	Stiff, 10YR (5/4) Yellowish brown. Silty clay. Low Plasticity. Moist	cl	1.75	HNU = 0 ppm BG = 0 cpm
		47	6	SAA	Cl	1.5	
10		9	6	SAA	cl	2.5	
		14	0	No Recovery	~~CL~~ 1/15/92	~~1.7~~	
11		13	6	SAA, some sand	cl	1.5	HNU = 0 ppm BG = 0 cpm
		21	6	SAA, very stiff	cl	3.0	
12							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment:

Driller: Elay Gardner, Don Jamison

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/17/91	
ELEVATION: 535.6 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 8 11	

DEPTH 12	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (01-14-92)
	101264 (0900) 12-17	20	5	Stiff. 5Y (5/3) Olive. Silty clay with some sand. Low plasticity, moist.	CL	1.75	HNU = 0 ppm BG = 0 cpm
		13	0	No recovery.			
13	101265 (0925) 12-17	3	0	No recovery.			
		7	0	No recovery.			
14		9	6	Very stiff. 5Y (5/3) Olive. Silty clay with sand and gravel. Low plasticity. Moist.	CL	2.5	HNU = 0 ppm BG = 0 cpm
15		17	1	SAA	CL	2.75	

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: Mobile Drill

Driller: Clay Gardner, Bob Jamison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9402-3.22	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1743	COORDINATES:	DATE 12/17/91	
ELEVATION: 531.4 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Augers		PAGE 6 OF ~~8~~ 11	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSIS/ENCY (TSF)	REMARKS
15		5	0	No Recovery			HNU=0 ppm BX=0 cpm
		11	0	No Recovery			
16	RAD 101266 101267 (0940) 12-17	14	6	Very Stiff. 5Y (5/3) Olive, silty clay w/sand & gravel Low plasticity, Moist	CL	2.75	
	RAD 101268 101269 (0940) 12-17	17	6	HARD. 5Y (5/3) Olive, silty clay w/sand & gravel. Low plasticity, moist.	CL	4.25	
17	RAD 101270 (1020) 101271 12-17	Shelby Tube	25"	Very Stiff. 5Y (5/3) Olive. Silty clay w/ sand & gravel, Low plasticity, moist.	CL	2.5	HNU=0 ppm BX=0 cpm
18							

NOTES:

Drilling Contractor: PENN DRILL

Drilling Equipment:

ler: Clay Gardner
Dan Samison

Shelby tube pushed from 17 to 20 FT

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 1748	COORDINATES:	DATE: 12/17/91
ELEVATION: 584 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER/PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18							
19	Tube						
	Shelby						
20	RAD 101272 110301 12-17	6	0	No Recovery			
		14	0	No Recovery.			
21							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment:

Driller: Clay Gardner, Dan Samison

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9102-3.22	PROJECT NAME: Fernald RI/FS FLUME	
BORING NUMBER: 1745	COORDINATES:	DATE: 12/17/91
ELEVATION: 586 ft	GWL: Depth Date/Time	DATE STARTED: 12/16/91
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 8 11.

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
21		14	0	No Recovery			
		19	0	No Recovery			
22		9	0	No Recovery			
		18	0	No Recovery			
23		21	0	No Recovery			
		24	0	No Recovery			
24							

NOTES:

Drilling Contractor: PENN DRILL

Drilling Equipment:

Elgy Gardner
Bob Samison

402-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 9602-3.22	PROJECT NAME. Fernald RI/FS FLUMP		
BORING NUMBER: 1745	COORDINATES:	DATE 12/17/91	
ELEVATION: 554	GWL: Depth Date/Time	DATE STARTED: 12/16/91	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 12/17/91	
DRILLING METHODS: Hollow Stem Augr		PAGE 9 OF 9	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
24		9	0	No Recovery			
		14	0	No Recovery			
25	101223 101224 (1445) 12-17	9	6	Very Stiff, 5Y (5/3) Olive. Silty clay with sand & gravel. Low Plasticity. Moist.	Cl	2.0	HNU=0 ppm RD=0cpm
RAD 26	101225 101226 (1445) 12-17	18	6	Hard. 5Y (5/3) Olive. Silty clay with sand & gravel low plasticity. Moist.	Cl	4.5	
RAD 27	101227 101228 (1445) 12-17	21	6	Very Stiff. 5Y (5/3) Olive Silty clay with sand & gravel. Low plasticity Moist.	Cl	2.5	
RAD	101229 101230 (1445) 12-17	24	6	Very Stiff. 5Y (5/3) Olive Silty clay with sand & gravel. Low plasticity. Moist	Cl	3.0	

NOTES:

Drilling Contractor: PENN DRILL

Drilling Equipment: Mobile Drill

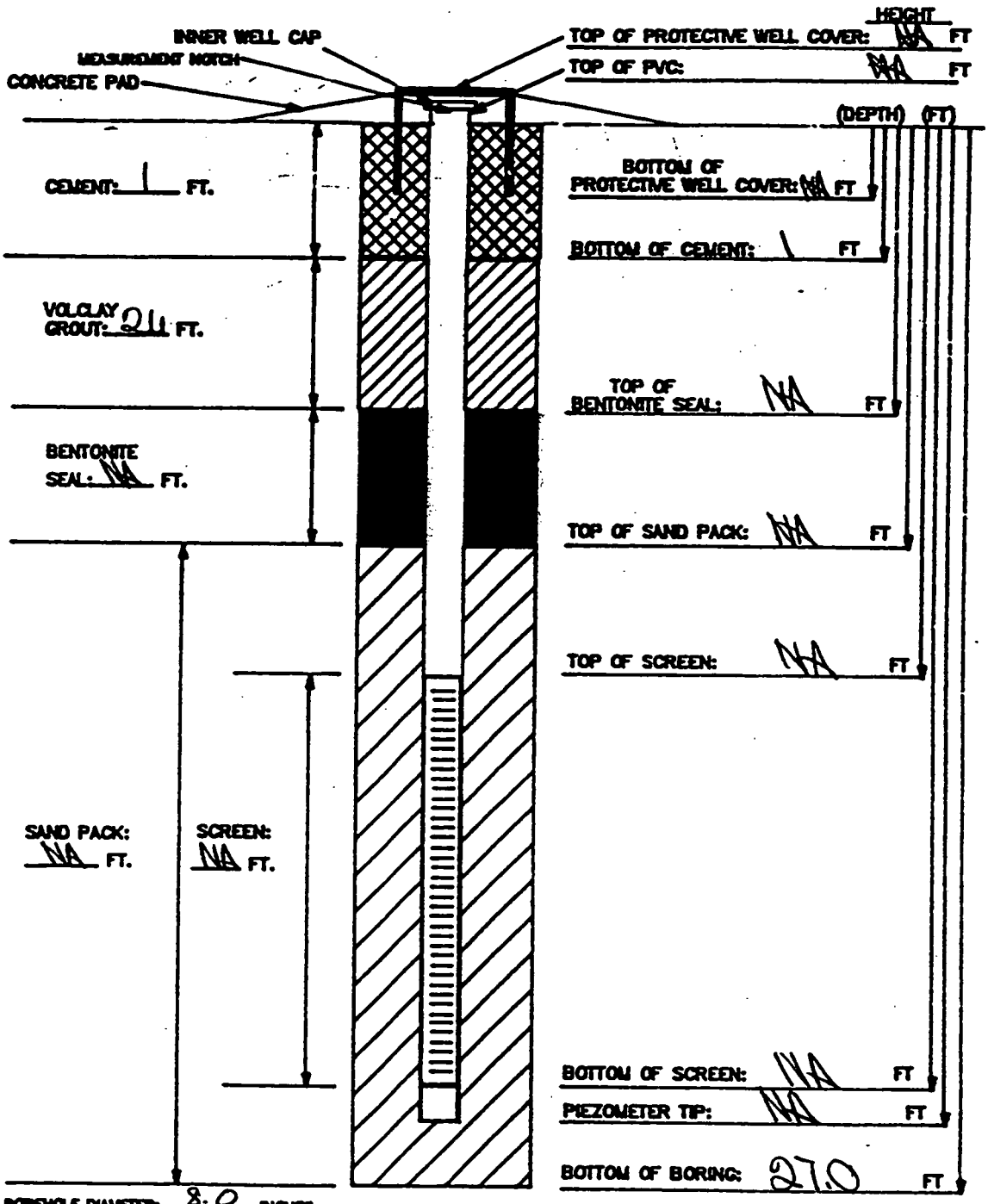
Driller: Clay Gardner
Don Jamison

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1745

INSTALLATION DATE: 12/17/91



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 Bags.
AMOUNT OF CEMENT: 1/2 sk
AMOUNT OF WATER USED:
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22. GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUXX FIELD ENG./GEO. D. O'Brien DATE 12/17/91
PROJECT NO. 9602-3.22 CHECKED BY C. Gaulke DATE 01-16-92
BORING NO. 1745
PIEZOMETER NO. NA DATE OF INSTALLATION 12/17/91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 27.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	27.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0-1.0 ft. cement cap

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: 1746	COORDINATES: N 478,000 E 1,382,500	DATE 12-16-91
ELEVATION: Est. 593'	GWL: Depth Date/Time	DATE STARTED: 12-16-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-16-91
DRILLING METHODS: AUGER		PAGE 1 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100687 11:10 12-16-91	5	↑ 6	Stiff (10YR 3/6) Dark yellowish Brown, Silty Clay, with Root Lets, No plasticity Dry	CI	1.5	HNU = Ø ppm Bγ = Ø cpm above Back ground
		7	0	No Recovery	NA	NA	Trip/field Blank 100688
1.		7	0	A/A	NA	NA	
	100689 13.50 12-16-91	13	↑ 6	HARD (10 YR 4/6) Dark yellowish Brown, Silty clay, Trace of Gravel, No Plasticy, Dry.	CI	DEM ~~41.5~~ 1-14-92 24.5	HNU = Ø ppm Bγ = Ø cpm above Back ground
2		12	0	No Recovery	NA	NA	
		16	0	A/A	NA	NA	

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Mobil Drilling Rig 80

Driller: Bobby Vest, Kevin Myers

Sample Tech: VERN LARGER

Color from Munsell Color Chart

A/A - As Above DEM 1-14-92

Background HNU = Ø ppm, Bγ = 40 cpm, α = No meter

Nodometers At Office.

001671

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1746	COORDINATES: N478,800 E1,382,500	DATE 12-16-91
ELEVATION: Est 593'	GWL: Depth Date/Time	DATE STARTED: 12-16-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-16-91
DRILLING METHODS: AUGERS		PAGE 2 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3	100689 1555 12-16-91	16	6	HARD (10YR 6/4) Light yellowish Brown, Silty Clay, with gravel No plasticity, DRY.	CL	BEM 1-14-92 <4.5 >4.5	HNU = Ø ppm BY = Ø cpm above Background.
		28	BEM 1-14-92 ~~15~~ 6	HARD (10YR 6/4) Light yellowish Brown, Silty clay, with gravel No Plasticity Dry	CL	BEM 1-14-92 <4.5 >4.5	
4		27	3	HARD (10YR 6/4) Light yellowish Brown, Silty clay, with gravel No plasticity, DRY ~~No Recovery~~ BEM 1-14-92	CL	BEM 1-14-92 <4.5 >4.5	
	100690 1400 12-16-91	12	6	HARD (10YR 4/4) DARK yellowish Brown, Silty clay with some gravel, No Plasticity, DRY	CL	BEM 1-14-92 <4.5 >4.5	HNU = Ø ppm BY = Ø cpm above Background.
5	Rad Screen 100693						
	100691 1400 12-16-91	13	6 ~~17~~ BEM 1-14-92	HARD (10YR 4/4) DARK yellowish Brown, Silty clay with some gravel No plasticity, DRY	CL	BEM 1-14-92 <4.5 >4.5	
	Rad Screen 100694						
	100692 1400 12-16-91	14	5	HARD (10YR 4/4) Dark yellowish Brown, Silty clay with some gravel, No plasticity, DRY.	CL	BEM 1-14-92 <4.5 >4.5	
6	Rad Screen 100695						

NOTES:

Drilling Contractor: See Page 1

Drilling Equipment:

Driller:

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602 3.22	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: ~~1446~~ 1746	COORDINATES: N 478,000 E 1,382,000	DATE 12-16-91
ELEVATION: Est 593'	GWL: Depth Date/Time	DATE STARTED 12-16-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-16-91
DRILLING METHODS: AUGER		PAGE 3 OF ~~4~~ 6

DEPTH 14.1	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DEM 1-14-92)
6		13	0	NO RECOVERY.	NA	NA	
	100696 1405 12-16-91	18	6	HARD (10YR 5/6) yellowish brown, gravel clay, no plasticity, DRY	CL	~~>4.5~~ 1.5 >4.5	HNU = Ø PPM BK = Ø CPM above Background
7	100697 1405 12-16-91	19	6 (16) DEM 1-14-92	medium stiff (10YR 5/4) yellowish brown, very fine clayey sand, no plasticity, moist	SC	1.0	
	100697 1405 12-16-91	16	4	medium stiff (10YR 5/4) yellowish brown, very fine clayey sand, no plasticity, moist ~~NO RECOVERY~~ DEM 1-14-92	SC	1.0	
8	100697 1410 12-16-91 Rad Screen 100697	20	6	very soft. (10YR 5/4) yellowish brown mottled w (10YR 5/1) gray very fine clayey sand, no plasticity, wet	SC	.25	HNU = Ø PPM BK = Ø CPM above Background. Hit Perched water at 8.0'
		22	~~10~~ DEM 1-14-92 4	very soft (10YR 5/4) yellowish brown, very fine clayey sand, no plasticity, ~~moist~~ wet. ~~NO RECOVERY~~ DEM 1-14-92	SC	.25	
9							

NOTES:

Drilling Contractor: See Page 1

Drilling Equipment:

Driller:

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602.3.22	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: 1746	COORDINATES: N 478,000 E 1,382,000	DATE 12-16-91	
ELEVATION: est 593'	GWL: Depth Date/Time	DATE STARTED: 12-16-91	
ENGINEER/GEOLOGIST: G Marsh II	Depth Date/Time	DATE COMPLETED: 12-16-91	
DRILLING METHODS: Auger		PAGE 4 OF ~~4~~ 6	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BCM 1-14-92)
		17	0	No Recovery	NA	NA	
9.5	1527 100698 12-16-91			very stiff (2.5 4/3) olive brown, gravelly clay, Low plasticity, moist.	Cl	2.75	HNU = ∅ ppm BG = ∅ cpm above Background
	1527 12-16-91 100699			very soft (2.5 4/3) olive brown Clayey Gravels, No plasticity. wet.	GC	.25	
10.5	100800 1527 12-16-91	Shelby Tube	19	very stiff (2.5 4/3) olive brown gravelly Clay, Low Plasticity, moist.	Cl	2.50	
11.5				No Recovery			
12.5				Total Depth 12.5'			

NOTES:

Drilling Contractor See page 1

Drilling Equipment

Driller:

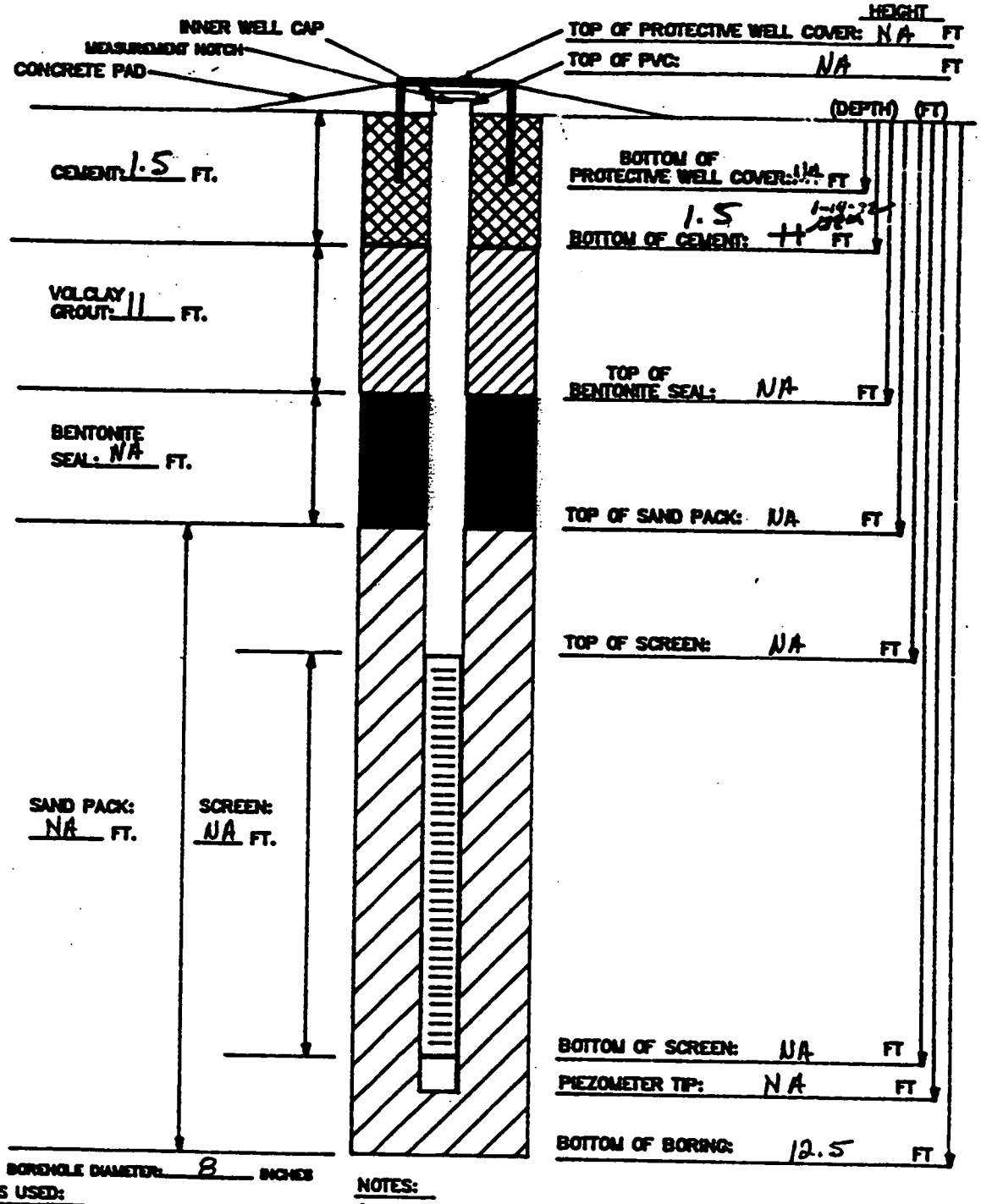
USED 1 Bag of Volclay.
1 Bag of Cement.

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1746

INSTALLATION DATE: 12-16-91



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA.
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: ~~50 gals~~ 25 gals
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22

GEOLOGIST/ENGINEER: G. Marshall

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS (EWMF) FIELD ENG./GEO. GE Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY C. Gruber DATE 01-15-92
BORING NO. 1746
PIEZOMETER NO. NA DATE OF INSTALLATION NA.

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger Bit.
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0 ~~593' 0.0~~ bem 1-14-92		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.5	BOTTOM 12.5	TOP 591.5'	BOTTOM 580.5'
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	12.5		580.5	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS Put 1.5' of cement plug from 0.0 to 1.5.

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.22	PROJECT NAME. FEMP RI/FS EWMF		
BORING NUMBER: 1747	COORDINATES:	DATE 12-10-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91	
ENGINEER/GEOLOGIST. P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 8	

AC 12-12-91

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS βγ = 20 CPM (background)
0	101226 1446 12-10-91	2	6	MEDIUM STIFF (10YR 4/6) DARK YELLOWISH BROWN SILTY CLAY. ABUNDANT ROOTS AND ORGANIC MATERIAL SLIGHTLY MOIST.	CL	0.5	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
ARCHIVE		3	6	VERY STIFF (10 YR, 4/6) DARK YELLOWISH BROWN SILTY CLAY, LESS ORGANIC MATERIAL. SLIGHTLY MOIST LOW PLASTICITY	CL	3.5	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
1		5	3	HARD, SAA	CL	>4.0	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
ARCHIVE	~~1453~~ PL 12-10 101251	12	0	NR	NA	NA	
2	101227 1453 12-10	15	6	DENSE (2.5Y 6/6) OLIVE YELLOW CLAYEY SILT, WITH SOME MINOR SAND DRY. LOW PLASTICITY. TRACE GRAVEL	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
DISTURBED GEOTECH		21	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
3							

NOTES:

DRILLERS: PENNSYLVANIA DRILLING
ELOY GARDNER
DAN JAMISON (HELPER)

SAMPLE TECH: CHRIS JOHNSON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 1747	COORDINATES:	DATE 12-10-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 8	

PC 12-10-91

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3	1500 ~~12-10~~ PC 12-10	28	6	DENSE (2.5Y 6/6) OLIVE YELLOW CLAYEY SILT WITH MINOR SAND AND SOME GRAVEL DRY.	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
DISTURBED GEOTECH		20	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
4		20	2	SAA	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
	1522 12-10	20	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
5 DISTURBED GEOTECH		20	6	SAA	ML	NA	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
DISTURBED GEOTECH 6	101228 PC ~~12-10~~ 12-10	24	2	STIFF (10YR 5/4) YELLOWISH BROWN ~~SLIGHT~~ SILTY CLAY PC 12-10 WITH TRACES OF SAND ~~AND GRAVEL~~ PC 12-10. PLASTIC ~~SLIGHTLY~~ MOIST. PC 12-10	CL	1.5	HNU = 0 ppm α = 0 cpm βγ = 20 cpm

NOTES:
DRILLERS: PENNSYLVANIA DRILLING
ELGY GARDNER
DAN JAMISON (HELPER)
SAMPLE TECH: CHRIS JOHNSON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.22	PROJECT NAME. FEMP RI/FS EWMF PC	
BORING NUMBER: 1747	COORDINATES:	DATE 10-12-10-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91
ENGINEER/GEOLOGIST. P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF ~~6~~ 8

PC 12-12-91

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	1548 12-10	22	6	MEDIUM STIFF (10YR 5/4) YELLOWISH BROWN ~~LOAM~~ SILTY CLAY WITH SAND ~~AND SILT~~ PC 12-10 TRACES AND SOME INTERMITTENT GRAVEL PC 12-10 SLIGHTLY PLASTIC, ~~SLIGHTLY~~ MOIST. PC 12-10	CL	0.75	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
DISTURBED GEOTECH		22	6	SAA.	CL	0.75	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
7		26	6	SAA.	CL	0.75	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
	1604 12-10	14	6	SAA WITH SOME LARGER CHUNKS OF GRAVEL PRESENT	CL	0.75	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
8 DISTURBED GEOTECH		16	6	SAA ONLY MEDIUM STIFF	CL	1.5	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
		21	6	VERY STIFF, PC ~~B~~ OTHERWISE SAA 12-10	CL	3.5	HNU = 0 ppm α = 0 cpm β γ = 20 cpm
9							

NOTES:
DRILLERS - PENNSYLVANIA DRILLING
ELGY GARDNER
DAN JAMISON (HELPER)
SAMPLE TECH - CHRIS JOHNSON

NA - NOT APPLICABLE
NR - NO RECOVERY
SAA - SAME AS ABOVE

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF	
BORING NUMBER: 1747	COORDINATES:	DATE 12-11-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 4 OF ~~6~~ 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (PC 12-12-91) βγ = 20 cpm background
9	101229 12-11 1000	NA	12	MEDIUM STIFF (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY SILT. SOME SMALL GRAVEL. SLIGHTLY MOIST	CL	0.8	SHELBY TUBE PUSHED 9'-12'. DENTED BOTTOM, CONTENTS REMOVED, ARCHIVED. ATTEMPT ANOTHER SHELBY 12'-15'
10		NA	12	SAA	CL	1.0	HNU=0 ppm α = 0 cpm βγ=20 cpm
11			4	STIFF (10YR, 5/6) YELLOWISH BROWN SILTY CLAY WITH SOME GRAVEL. LOW PLASTICITY, SLIGHTLY MOIST	CL	1.25	
12	101230 12-11-91 1200			MEDIUM STIFF (10YR, 4/4 → 5/6) YELLOWISH BROWN SILTY CLAY WITH SOME GRAVEL. MOIST AND PLASTIC. (12-11-91)	CL	1.0	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
13	101231 RAD SCREEN (TOP)	SHELBY TUBE PUSHED	30				
14	101232 RAD SCREEN (BOTTOM)	12.0-14.5'		PC 12-11-91 ~~HARD~~ STIFF (5Y, 5/1) GRAY CLAY WITH SOME LARGE GRAVEL. MOIST AND PLASTIC.	CL	1.5	HNU=0 ppm α = 0 cpm βγ = 20 cpm PC 12-11-91
15	101246 1305 12-11	15	0	NR	NA	NA	HNU = ~~20~~ 0 ppm α = 0 cpm βγ=20 cpm (12-11-91)

NOTES:
PENNSYLVANIA DRILLING
DRILLER - E. GARDNER
HELPER - D. JAMISON
SAMPLE TECH - C. JOHNSON

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.22	PROJECT NAME: FEMP RI/FS EWMF		
BORING NUMBER: 1747	COORDINATES:	DATE 12-11-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91	
ENGINEER/GEOLOGIST: P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 5 OF 68	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (AC 12-12-91) βγ=20cpm background
15	101233 1313 12-11 (RAD SCREEN, TOTAL U βγ SPEC)	6	6	STIFF, MEDIUM DENSE (5Y, 5/1) GRAY CLAY WITH MINOR SILT AND SOME GRAVEL. MOIST AND PLASTIC	CL	1.75	HNU=0 ppm α=0 cpm βγ=20 cpm
	101247 1313 12-11	8	0	NR	NA	NA	ATTEMPTED GEOCHEM SAMPLE, BUT INSUFFICIENT RECOVERY, SO SAMPLE WAS USED FOR RAD SCREEN AND TOTAL U βγ SPEC. (101233)
16		11	0	NR	NA	NA	ATTEMPT ANOTHER GEO AT 17'-19'.
		21	0	NR	NA	NA	
17	101234 1340 12-11 GEOCHEM PC (234 GEOCHEM, 235 RAD SCREEN)	34 (PC 12-11-91)	6	VERY STIFF, VERY DENSE (5Y, 5/1) GRAY CLAY. CONTAINS SOME SILT AND GRAVEL (SOME QUITE LARGE) MOIST AND PLASTIC	CL ~~2.5~~ PC (12-11-91)	2.5	HNU=0 ppm α=0 cpm βγ=20 cpm
	101235 12-11 1340 (236 GEOCHEM, 237 RAD SCREEN)						
	101236 12-11 1340						HNU=0 ppm α=0 cpm
	101237 12-11 1340	30	6	SAA	CL ~~3.0~~ PC (12-11-91)	3.0	βγ=20 cpm
18							

NOTES: PENNSYLVANA DRILLING
DRILLER - E. GARDNER
HELPER - D. JAMISON
SAMPLE TECH - C. JOHNSON

NA - NOT APPLICABLE
SAA - SAME AS ABOVE
NR - NO RECOVERY

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.22	PROJECT NAME. FEMP RI/FS EWMF		
BORING NUMBER: 1747	COORDINATES:	DATE 12-11-91	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-10-91	
ENGINEER/GEOLOGIST. P. CASSEDAY	Depth Date/Time	DATE COMPLETED: 12-11-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 6 OF ~~6~~ 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18	101238 12-11 1340 101239 12-11 1340	27	6	VERY STIFF, VERY DENSE (5Y, 5/1) GRAY CLAY, GRADING INTO A CLAYEY SILT WITH GRAVEL. MOIST.	CL	3.0	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
	101240 12-11 1340 101238 12-11 1340	21	6	SAA, with INCREASING SILTINESS	CL	3.0	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
19	101242 12-11 1440			VERY STIFF (5Y, 5/1) GRAY SANDY SILT. CONTAINS SOME GRAVEL. VERY WET	ML	3.0	HNU = 0 ppm α = 0 cpm βγ = 20 cpm
20		SHELBY TUBE PUSHED	30				SHELBY TUBE PUSHED WATER ENCOUNTER 21'-21.5' PERCHED TABLE. EMPTIED SHELBY, COLLECTED DISTURBED GEOTECH AND FULL RAD & RAD SCREEN. DRILLING HALTED
21	101243 12-11 1440						
				Bottom of Sampling 21.5 FT			

NOTES: PENNSYLVANIA DRILLING
DRILLER - E. GARDNER
HELPER - D. JAMISON
SAMPLE TECH - C. JOHNSON

SAA - SAME AS ABOVE
NA - NOT APPLICABLE
NR - NO RECOVERY

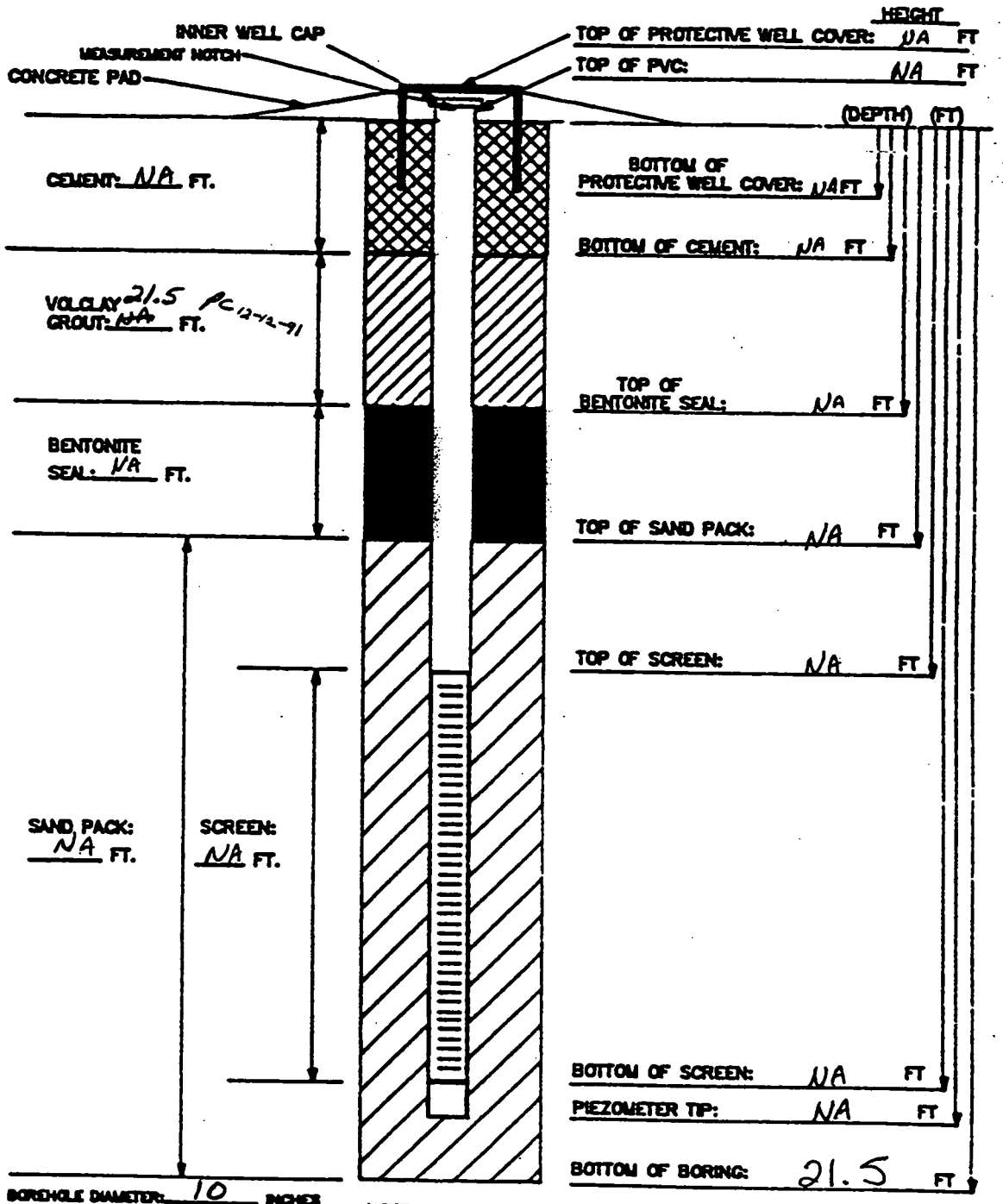
402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1747

HOLE GROUTED TO SURFACE UPON COMPLETION

INSTALLATION DATE: 12-12-91



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 8 bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: NA
OTHER: HOLE GROUTED TO SURFACE

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: EWMF 3.22 GEOLOGIST/ENGINEER: R. P. CASSEDAY

BORING (ID) 1747

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS EWMF
FIELD ENG./GEO. R.P. Casseday DATE 12-12-91
PROJECT NO. 602.3.22
CHECKED BY C Gruber DATE 01-15-92
BORING NO. 1747
PIEZOMETER NO. NA
DATE OF INSTALLATION 12-12-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
TYPE OF BIT Hollow Auger
DRILLING FLUID (S) USED: None
FLUID NA FROM — TO —
FLUID NA FROM — TO —
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 21.5ft	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	PC 12-12-91 ~~NA~~ 21.5 ft			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
IS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Boring 1747 was continuously sampled to depth of 21.5 ft then grouted to surface.

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 9602.3.22	PROJECT NAME FERNALD RI/FS (EWMF)	
BORING NUMBER: 17-48	COORDINATES N-477,300 E 1,382,500	DATE 12-9-91
ELEVATION: Est. 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 1 OF 9 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	100651 1330 12-10-91	3	6	Stiff (10YR 3/6) Dark yellowish Brown, Silty Clay, Silt, Rootlets DRY, No Plasticity	Cl	1.5	Trip Field Blank 100652
	100652 1330 12-10-91	5	6	MED Stiff (10YR 3/6) Dark yellowish Brown, Silty Clay, DRY No plasticity	Cl	1.0	HNU - ∅ PPM BY - ∅ CPM. Above Background
1	100653			Stiff (10YR 5/8) yellowish brn Clay Silty, DRY, No Plasticity	Cl	1.75	
		3	0	No Recovery	NA	NA	
	100653 1340 12-10-91	6		HARD (10YR 5/8) yellowish Brown, Silty Clay, DRY, No Plasticity	Cl	>4	HNU - ∅ PPM BY - 0 CPM. Above Background.
2		12	6	No Recovery	NA	NA	
		15	0		NA	NA	
3							

NOTES: Penn Drilling Co.
Mobil Drilling Rig. 80.
Driller - Bobby Yost
Drill Helper - Kevin Mayers
Sample Tech. Vern Larger

Background HNU = 0ppm
BY = 0-80cpm
α = 0 cpm.

No alpha meters at office

Color from Munsell color Chart

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS (FWMF)	
BORING NUMBER: 1248	COORDINATES: N-477300 E 1,382,800	DATE 12-9-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marsh II	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: AUGER		PAGE 2 OF 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BCR 1-14-92)
3	100653 1400 12-10-91	12	6	HARD (10YR 5/8) yellowish brown silty clay, No Plasticity, Dry	CI	>4 ~~<4~~ BCM 1-14-92	HNU = Ø PPM BG = Ø CPM above Background
	100653 1400 12-10-91	22	6 (13) BCM 1-14-92	HARD (10YR 5/8) yellowish brown silty clay, No Plasticity, Dry.	CI	>4 ~~<4~~ BCM 1-14-92	
4		21	1	AS ABOVE ~~NO RECOVERY~~ BCM 1-14-92	CI ~~NA~~ ~~BCM~~	>4 ~~NA~~ ~~1-14-92~~	
	100653 1420 12-10-91	21	↑	HARD (10YR 5/6) yellowish brown, silty clay w traces of gravel, No Plasticity, DRY	CI	>4 ~~<4~~ BCM 1-14-92	HNU = Ø PPM BG = Ø CPM. above Background
5	100653	18	(6) 0	NO RECOVERY	NA	NA	
6		12	0	NO RECOVERY	NA	NA	

NOTES:

Drilling Contractor: Refer to Page 1.

Drilling Equipment:

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS (EW MF)	
BORING NUMBER: 1748	COORDINATES: N 477,300 E 1,382,580	DATE 12-10-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 3 OF 9 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	100654 1515 12-10-91	11	6	Very stiff (10YR 5/3) Brown, Clay with sand and gravel High plasticity, moist.	CI	3.5	HNU = Ø PPM Br = Ø CPM above Background
	RAD SCREEN 100686						
	100654 1515 12-10-91	15	6 (18) 1-14-92	Stiff (10YR 5/3) Brown, Clay with sand and gravel High plasticity, moist	CI	1.75	
7	100654 1515 12-10-91	11	6	Very stiff (10YR 5/3) Brown, Clay with sand and gravel High plasticity, moist.	CI	2.75	
	100654 1525 12-10-91	11	6	Stiff (10YR 5/3) Brown, Clay with sand and gravel, Low Plasticity, moist.	CI	1.0	HNU = Ø PPM Br = Ø CPM above Background
8	RAD SCREEN 100686						
	100654 1525 12-10-91	13	6 (18) 1-14-92	Very Stiff (10YR 5/3) Brown, Clay with sand and gravel, Low Plasticity, moist	CI	2.0	
	100654 1525 12-10-91	11	6	Hard (10YR 5/3) Brown, Clay with sand and gravel, Low Plasticity, moist.	CI	4.0	
9							

NOTES:

Drilling Contractor: Refer to Page 1.

Drilling Equipment:

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602-3.22	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: 1248	COORDINATES: N 477,300 E 1,382,500	DATE 12-10-91 & 12-11-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 4 OF ~~9~~ 11

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BEM 1-14-91)
9	100655 1600 12-10-91 Rad Screen 100656	Shelby Tube	33		CI	1.5	HNU = Ø PPM BG = Ø CPM above Background
10							
11	100657 Rad Screen			HARD (10YR 5/1) GRAY, Clay with Sand & gravel, No Plasticity, DRY.		1-14-92 BEM ~~2~~4.0	HNU = Ø PPM BG = Ø CPM above Background
				~~NO RECOVERY~~ BEM 1-14-92			
12	100658 0940 12-11-91	9	6	HARD (5YR 5/8) yellowish Red, Silty clay with sand & gravel Low Plasticity, moist.	CI	3.0	HNU = Ø PPM BG = Ø CPM above Background
	100661 Rad Screen						
	100659 0940 12-11-91	10	6	HARD (10YR 5/1) gray modeled w (5YR 5/8) yellowish Red, Clay with Sand & gravel, Low Plasticity, moist	CI	2.5	HNU = Ø PPM BG = Ø CPM above Background
13	100662 Rad Screen						
	100660 0940 12-11-91	16	6	Very Hard (10YR 5/1) gray modeled w (5YR 5/8) yellowish Red, Clay with sand & gravel, Low Plasticity, moist.	CI	7.45 ~~4.5~~ BEM 1-14-92	HNU = Ø PPM BG = Ø CPM. above Background
	100663 Rad Screen						

NOTES:

Drilling Contractor Refer to Page 1.

Drilling Equipment

Driller:

Back ground Readings for 12-11-91
HNU = Ø ppm
BG = 40 CPM

402-11-86

FERNALD RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-322	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: 174B	COORDINATES: N 477,300 E 1,382,500	DATE 12-11-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 5 OF ~~9~~ 11

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0940	20	0	NO RECOVERY	NA	NA	
14	100664 1017 12-11-91	4	6	FIRM (5YR 4/4) Reddish Brown Silty Clay with Sand and gravel, Low plasticity, moist	CI	1.25	HNU = Ø PPM Br = Ø CPM above Background
	100664 RAD SCREEN						
	100664 1017 12-11-91	9	6 (12) 1-14-92	HARD (10YR 5/1) GRAY, Silty Clay with Sand & gravel, Low plasticity Moist.	CI	2.5	
15		13	0	No RECOVERY	NA	NA	
	100685 1039 12-11-91 100683 Rad SCREEN 100684	9	6	FIRM (10YR 5/1) gray, gravelly Clay with sand, Low Plasticity Moist.	CI	1.5	HNU = Ø PPM Br = Ø CPM above Background
16	1039 12-11-91 100683	12	(19) 1-14-92 6	Very Stiff (10YR 5/1) gray, gravelly clay with sand, Low Plasticity Moist.	CI	2.75	Sample interval used for Disturbed Geotech.

NOTES:

Drilling Contractor: Refer to Page 1.

Drilling Equipment:

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER: 9602.3.22	PROJECT NAME: Fernald RI/FS	RWMF
BORING NUMBER: 1748	COORDINATES: N 477,300 E 1,372,500	DATE 12-9-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 6 OF 9 11

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DEM 1-14-92)
	NO GES Header 1039 12-11-91	16	2	Very stiff (10YR 5/1) gray, gravelly Clay with sand, Low Plasticity, moist. ~~NO RECOVERY~~ DEM 1-14-92	Cl	2.75	
17	Header 1343 12-11-91 100685 Rec screen 100685	11	6	Very Stiff (5Y 5/1) gray, gravelly Clay with sand, Low Plasticity Moist. TRACE of wood	Cl	2.75	HNU = Ø PPM Bγ = Ø cpm above Background Sample interval used for Disturbed Geotech.
	Header 1343 12-11-91 100683	20	6 (18) DEM 1-14-92	Very stiff (5Y 5/1) gray, gravelly Clay with sand, Low plasticity Moist.	Cl	2.50	
18	Header 1343 12-11-91 100683	23	6	Very stiff (5Y 5/1) gray, gravelly Clay with sand, Low Plasticity Moist.	Cl	2.50	
19	100665 1425 12-11-91	Slide by tube	(22)	Very stiff (5Y 5/1) gray, gravelly clay with sand, Low Plasticity, moist.	Cl	3.0	HNU = Ø PPM Bγ = 0 cpm above Background Recovery too Low. Archive Sample.

NOTES:

Drilling Contractor Refer to Page 1.

Drilling Equipment

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

- 5711

PROJECT NUMBER: 9602 3.22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1748	COORDINATES: N 477,300 E 1,382,500	DATE 12-11-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 7 OF 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (DRA 1-14-92)
20	100665 1343 12-11-91	Shelby tube	16	Very stiff (5y 5/1) gray, gravelly Clay with Sand, Low Plasticity, Moist.	CL	2.5	HNU = Ø PPM Br = Ø CPM above background.
21							
22				NO RECOVERY			Drilled and extra 6in to try to get pass Cobble.
23	100665 1450 12-11-91	tube	24	Very stiff (5y 5/1) gray gravelly Clay with Sand, Low Plasticity, moist.	CL	3.0	HNU = Ø PPM Br = Ø CPM above background. tube crushed, Low Recovery, Archive Sample.
24		Shelby					
25							

NOTES:

Drilling Contractor Refer to Page 1

Drilling Equipment

Driller:

402-11-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 9602-3-22	PROJECT NAME: FERNALD RI/FS (EWMF)	
BORING NUMBER: 1748	COORDINATES: N 477,300 E 1,382,500	DATE 12-9-91
ELEVATION: Est 601	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE 8 OF 11

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25	100666 1556 12-11-91	7	6	HARD (5Y 5/1) gray, gravelly clay with sand, low plasticity, moist	CL	1-14-92 BLM 24.5	HNU = Ø PPM BK = Ø CPM above background.
	100669 Rad Screen						
	100667 1556 12-11-91	11	6	HARD (5Y 5/1) gray, gravelly clay with sand, low plasticity, moist	CL	1-14-92 BLM 24.5	
26	100670 Rad Screen						
	100668 1556 12-11-91	14	6	HARD (5Y 5/1) gray, gravelly clay with sand, low plasticity, moist.	CL	1-14-92 BLM 24.5	
	100671 Rad Screen						
		18		No Recovery	NA	NA	
27	100672 1615 Rad Screen 100673	Shelby Tube.	16	HARD (5YR 5/2) olive gray, gravelly clay with sand (fine) low plasticity, moist	CL	1-14-92 BLM 24.5	HNU = Ø PPM BK = Ø CPM above Backgrounds
28							
29							

NOTES:

Drilling Contractor Refer to Page 1

Drilling Equipment

Driller:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

PROJECT NUMBER 9602.3.22	PROJECT NAME: Fernald RI/FS (EWMF)	
BORING NUMBER: 1748	COORDINATES: N 477,300 E 1,382,500	DATE 12-11-91
ELEVATION: Est 602	GWL: Depth Date/Time	DATE STARTED: 12-9-91
ENGINEER/GEOLOGIST: G. Marshall	Depth Date/Time	DATE COMPLETED: 12-12-91
DRILLING METHODS: AUGER		PAGE ~~10~~ 9 OF ~~9~~ 11

BCM BCM 1-14-92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	Rad screen 100674	Shelby Tube	91-15-92 46 See previous page	HARD (5Y 5/2) olive gray, gravelly Clay with fine sand, Low plasticity moist.	Cl	4.5	
30	100675 1632 12-11-91	5	6	Very stiff (5Y 5/1) gray, gravelly clay, with medium sand, Low Plasticity, moist.	Cl	3.0	HNU = Ø PPM BX = Ø CPM above background
	100679	Rad screen					
	100676 1632 12-11-91	17	6	Very stiff (5Y 5/1) gray, gravelly Clay, with Medium size Sand Low Plasticity, moist.	Cl	2.5	
31	100680	Rad	24				
	100677 1632 12-11-91	22	6	Very stiff (5Y 5/1) gray, gravelly Clay, with medium siz Sand, Low Plasticity, moist.	Cl	2.75	
	100681	Rad screen					
	100678 1632 12-11-91	27	6	Very stiff (5Y 5/1) gray, gravelly clay, with medium size sand, Low Plasticity, moist.	Cl	2.75	
32	100682	Rad screen					Total Depth 32'

NOTES:

Drilling Contractor Refer to page 1

Drilling Equipment

iller:

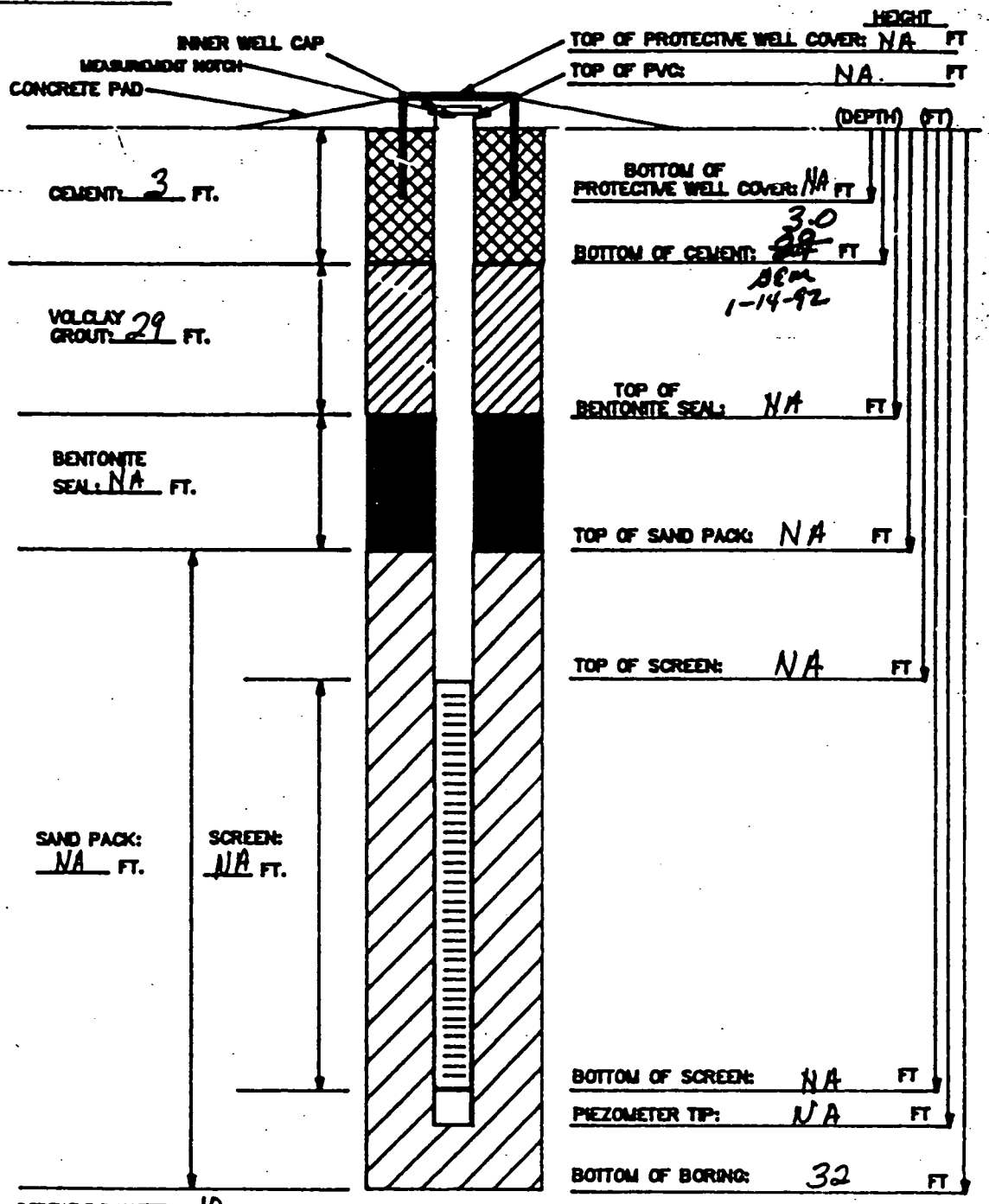
USED 4 bags of Volclay to Plug Hole. and 1 bag of cement.

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1748

INSTALLATION DATE: 12-12-91 5711



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 100 gals
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.22 GEOLOGIST/ENGINEER: G. Marshall

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

5711

PROJECT NAME Fernald RI/FS EWMF FIELD ENG./GEO. D. Marshall DATE 1-14-92
PROJECT NO. 9602.3.22 CHECKED BY C. Gruber DATE 01-15-92
BORING NO. 1748
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger Bit.
DRILLING FLUID (S) USED: NA	CASING SIZE (S) USED: NA
FLUID NA FROM — TO —	SIZE NA FROM — TO —
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 3	BOTTOM 32	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	32.0 ft			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS 3.0 ft of Cement from 0.0 to 3.0

409-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FCUMF		
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92	
ELEVATION:	GWL: Depth N/A Date/Time	DATE STARTED: 3/10/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92	
DRILLING METHODS: Hollow Stem Augers		PAGE 1	OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1000 101501 3/11/92	2	6	Stiff. 10YR (3/4) yellowish brown. silty clay, no plast. slightly moist.	CL	1.0	HNU = 0 ppm BX = 50 cpm
		3	6	SAA	CL	1.25	HNU = 0 ppm BX = 60 cpm
1		4	3	SAA, very stiff	CL	2.5	HNU = 0 ppm BX = 60 cpm
		6	0	No Recovery DSO 3/11/92	NA	NA	~~HNU = 0 ppm~~ ~~BX = 40 cpm~~ DSO 3/11/92
2	1005 101502 101503 3/11/92	5	6	~~SAA~~ Stiff. 10YR (3/4) yellowish brown, silty clay, no plasticity, slightly moist	CL	2.0	HNU = 0 ppm BX = 40 cpm
	1005 101504 101505 3/11/92	7	6	SAA	CL	2.0	HNU = 0 ppm BX = 40 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barilla
Craig Coulter

SAA - same as above
NA - not applicable

Samples collected per ASTM Standard Penetration Test
Colors identified using Munsell Color Chart
Bkgd: HNU = 0 ppm
BX = 40 to 60 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.08.01.04	PROJECT NAME. Fernald RI/FS FCUMF		
BORING NUMBER: 1749	COORDINATES:		DATE 3/11/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Auger			PAGE 1 2 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1005 101506 101507 3/11/92	9	6	V. St. Stiff. 10YR (5/4) Yellowish brown, silty clay no plasticity, slightly moist	Cl	3.0	HNu = 0ppm BX = 60cpm
		11	0	No Recovery	NA	NA	~~HNu = 0ppm BX = 50cpm~~ DOA 3/11/92
4	1050 101508 3/11/92	6	6	V. Stiff. 2.5Y (6/3) Light yellowish brown, silty clay w/gravel, no plasticity dry	Cl	2.0	HNu = 0 ppm BX = 30cpm
		9	6	SAA	Cl	2.25	HNu = 0ppm BX = 50cpm
5		13	6	SAA	Cl	2.25	HNu = 0ppm BX = 40cpm
		17	6	SAA, hard	Cl	4.0	HNu = 0ppm BX = 40cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Barilly, Craig Coulter

SAA - same as above
NA - not applicable
BKgd - HNu = 0ppm
BX = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FCUMF	
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1015B 1015BD 1100 3/11/92	6	6	Hand. 2.5Y (6/3) Light yellowish brown silty clay w/ gravel, low plasticity, slightly moist ~~4.0~~ DSO 3/11/92	CL	4.0	HNU = 0 ppm BG = 40 cpm
		11	0	No Recovery	NA	NA	
7		14	0	No Recovery	NA	NA	
		18	0	No Recovery	NA	NA	
8	1400 DSO 3/11/92 1015C 1015CD 1015C9 3/11/92	18	18	V. Stiff. 2.5Y (6/3) Light yellowish brown silty clay w/ gravel, low plasticity, slightly moist	CL	3.5	Archive HNU = 0 ppm BG = 60 cpm
		Shelby		~~SAA~~ DSO 3/11/92			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: _____

Driller: Joe Basile, Craig Carter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FCUMF		
BORING NUMBER: 1749	COORDINATES:		DATE 3/11/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Auger			PAGE 3 4 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	Tube			~~SAA~~ DSD 3/11/92	C		
10	Tube						
	Tube						
11	1420 101510 3/11/92	14	6	DSD 3/11/92 Red V. Stiff. 5Y (5/1) Gray Clay w/gravel, low plasticity, dry	CI	2.0	HNU = 0 ppm BX = 60cpm
		18	6	SAA, V. Stiff ~~5Y (5/1) Gray Clay w/gravel~~ DSD 3/11/92	CI	3.5	HNU = 0 ppm BX = 40cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

iller: Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FCUMF		
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		27	6	Hard. 5Y (5/1) Gray clay w/ gravel, no plasticity dry DSO	cl	>4.0	HNU = 0 ppm BG = 40 cpm
		30	6	SAA, ~~mod.~~ Vstiff	cl	2.75	SAA
13	101511 101512 1430	6	6	SAA, stiff	cl	2.0	HNU = 0 ppm BG = 60 cpm
	101513 101514 1430	7	6	SAA, V. stiff	cl	2.25	SAA
14	101515 101516 1430	14	3	SAA	cl	2.25	SAA
		22	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Barily, Craig Carter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FCUMF		
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5/6 OF 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	3/11/92 REMARKS
	1445 101517 3/11/92	4	6	V. Stiff. 5Y (5/1) Gray clay with pockets of poorly graded coarse sand, low plasticity, wet.	cl	2.0	HNU = 0ppm BG = 40cpm
		9	3	SAA	cl	2.0	HNU = 0ppm BG = 50 cpm
16		11	0	No Recovery	NA	NA	
		20	0	No Recovery	NA	NA	
17	1500 101518 101519 3/11/92	7	6	V. Stiff 5Y (5/1) Gray clay some gravel, low plasticity, wet	cl	2.0	HNU = 0ppm BG = 50cpm
		14	6	SAA	cl	2.0	SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Basily
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 102.03.01.04	PROJECT NAME: Fernald RI/FS FCWMF	
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Augers		PAGE 7 OF 12

DEPTH 14.4 -	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	DOO 3/11/92 REMARKS
		15	6	N Stiff. 5Y (5/1) Gray clay some gravel, low plasticity, wet.	CL	2.0	HNU = 0 ppm BX = 60 cpm
		18	6	SAA, med. stiff	CL	.75	SAA
19	1530 101521 101522 3/11/92	↑	31	SAA, stiff	CL	1.75	SAA
		Shelby Tube					
20							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Barilly, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1.02.03.01.04	PROJECT NAME. Fernald RI/FS FCUMF	
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby Tube					
	101523 1590 3/11/92						
22	101524 1550 3/11/92	8	6	Mod. Stiff. 5Y (5/1) Gray clay low plasticity, slightly moist	cl	.5	HNU = 0 ppm BX = 40 cpm
		12	2	SAA, Stiff.	cl	1.0	SAA
23		13	0	No Recovery	NA	NA	
		15	0	No Recovery	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller: Joe Barily, Craig Carter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1602.03.01.04	PROJECT NAME: Fernald RI/FS ELUMF	
BORING NUMBER: 1749	COORDINATES:	DATE 3/11/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Augs		PAGE 8 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1550 101524 101525 3/11/92	6	6	Stiff. 5Y (5/1) Gray clay some gravel, high plasticity slightly moist	CI	1.25	HNO = 0 ppm BZ = 40 ppm
		8	6	SAA	CI	1.0	SAA
25		11	6	SAA, mod stiff	CI	.5	SAA
		14	6	SAA	CI	.5	SAA
24	101524	4	6	SAA, mod stiff	CI	.75	SAA
		5	6	SAA	CI	.75	SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Basily, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FLUME		
BORING NUMBER: 1749	COORDINATES:		DATE 3/11/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/10/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/11/92
DRILLING METHODS: Hollow Stem Auger			PAGE 9 10 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		7	4	Soft. 5Y (5/1) Gray clay high plasticity, moist	cl	< .5 (3/31/92)	HNU=0ppm BG=50cpm
		9	0	No Recovery	NA	NA	
28	101526 101527 1630 3/11/92	11	6	Soft. 5Y (5/1) Gray clay mod. plasticity, moist	cl	< .5 (3/31/92)	HNU=0ppm BG=40cpm
	101528 101529 1630 3/11/92	14	6	SAA, mod. stiff	cl	.75	SAA
29	101530 101531 1630 3/11/92	27	6	SAA	cl	.75	SAA
		31	0	No Recovery	NA	NA	
				Bottom of Boring at 30.0ft.			

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller: Joe Barily, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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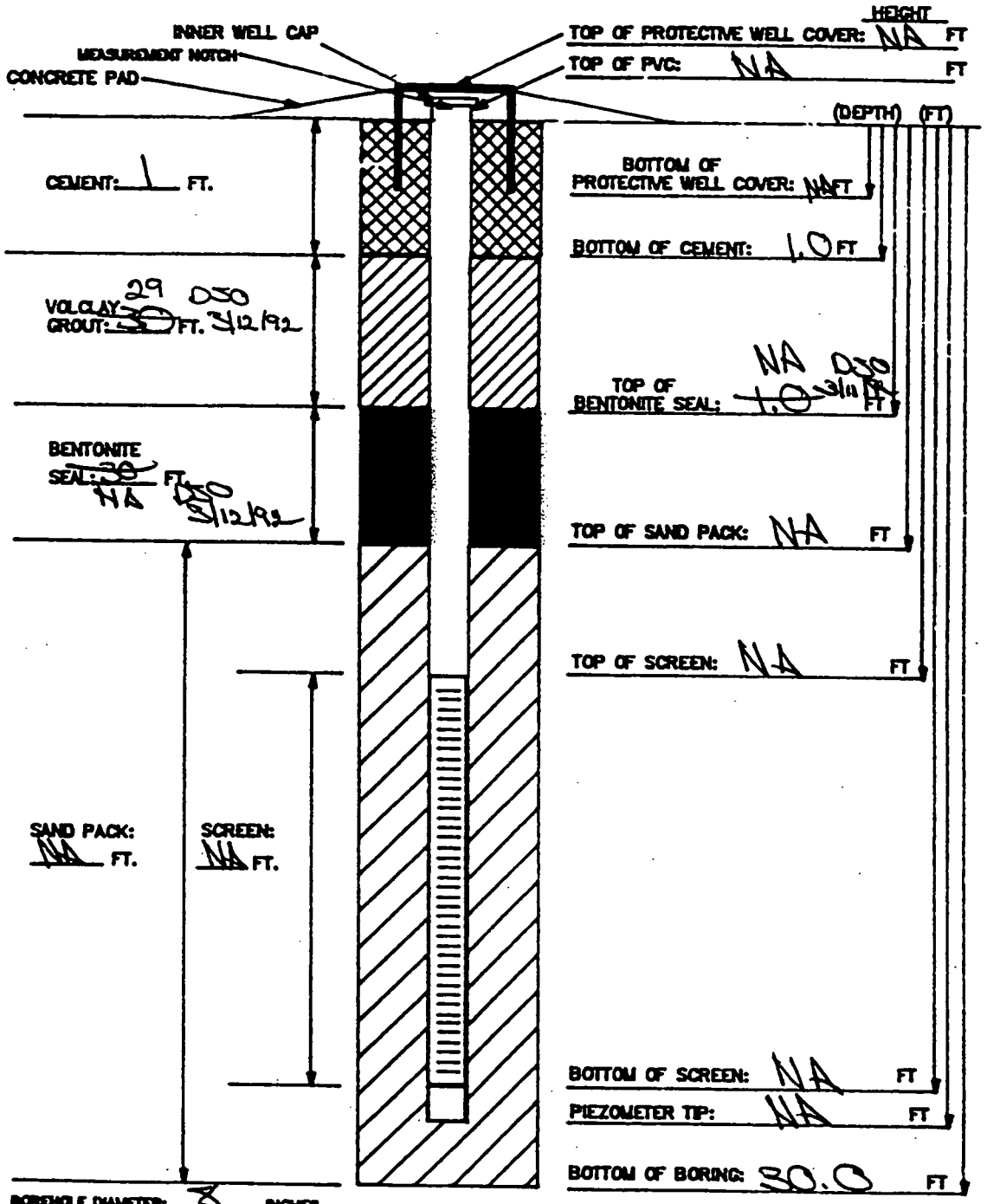
11 04 12
5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1749

INSTALLATION DATE: 3/12/92



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 bags
AMOUNT OF CEMENT: 112 lbs
AMOUNT OF WATER USED: 60 gal.
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.03.01.04 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

120/12

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS Flume FIELD ENG./GEO. D. O'Brien DATE 3/12/92
PROJECT NO. ~~3/12/92 - 3.22~~ 602.03.01.04 CHECKED BY C. Grube DATE 4/22/92
BORING NO. 1749
PIEZOMETER NO. NA DATE OF INSTALLATION 3/12/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers	TYPE OF BIT NA
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Cement GROUT/SLURRY	TOP ~~0.0~~ 1.0 DD 3/12/92	BOTTOM 30.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 0.0 - 1.0 Ft. cement cap

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.03.01.04	PROJECT NAME: Fernald RI/FS Fluor		
BORING NUMBER: 1750	COORDINATES:	DATE 3/12/92	
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED: 3/12/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE	OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1515 101515-4 3/12/92	2	6	Med. Stiff. 10YR (5/4) Yellowish brown. Silty clay, low plasticity, slightly moist.	cl	.75	HNU = 0 ppm BX = 40 cpm
		4	6	SAA, stiff.	cl	1.0	HNU = 0 ppm BX = 40 cpm
1		6	4	SAA	cl	1.75	HNU = 0 ppm BX = 400 cpm 3/12/92
		8	0	No Recovery	NA	NA	HNU = NA BX = NA
2	1525 101525 101525-4 3/12/92	3	[illegible]	Med. St[illegible] 10YR (5/4) Yellowish brown S[illegible] clay, low [illegible]sticity slightly moist.	cl	.5	3/12/92 HNU = 0 ppm BX = 50 cpm
	1525 101550 101550-8 3/12/92	7	6	SAA	cl	.5	HNU = SAA BX = SAA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable
Bkgd - HNU = 0 ppm
BX = 40-60 cpm

Samples collected per ASTM Standard Penetration Test
Colors identified using Munsell Color Chart

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1102.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1750	COORDINATES:		DATE 3/12/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/12/92
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1528 D1339 101540 3/12/92	9	6	Med. Stiff. 10YR(3/4) Yellowish brown silty clay, low plasticity, slightly moist	CL	.5	HNU = 0 ppm BG = 30 cpm
		12	0	No Recovery	NA	NA	HNU = NA BG = NA
4	1530 101541 3/12/92	8	6	Soft. 2.5Y (3/4) Light olive brown silty clay, some gravel med plasticity, moist.	CL	<.5	HNU = 0 ppm BG = 40 cpm
		12	6	SAA, V. Stiff.	CL	2.25	HNU = SAA BG = SAA
5		15	6	SAA	CL	3.0	HNU = SAA BG = SAA
		18	6	SAA	CL	3.0	HNU = SAA BG = SAA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-66

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.03.01.04	PROJECT NAME: Fernald RI/FS Fluor	
BORING NUMBER: 1750	COORDINATES:	DATE 3/12/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/13/92
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1530 101511 101512 3/12/92	3	6	V. Stiff. 2.5Y (5/4) Light olive brown silty clay some gravel, medium plasticity, moist.	cl	2.0	HNU = 0 ppm BX = 50 cpm
		6	6	SAA	cl	2.0	HNU = SAA BX = SAA
7		10	6	SAA	cl	2.5	HNU = SAA BX = SAA
		10	2	SAA	cl	2.5	HNU = SAA BX = SAA
8	1605 101513 101514 3/12/92	Tube ↑	25	SAA	cl	3.5	HNU = SAA BX = SAA
		Shelby					HNU = NA BX = NA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Fluor	
BORING NUMBER: 1750	COORDINATES:	DATE: 3/12/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/13/92
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 9

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1					HNU = NA BZ = NA
		Tube					HNU = NA BZ = NA
10							HNU = NA BZ = NA
	1605 10/13/15 3/12/92	Shelby ↓					HNU = NA BZ = NA
11		8	0	No Recovery	NA	NA	HNU = NA BZ = NA
		11	0	No Recovery	NA	NA	HNU = NA BZ = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1002.03.01.04	PROJECT NAME. Fernald RI/FS Fluor		
BORING NUMBER: 1750	COORDINATES:		DATE 3/12/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST. D. O'Brun	Depth	Date/Time	DATE COMPLETED: 3/19/92
DRILLING METHODS: Hollow Stem Auger			PAGE 5 OF 19

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		5	0	No Recovery	NA	NA	HNU = NA BX = NA
		19	0	No Recovery	NA	NA	HNU = NA BX = NA
13	1650 101546 3/12/92	6	6	Mod Stiff. 2.5Y(5/4) Light olive brown silty clay with gravel mod. plasticity moist	cl	.75	HNU=0ppm BX=50cpm
		6	6	SAA, v. stiff	cl	2.25	HNU=0ppm BX=50cpm
14	1650 101549 3/12/92	11	6	Stiff. 5Y(5/1) Gray clay with gravel low plasticity slightly moist	cl	1.5	HNU=0ppm BX=50cpm
		20	4	SAA, med. stiff	cl	.75	HNU=0ppm BX=50cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1102.0301.04	PROJECT NAME. Fernald RI/FS Fund	
BORING NUMBER: 1750	COORDINATES:	DATE 3/12/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth: Date/Time	DATE COMPLETED: 3/12/92
DRILLING METHODS: Hollow Stem Auger		PAGE 6 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1100 101548 3/12/92	6	6	V. Stiff 2.5 (3/4) Light olive brown silty clay low plasticity, moist	CL	2.25	HNU = 0 ppm BX = 60 cpm
	1100 101549 3/12/92	7	6	V. Stiff 5Y (5/1) Gray clay w/gravel, low plasticity moist	CL	2.5	HNU = 0 ppm BX = 60 cpm
16		9	0	No Recovery	NA	NA	HNU = NA BX = NA
		14	0	No Recovery	NA	NA	HNU = NA BX = NA
17	0840 101550 3/13/92	6	6	V. Stiff. 5Y (5/1) Gray clay with gravel, low plasticity, wet.	CL	2.5	HNU = 0 ppm BX = 50 cpm
		10	3	SAA		2.5	HNU = 0 ppm BX = 50 cpm

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill B-80

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1.02.03.01.04	PROJECT NAME. Fernald RI/FS FWMF		
BORING NUMBER: 1780	COORDINATES:	DATE 3/13/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/13/92	
ENGINEER/GEOLOGIST. D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		13	0	No Recovery	NA	NA	HNU = NA BX = NA
		15	0	No Recovery	NA	NA	HNU = NA BX = NA
19	0855 101551 3/13/92	Tube	17	Hard. 5Y(3/1) Gray clay with gravel. Low plasticity, moist.	CL	>4.0	HNU = 0 ppm BX = 50 cpm Archived shelby Not enough recovery
							HNU = SAA BX = SAA
20		Shelby					HNU = SAA BX = SAA
							HNU = NA BX = NA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-66

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1102.03.01.04	PROJECT NAME. Fernald RI/FS FWMF		
BORING NUMBER: 1750	COORDINATES:	DATE 3/13/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/13/92	
ENGINEER/GEOLOGIST. D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/13/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1 Day					HNU = NA BX = NA
		2 Nights					HNU = NA BX = NA
22	0905 101552 101553 3/13/92	10	6	Hard 5Y(5/1) Gray gravelly clay, no plasticity moist	CL	>4.0	HNU = 0 ppm BX = 60 cpm
	0905 101554 101555 3/13/92	12	6	SAA	CL	>4.0	HNU = SAA BX = SAA
23	0905 101556 101557 3/13/92	14	6	SAA, v. stiff	CL	3.5	HNU = SAA BX = SAA
	0905 101558 101559 3/13/92	18	6	SAA, hard	CL	>4.0	HNU = SAA BX = SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1750	COORDINATES:		DATE: 3/13/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/13/92
DRILLING METHODS: Hollow Stem Auger			PAGE 9 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0910 101560 101561 3/13/92	10	6	Stiff. 5Y (5/1) Gray gravelly Clay. No plasticity	CL	1.75	HNU = 0 ppm BX = 40 cpm
		11	4	SAA	CL	1.5	HNU = 0 ppm BX = 40 cpm
25		14	0	No Recovery	NA	NA	HNU = NA BX = NA
		13	0	No Recovery	NA	NA	HNU = NA BX = NA
26	101560	4	6	Stiff. 5Y (5/1) Gray gravelly clay, low plasticity, ~~moist~~ wet 3/13/92	CL	1.25	HNU = 0 ppm BX = 40 cpm
		4	6	SAA	CL	1.25	HNU = SAA BX = SAA

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Mobile Drill 80
Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1.02.03.01.04	PROJECT NAME. Fernald RI/FS FWMF		
BORING NUMBER: 1750	COORDINATES:		DATE 3/13/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/12/92
ENGINEER/GEOLOGIST. D. O'Brun	Depth	Date/Time	DATE COMPLETED: 3/13/92
DRILLING METHODS: Hollow Stem Auger			PAGE 10 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	0	No Recovery	NA	NA	HNU = NA BX = NA
		7	0	No Recovery	NA	NA	HNU = NA BX = NA
28	0940 101562 101563 3/13/92	6	6	V. Stiff. BY (5Y 5/1) Gray gravelly clay low plasticity, wet	cl	2.0	HNU = 0 ppm BX = 60 cpm
	0940 101564 101565 3/13/92	8	6	SAA	cl	2.0	HNU = SAA BX = SAA
29	0940 101566 101567 3/13/92	9	6	SAA	cl	2.0	HNU = SAA BX = SAA
	0940 101568 101569 3/13/92	11	6	SAA Bottom of Boring at 30.0 ft.	cl	2.5	HNU = SAA BX = SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barill

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

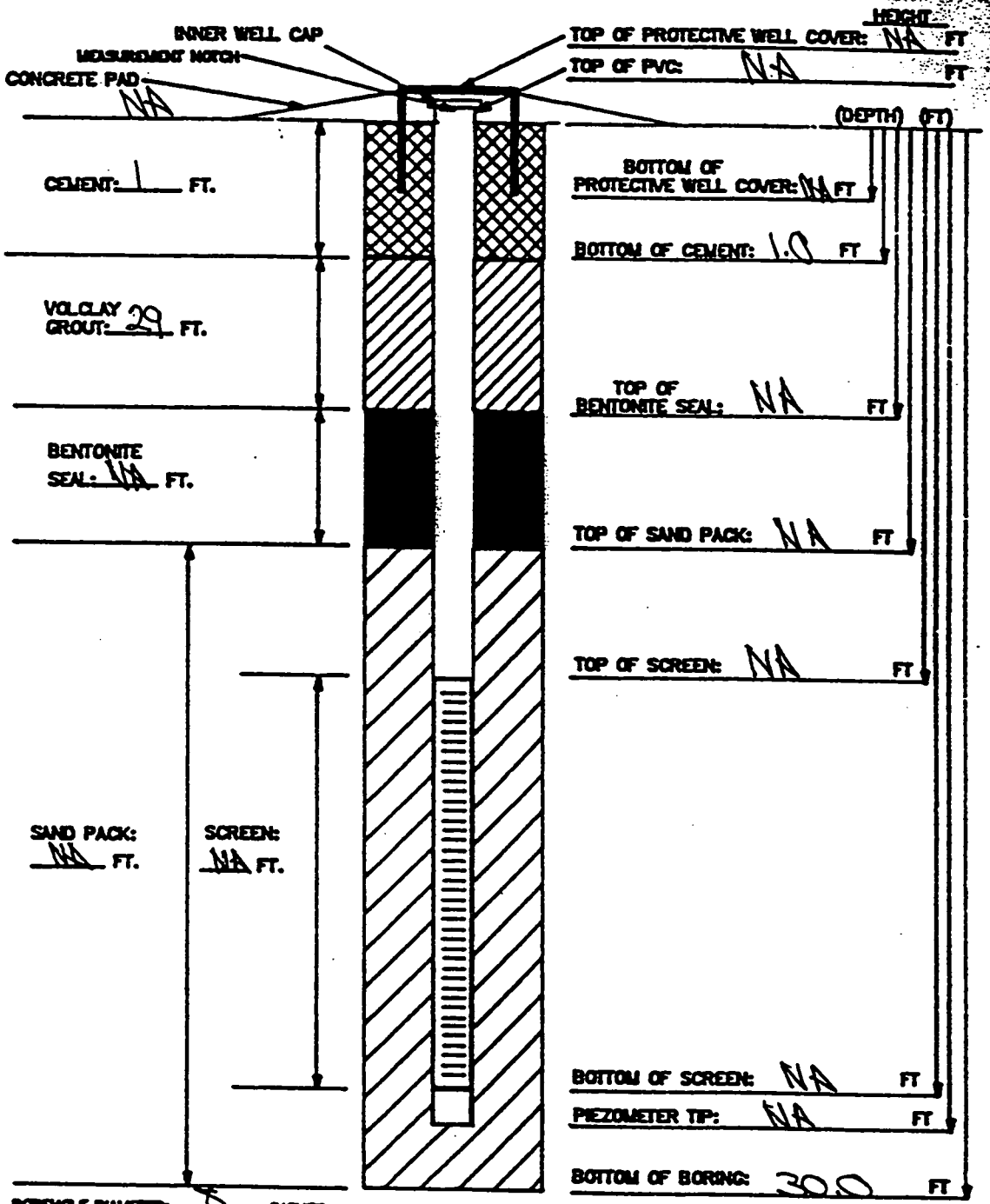
402-11-86

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1750

INSTALLATION DATE: 3/18/92



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 5 bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 60 gal
OTHER: NA

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.03.01.04 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

120112

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FUMF
FIELD ENG./GEO. D. O'Brien
DATE 3/13/92
PROJECT NO. 602.03.01.04
CHECKED BY C. Gulu
DATE 04/22/92
BORING NO. 1750
PIEZOMETER NO. NA
DATE OF INSTALLATION 3/13/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
TYPE OF BIT Auger Bit
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Cement GROUT/SLURRY	TOP ~~29.0~~ 1.0 Start	BOTTOM 29.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

001719

409-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1002.03.01.04	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1751	COORDINATES:		DATE: 3/24/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1410 101603 3/24/92	2	6	V. Stiff. 10YR(5/8) brownish yellow silty clay low plasticity, slightly moist	CL	2.25	HNu = 0 ppm BG = 50cpm
		3	6	SAA	CL	3.0	
1		4	0	No Recovery	NA	NA	
		9	0	No Recovery	NA	NA	
2	1415 101609 101610 3/24/92	4	6	V. Stiff 10YR (6/4) Light yellowish brown silty clay low plasticity, slightly moist	CL	2.25	HNu = 0 ppm BG = 60cpm
	1415 101611 101612 3/24/92	6	6	SAA	CL	2.5	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Jay Baily

Craig Coulter

SAA - same as above
NA - not applicable
BKgd - HNu = 0 ppm
BG = 40-60cpm

Samples collected per ASTM Standard Penetration Test
Colors identified using Munsell Color Chart

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002.03.01.04	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1751	COORDINATES:		DATE: 3/24/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		9	0	No Recovery	NA	NA	
		12	0	No Recovery	NA	NA	
4	1420 10163 3/24/92	14	6	V. Stiff. 2.5Y (6/6) Olive yellow silty clay w/ gravel. Low plasticity slightly moist	CL	2.0	HNU=0ppm BD=40cpm
		19	6	SAA, Stiff	CL	1.75	
5		21	6	SAA, V. Stiff	CL	2.5	
		21	6	SAA	CL	2.75	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

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RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1002.03.01.04	PROJECT NAME: Fernald RI/FS EU#7	
BORING NUMBER: 1751	COORDINATES:	DATE: 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1430 101613 101614 3/24/92	12	6	V. Stiff, 2.5Y (6/6) Olive yellow silty clay w/gravel Low plasticity, slightly moist	CL	3.75	HNU = 0 ppm BG = 40 cpm
		17	6	SAA, hard	CL	4.0	
7		19	6	SAA, V. Stiff	CL	3.75	
		21	6	SAA	CL	3.75	
8	1450 101615 101616 3/24/92	↑ To 12	28	SAA, hard	CL	4.0	HNU = 0 ppm BG = 50 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Jim Barile

Craig Coulter

SAA - same as above

NA - not applicable

See p. 1

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002.03.01.04	PROJECT NAME: Fernald RI/FS EU#7	
BORING NUMBER: 1751	COORDINATES:	DATE: 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10							
	101617						
11		7	0	No Recovery	NA	NA	
		14	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Basile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1602.03.01.04	PROJECT NAME. Fernald RI/FS EWMF	
BORING NUMBER: 1751	COORDINATES:	DATE 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		21	0	No Recovery	NA	NA	
		23	0	No Recovery	NA	NA	
13		4	0	No Recovery	NA	NA	
		5	0	No Recovery	NA	NA	
14		6	0	No Recovery	NA	NA	
		10	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 6.02.03.01.04	PROJECT NAME. Fernald RI/FS EU#7		
BORING NUMBER: 1751	COORDINATES:		DATE 3/24/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth:	Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger			PAGE 6 OF 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1st USS 1545 3/24/92 101618 3/24/92	4	6	Stiff. 5Y (6/6) Olive yellow silty clay w/gravel mod. plasticity, moist	CL	1.75	HNu = 0 ppm Bg = 40 cpm
	1545 101619 3/24/92	6	6	Stiff. 5Y (5/1) Gray clay with gravel, low plasticity moist.	CL	1.5	
16		9	2	SAA	CL	1.75	
		14	0	No Recovery	NA	NA	
17		5	0	No Recovery	NA	NA	
		8	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Event	
BORING NUMBER: 1751	COORDINATES:	DATE: 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Augers		PAGE 7 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		14	0	No Recovery	NA	NA	
		11	0	No Recovery	NA	NA	
19	1615 101620 101621 3/24/92	↑	0.50 3/24/92 20 20	Stiff. 5Y (5/1) Gray gravelly clay, low plasticity, moist	CL	1.0	HNu = 0 ppm BG = 60 cpm
20							

Spoil

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Jay Barile

Craig Coultis

SAA - same as above

NA - not applicable

see p. 1

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 6.02.03.01.04	PROJECT NAME. Fernald RI/FS EU#7		
BORING NUMBER: 1751	COORDINATES:	DATE 3/24/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Shelby					
	1615 101622 3/24/92						
22	1625 101623 101624 3/24/92	7	6	Med. Stiff 54 (B1,) Gray gravelly clay low plasticity slightly moist	Cl	.75	HNU = 0 ppm BG = 50 cpm
	1625 101625 101626 3/24/92	9	6	SAA, Stiff	Cl	1.5	
23	1625 101627 101628 3/24/92	10	6	SAA	Cl	1.0	
	1625 101629 101630 3/24/92	12	6	SAA	Cl	1.25	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Jim Basile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1602.03.01.04	PROJECT NAME. Fernald RI/FS EWMF	
BORING NUMBER: 1751	COORDINATES:	DATE 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/24/92
DRILLING METHODS: Hollow Stem Auger		PAGE 9 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1650 101631 3/24/92	4	6	Stiff. 5Y(5/1) Gray granully clay, low plasticity slightly moist	CL	1.5	HNU = 0 ppm BG = 60 cpm
		4	6	SAA	CL	1.5	
25		7	4	SAA	CL	20	
		9	0	No Recovery	NA	NA	
26	1635 101631 3/24/92	8	4	Stiff. 5Y(5/1) Gray granully clay, low plasticity	CL	1.5	HNU = 0 ppm BG = 60 cpm Hit a rock
		50/2	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Jon Basile, Craig Coulter

SAA - same as above
NA - not applicable

402-11-06

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002.03.01.04	PROJECT NAME: Fernald RI/FS EU#7	
BORING NUMBER: 1751	COORDINATES:	DATE 3/24/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/26/92
DRILLING METHODS: Hollow Stem Auger		PAGE 10 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		NA Refusal	0	No Recovery	NA	NA	
		NA refusal	0	No Recovery	NA	NA	
28		refusal	0	No Recovery	NA	NA	End boring at 28.0 ft
29							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Basile

Craig Coulter

SAA - same as above

NA - not applicable

See p. 1

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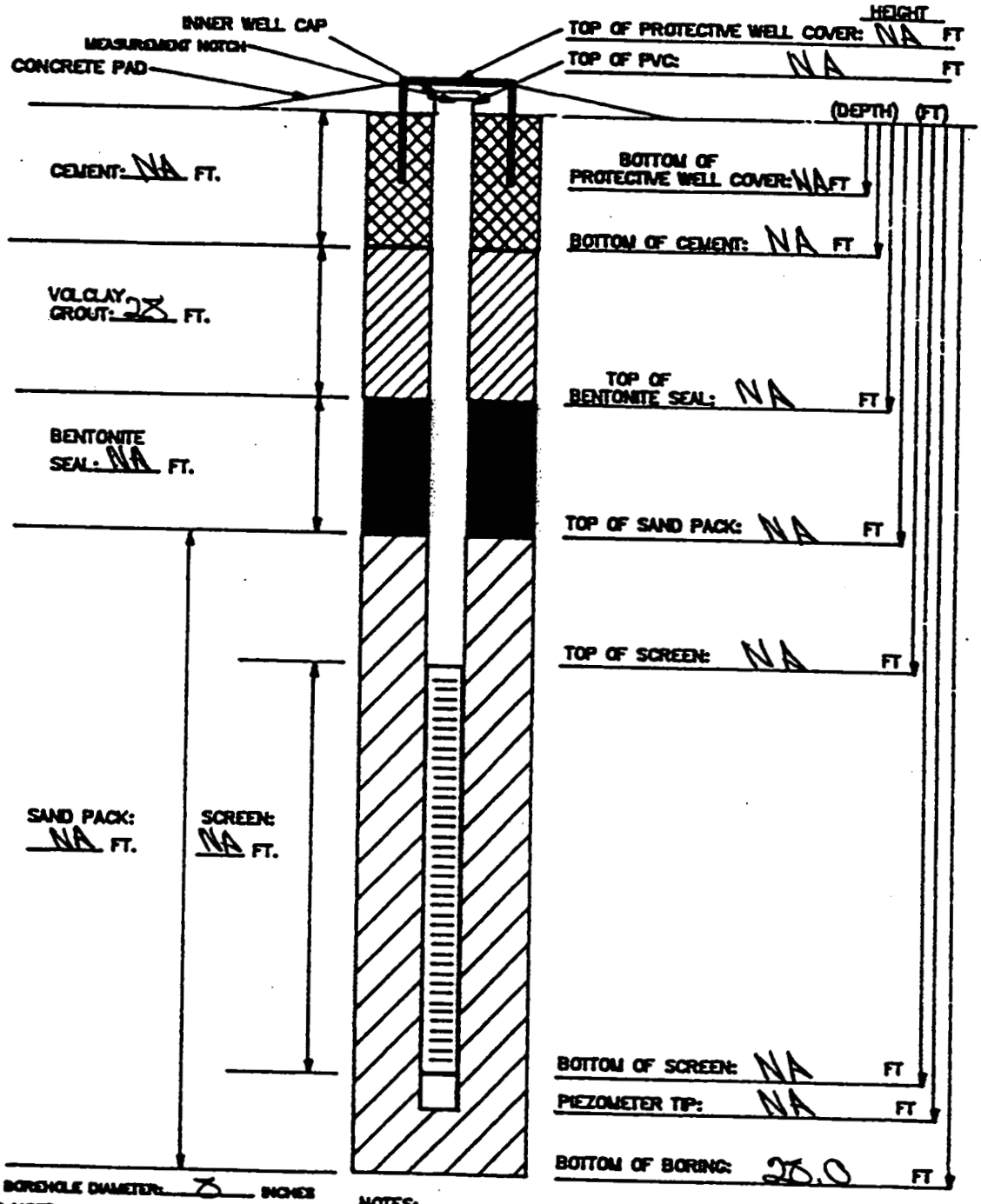
1104 12 5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1751

INSTALLATION DATE: 3/24/92



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3000#
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 60gal.
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 6.02.03.01.04 GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

12012

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FWMF FIELD ENG./GEO. D. O'Brien DATE 3/24/92
PROJECT NO. 602.03.01.04 CHECKED BY _____ DATE _____
BORING NO. 1751
PIEZOMETER NO. NA DATE OF INSTALLATION 3/24/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Auger Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. NA I.D. NA
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0	BOTTOM 28.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	28.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS _____

409-11-8

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1.02.03.01.04	PROJECT NAME. Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:		DATE 3/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/16/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/17/92
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1355 101570 3/16/92	2	6	V. Stiff. 2.5Y (5/4) Light olive brown silty clay, low plasticity, slightly moist	CL	~~1.0~~ 1.0 2.5	HNU = ~~50~~ ppm BG = 50 cpm DSO 3/16/92
		6	6	SAA, stiff.	CL	1.5	HNU = SAA BG = SAA
1		9	0	No Recovery	NA	NA	HNU = ~~SAA~~ NA BG = ~~SAA~~ NA CB 4/1/92
		12	0	No Recovery	NA	NA	HNU = ~~SAA~~ NA BG = ~~SAA~~ NA CB 4/1/92
2	1405 101571 3/16/92	12	6	Hard. 2.5Y (5/4) Light olive brown silty clay w/ large limestone fragments. No plasticity, slightly moist	CL	4.0	HNU = 0 ppm BG = 40 cpm
		24	0	No Recovery	NA	NA	HNU = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable
Bkgd - HNU = 0 ppm
BG = 40-60 cpm

Samples collected per ASTM Standard Penetration Test
Colors identified using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF ~~12~~ 12	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		50/2	0	No Recovery	NA	NA	HNU = NA BX = NA
		refusal	0	No Recovery	NA	NA	HNU = NA BX = NA
030 3/16/92 34	1420 101572 101573 3/16/92	11	6	Stiff. 2.5 (5/4) Light olive brown silty clay with gravel low plasticity, slightly moist	CI	1.75	HNU = 0 ppm BX = 60 cpm
	1420 101574 101575 3/16/92	14	6	SAA, v. stiff	CI	2.0	HNU = SAA BX = SAA
000 3/16/92 45	1420 101576 101577 3/16/92	18	6	SAA, stiff	CI	1.75	HNU = SAA BX = SAA 000 3/16/92
		24	0	No Recovery	NA	NA	HNU = ~~SAA~~ NA BX = ~~S~~ NA 000 3/16/92

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Basile

Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

(2) 4/1/92

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST: D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Augs		PAGE 3 OF ~~12~~ 12	

(BY) 4/1/92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1450 10157B 3/16/92	14	6	Hard. 2.5Y (6/4) Light yellowish brown silty clay w/ gravel no plasticity, slightly moist	CL	>40	HNU = 0 ppm BZ = 60 cpm
		21	0	No Recovery	NA	NA	HNU = NA BZ = NA
7		25	0	SAA - No Recovery	NA	NA	HNU = NA BZ = NA
		37	0	SAA - No Recovery	NA	NA	HNU = NA BZ = NA
8	1440 10158 3/16/92	↑	00 3/16/92 #7	Hard. 2.5Y (6/4) Light yellowish brown silty clay w/ limestone fragments no plasticity, dry	CL	>40	HNU = 0 ppm BZ = 40 cpm Archived Shelby
		SAA					HNU = SAA BZ = SAA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:		DATE: 3/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/16/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/17/92
DRILLING METHODS: Hollow Stem Auger			PAGE 4 OF ~~12~~ 12

CB 4/1/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		Tube					HNU = 0 ppm BX = 40 cpm
		Tube					HNU = NA BX = NA
10		Tube					HNU = NA BX = NA
		Tube					HNU = NA BX = NA
11	1450 101578 101580 RSS 3/16/92 3/16/92	21	6	V. Stiff. 2.5 (6/4) Light yellowish brown silty clay w/ limestone fragments, no plasticity, dry	CL	3.5	HNU = 0 ppm BX = 30 cpm
		14	0	No Recovery	NA	NA	HNU = NA BX = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

er: Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF ~~12~~ 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (LH 4/1/92)
		10	0	No Recovery	NA	NA	HNU = NA BX = NA
		11	0	No Recovery	NA	NA	HNU = NA BX = NA
13	101578	13	6	Hard. 2.5Y (6/4) Light yellowish brown silty clay w/ limestone fragments, no plasticity dry	CI	>4.0	HNU = 0 ppm BX = 50 cpm
		13	2	SAA	CI	>4.0	HNU = SAA BX = SAA
14		15	0	No Recovery	NA	NA	HNU = NA BX = NA
		21	0	No Recovery	NA	NA	HNU = NA BX = NA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS Fluor		
BORING NUMBER: 1752	COORDINATES:		DATE 3/16/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/16/92
ENGINEER/GEOLOGIST. D. O'Brun	Depth	Date/Time	DATE COMPLETED: 3/17/92
DRILLING METHODS: Hollow Stem Auger			PAGE 6 OF ~~10~~ 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1015	4	6	V. Stiff. 2.5Y (6/4) Light yellowish brown, silty clay w/ limestone fragments no plasticity dry	Cl	2.5	HNU = 0 ppm BX = 40cpm
		14	6	SAA, hard	Cl	4.0	HNU = SAA BX = SAA
16		16	6	SAA, hard	Cl	4.0	HNU = SAA BX = SAA
		23	2	SAA, hard	Cl	4.0	HNU = SAA BX = SAA
17	1615 10880 3/16/92	10	6	V. Stiff. 2.5Y (5/4) Light olive brown, silty clay w/ gravel, no plasticity slightly moist	Cl	3.5	HNU = 0 ppm BX = 40cpm
		14	4	SAA	Cl	3.5	HNU = SAA BX = SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-66

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FCWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST. D. O'Brun	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 7 OF 12	

CB 4/1/92

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		15	0	No Recovery	na	na	HNU = NA BX = NA
		22	0	No Recovery	NA	NA	HNU = NA BX = NA
19	101750	↑ Shelby Tube	19	V. Stiff. 2.5Y (3/4) Light olive brown silty clay w/ gravel. Low plasticity Slightly moist	CL	3.25	HNU = 0 ppm BX = 60 cpm Archive Shelby
20							HNU = SAA BX = SAA
							HNU = SAA BX = SAA
							HNU = SAA BX = SAA

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 8 OF ~~12~~ 12	

QY 4/1/92

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1/6					HNU = NA BX = NA
		1/5					HNU = NA BX = NA
22	1700 101581 101582 3/16/92	50/4	6	V. Stiff. 2.5Y (5/4) Light yellow brown silty clay w/ gravel no plasticity, slightly moist	CL	30	HNU = 0 ppm BX = 50 cpm
		Refusal	0	No Recovery	NA	NA	HNU = NA BX = NA
23		Refusal	0	SAA	NA	NA	HNU = NA BX = NA
		Refusal	0	SAA	NA	NA	HNU = NA BX = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1.02.03.01.04	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES: NK		DATE: 3/16/92
ELEVATION: NK	GWL: Depth	Date/Time	DATE STARTED: 3/16/92
ENGINEER/GEOLOGIST: ~~D. O'Brien~~ T. MULDER	TM 3/17/92 Depth	Date/Time	DATE COMPLETED: 3/17/92
DRILLING METHODS: Hollow Stem Auger			PAGE 9 OF ~~10~~ 12

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Hole discrepancy. Topad to 25.5ft. Due to rig slipping & switching drillers. See FADL for 3/17/92 for more Details			HNU = NA BX = NA
							HNU = NA BX = NA
25							HNU = NA BX = NA
	~~101583~~ 101583	3/17/92 TM 10	3/17/92 TM ~~10~~ 3	Very stiff, lt. yellowish brown (2.5 Y 6/4), ~~w/ gravel to~~ TM 3/17/92	Cl	2.5	
	101584 101045 3-11	5	3/17/92 TM ~~4~~ 6	Silty clay w/ gravel to 1cm, low plasticity, ~~moist~~ wet TM 3/17/92 SAA	cl	2.5	HNU = ~~0~~ 4 ppm BX = ~~NK~~ 50 cpm TM 3/17/92
26		11	6	~~Stiff~~, lt. yellowish brown (2.5 Y 6/4) silty clay w/ gravel to 1cm, low plasticity, wet	cl	0.5	HNU = ~~0~~ 0 ppm BX = ~~NK~~ 50cpm TM 3/17/92
		26	6	SAA	cl	0.5	HNU = ~~0~~ 0 ppm BX = ~~NK~~ 50 cpm TM 3/17/92

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: TM ~~Joe Bonilla~~ E. Gardner

3/17/92 ~~Craig Coulter~~ M. Rebolt

SAA - same as above

NA - not applicable

see p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 402.03.01.01	PROJECT NAME: Fernald RI/FS FWMF		
BORING NUMBER: 1752	COORDINATES:	DATE 3/16/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/16/92	
ENGINEER/GEOLOGIST: ~~D. O'Brien~~ / ~~T. Mulder~~ D. O'Brien TM 3/17/92	Depth Date/Time	DATE COMPLETED: 3/17/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 10 OF ~~10~~ 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		14	6	Soft. (2.5Y (6/4)) Light yellowish brown silty clay with gravel to 1cm, low plasticity, wet	cl	0.5	HNu = ~~0~~ 0 ppm BX = ~~N/A~~ 50cpm TM TM 3/17/92
	101585 3/17/92 TM 1100 3-17	32	6	Stiff, lt. olive brown (2.5Y 5/6), ~~clay~~ TM 3/17/92 laminated clay, low plasticity, moist	cl	2.0	HNu = ~~0~~ 4.5 ppm BX = ~~N/A~~ 50 cpm TM 3/17/92 TM ~~1-2~~ 1-2 mm laminae
				Shale gravel, olive gray (5Y 5/2) moist	GW	>4.0	
28				Stiff, lt olive brown (2.5Y 5/6), laminated clay, low plasticity, moist	cl	2.0	
	101586 101587 1120 3-17	22	6	Soft, lt. yellowish brown (2.5Y 6/4), silty clay, low plasticity, wet	cl	0.25	HNu = 4 ppm BX = 50 cpm
	101588 101589 1120 3-17	24	6	SAA	cl	0.25	HNu = 3 ppm BX = 50 cpm
29	101590 101591 1120 3-17	25	6	SAA	cl	0.25	HNu = 3 ppm BX = 50 cpm
	101592 101593 1120 3-17	50/3	6	SAA	cl	0.25	HNu = 2 ppm BX = 50 cpm
				Bottom of Boring at 30.0 Ft.			* Total 1.7 drums of cuttings

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Mobile Drill 80

Driller: TM ~~Joe Barill~~ E. Gardner 3/17/92 ~~Craig Coulter~~ M. Rebolt

SAA - same as above
NA - not applicable

See p. 1

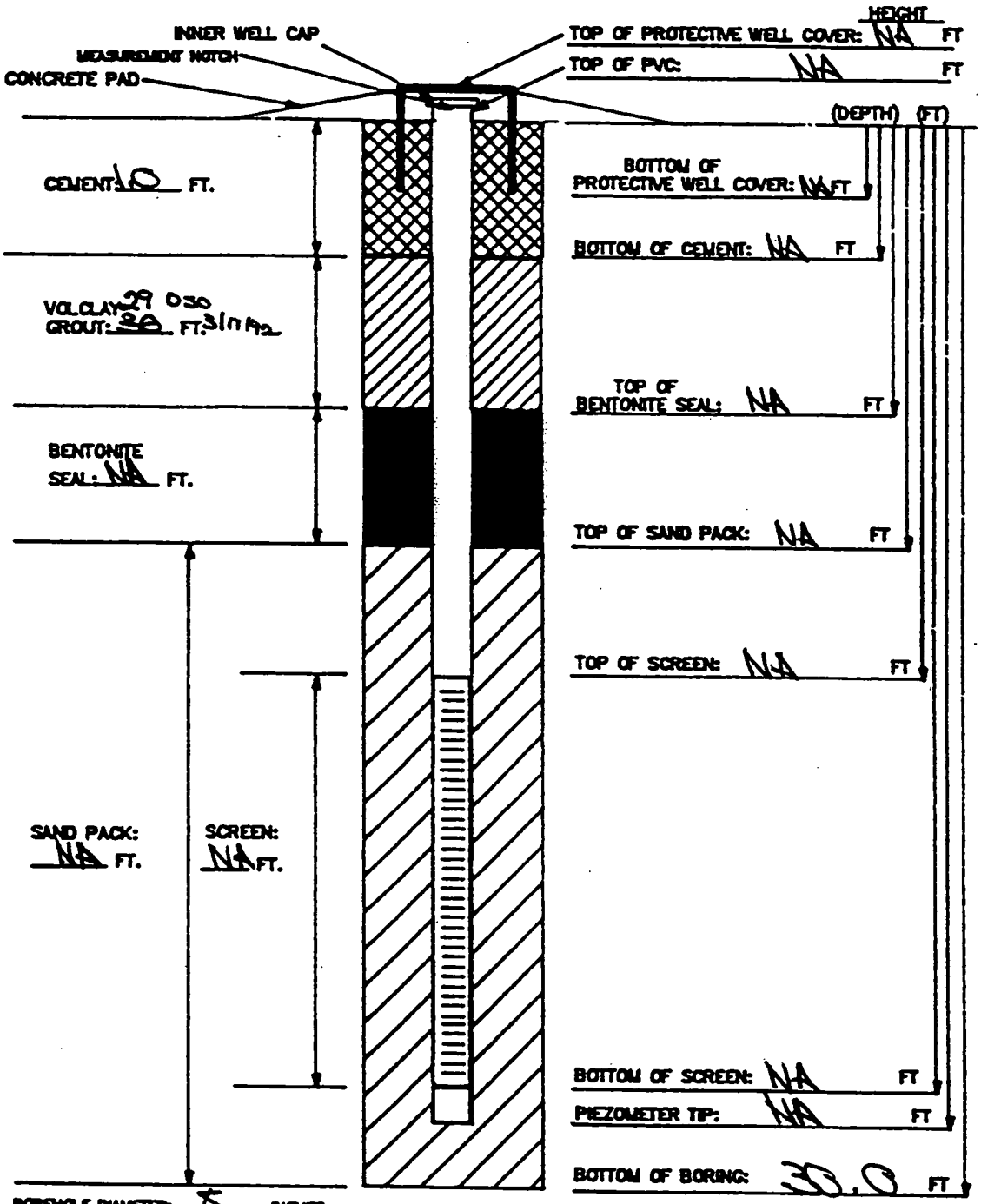
402-11-46

15811 12

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1752

INSTALLATION DATE: 3/17/92



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 60 gal
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 60203104 GEOLOGIST/ENGINEER: D. O'Brien

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FLUMF FIELD ENG./GEO. D. O'Brien DATE 3/17/92
PROJECT NO. 602.03.01.04 CHECKED BY [illegible] DATE 4/22/92
BORING NO. 1752
PIEZOMETER NO. NA DATE OF INSTALLATION 3/17/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Auger Bit
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

001743

409-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 6002.03.01.04	PROJECT NAME. Fernald RI/FS Equip	
BORING NUMBER: 1753	COORDINATES:	DATE 3/23/92
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED: 3/23/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/23/92
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0850 101595 3/23/92	2	6	Stiff. 10YR(4/4) Dark yellowish brown silty clay low plasticity, moist	CL	1.5	HNU = 0 ppm Bγ = 40 cpm
		4	6	SAA, v. stiff	CL	2.25	
1		6	2	SAA	CL	2.25	
		9	0	No Recovery	NA	NA	
2	0900 101596 101597 3/23/92	6	6	0850 3/23/92 V. Stiff. 10YR(5/4) Light olive brown, silty clay some gravel, no plasticity slightly moist	CL	2.75	HNU = 0 ppm Bγ = 50 cpm
	0900 101598 101599 3/23/92	9	6	SAA	CL	3.25	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

Bkgd - HNU = 0 ppm
Bγ = 40-60 cpm

Samples collected per ASTM standard Penetration Test
Colors identified by using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS EWMF		
HOLE NUMBER: 1753	COORDINATES:		DATE: 3/23/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/23/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/23/92
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0900 101600 101601 3/23/92	16	6	V. Stiff. 2.5Y (5/4) Light olive brown, silty clay some gravel, no plasticity slightly moist.	CL	3.5	
		18	0	No Recovery	NA	NA	
4	0903 101602 101603 Rad Scan 3/23/92	21	6	V. Stiff. 2.5Y (6/4) Light yellowish brown, silty clay, some gravel, no plasticity, dry	CL	3.0	HNU = 20 ppm RS = 50 cpm
		37	6	SAA	CL	3.0	
5		25	6	SAA, hard	CL	>4.0	
		31	6	SAA	CL	>4.0	

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Mobile Drill 80
Joe Barile
Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1602.03.01.04	PROJECT NAME. Fernald RI/FS Elum F		
BORING NUMBER: 1753	COORDINATES:	DATE 3/23/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/23/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth: Date/Time	DATE COMPLETED: 3/23/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1305 101602 3/23/92	24	6	DSO 3/23/92 V. stiff. 2.5Y (6/4) Light yellowish brown silty clay, no plasticity, dry	CL	1.75	HNU= 0 ppm BG= 40 cpm
		37	6	SAA, V. stiff	CL	2.0	
7		50/2	6	SAA, hard	CL	>4.0	
		50/0.4	6	SAA	CL	>4.0	
8	1325 101604 3/23/92	1325 DSO 101604 3/23/92	6	Hard. 2.5Y (6/4) Light yellowish brown weathered shale, no plasticity dry.	Sh	>4.0	HNU=20 ppm BG= 40 cpm Archived Shelby
			Shelby				

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS EWMF		
LING NUMBER: 1753	COORDINATES:	DATE 3/23/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/23/92	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/23/92	
DRILLING METHODS: Hollow Stem Augr		PAGE 4 OF 8	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	Shelby 1	Shelby 1					
	Shelby	Shelby ↓					
10	1420 101602	20	6	Hard. 2.5Y(6/2) Light brownish gray weathered shale & limestone interbedded dry.	Sh	>4.0	HNu = 0 ppm BG = 40 cpm
		50/4	0	No Recovery	NA	NA	
11			0	No Recovery	NA	NA	~~HNU~~ = 0 ppm ~~BG~~ 3/23/92
			0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Mobile Drill 80

Jay Basile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002.03.01.04	PROJECT NAME: Fernald RI/FS EWMF		
BORING NUMBER: 1753	COORDINATES:	DATE 3/23/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/23/92	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/23/92	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 8	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1435 1016 3/23/92	22	6	2.5Y (N6/) Gray weathered shale, dry.	Sh	NA	HNu = 0 ppm BG = 60 cpm
		50/4	0	No Recovery	NA	NA	
13			0	No Recovery	NA	NA	~~HNu~~ 0 ppm ~~BG~~ 3/23/92
			0	No Recovery	NA	NA	Hit bedrock, aging to core 5'.
14							Augered thru rock to 15'
15				End soil boring-core 5'			

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Mobile Drill 80
Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 602.03.01.04 FIELD ENG./GEO. D. O'Brien PAGE 6 OF 8
PROJECT NAME Fernald RI/FS EGWMF BORING NO. 1753
APPROX. ELEV. _____ CORE SIZE 2" DATE 3/23/92
DRILLING METHOD Auger DATE STARTED 3/23/92
COORDINATES _____ DATE COMPLETED 3/23/92

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
8"	15'	NA	— NA	— NA	— NA

RUN NUMBER	DEPTH (Ft)	RECOVERY (IN)	RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	MINIMUM	AVERAGE	REMARKS
	15	15	18		Soft. 2.5Y(N6/) Gray shale weathered. Very thinly bedded				HNu = 0 ppm RX = 500 cpm
		10 10 6 7	6						
		3/23/92							
			6		SAA				
	16		6		SAA				
			6		SAA				
	17		6		SAA				SAA = Same As Above
			6		SAA				See p. 1 Notes Section for additional information
	18		6	NA	SAA				
			6		SAA				
	19		6		SAA				
			6		SAA				
	20		6		SAA				
					Very hard. 2.5Y(N6/) Gray crystalline limestone with fossils.				
	21								

Bottom of Coring at 20.5 ft

001749

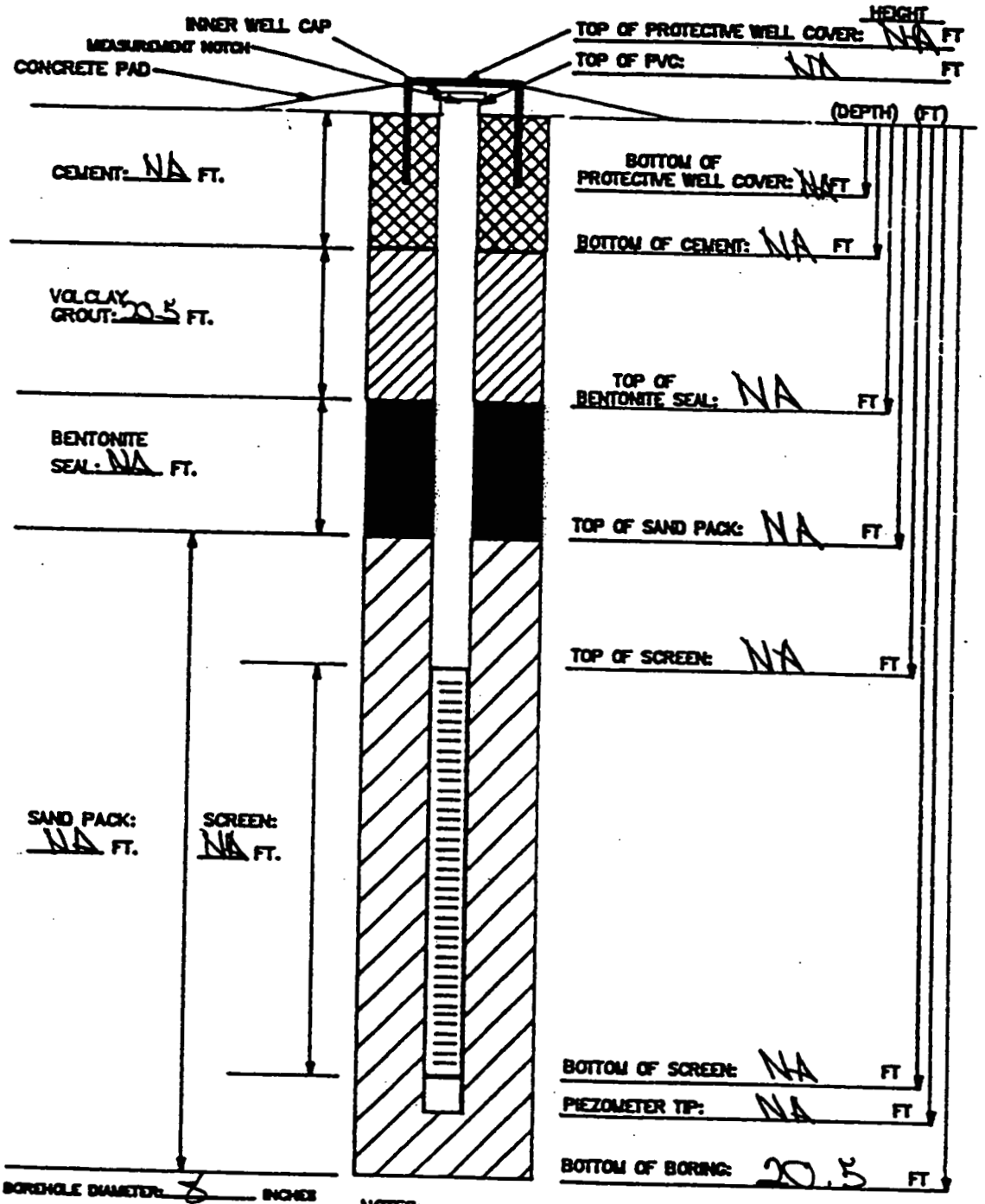
398-11-86

7018 5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1753

INSTALLATION DATE: 3/23/92



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 bags
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 60 gal
OTHER: NA

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG.
4) WATER DEPTH/DATE: NA
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.03.01.04 GEOLOGIST/ENGINEER: D.O'Brien

FERNALD
RI/FS

8 of 8

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FWMF
PROJECT NO. 602.03.01.04
BORING NO. 1753
PIEZOMETER NO. NA

FIELD ENG./GEO. D. O'Brien DATE 3/23/92
CHECKED BY C. Gruber DATE 4/22/92
DATE OF INSTALLATION 3/23/92

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Auger Bit
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0	BOTTOM 20.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

001751

409-11-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. ELWMF	
BORING NUMBER: 1754	COORDINATES:	DATE 4/23/92
ELEVATION:	GWL: Depth NA Date/Time 4/27/92	DATE STARTED: 4/23/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 4/27/92
DRILLING METHODS: Cable Tool		PAGE 1 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5				See boring 2754 for Visual Classification			
8	1440 10/6/84 4/23/92	Shelby	13	V. Stiff. 10YR(5/4) Yellowish brown gravelly clay, no plasticity slightly moist	CL	3.0	HNU = 0ppm BG = 60cpm
11				See boring 2754 for Visual Classification			
14							
20							
25							
30				END OF BORING 30'			

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: 43 Cyclone

Crew: Craig Coulter, Joe Barile

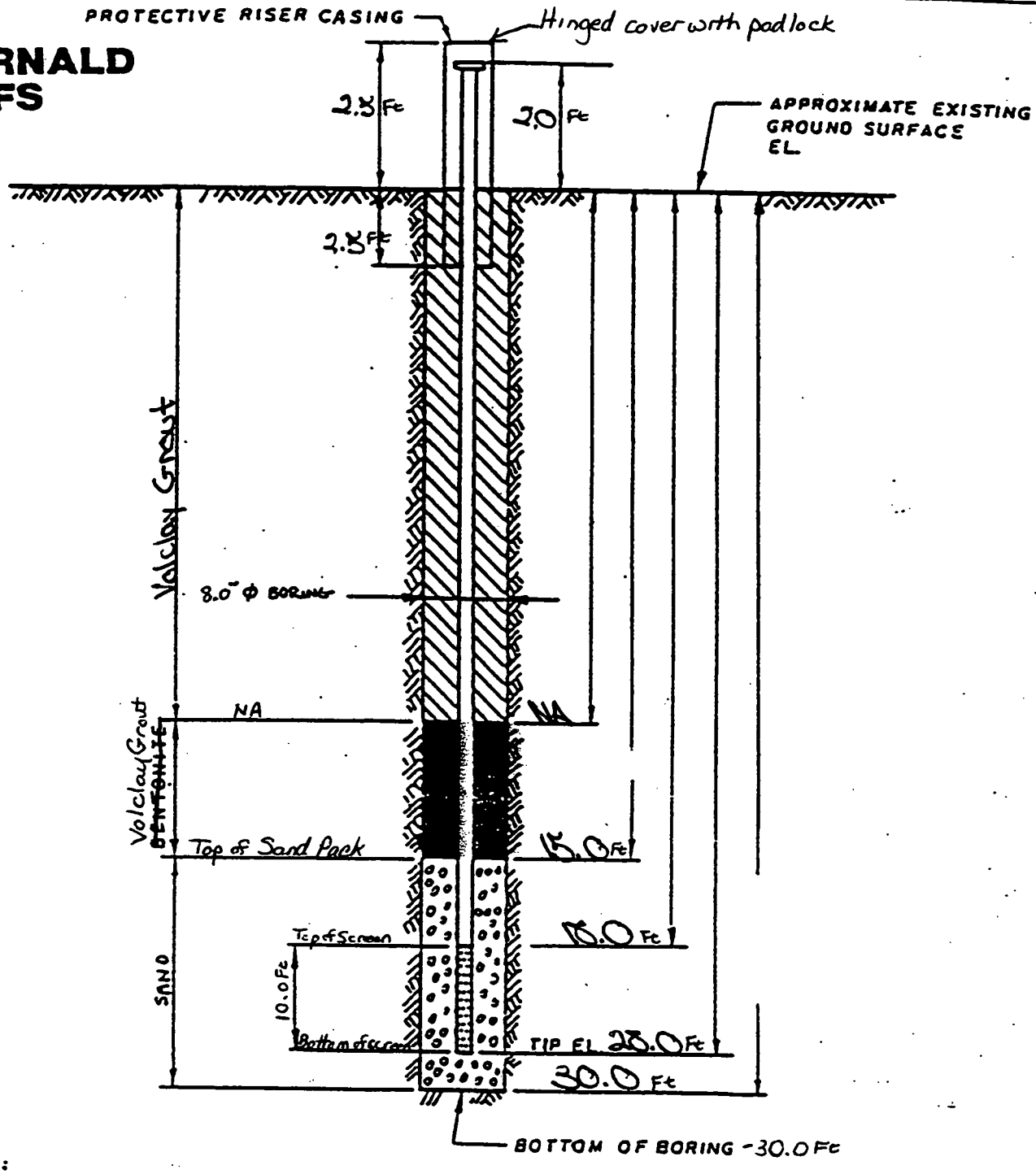
SDSO 4/23/92

Bkgd: HNU = 0ppm, BG = 40-60 cpm

Samples collected per ASTM Standard Penetration Test. Colors identified by using Munsell Color Chart

402-11-86

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE 316 SS PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D. 316 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED. [with welded silt trap]
4. ELEVATION OF WATER LEVEL NA - Dry
5. WATER LEVEL READING ON ~~NA~~ - 4/27/92

~~CCC~~ 4/27/92

Materials used during drilling

3 ~~15~~ bags Volclay grout
CCC 120 ~~100~~ gal water
~~3 bags bentonite~~
12/15/92 8 ~~11~~ bags of sand

Geologist: D. O'Brien

3 Drums generated on this well - soil

INSTALLATION DETAILS
MONITORING WELL 1784

PREPARED FOR EG&G

DRAWING NUMBER | CHECKED BY | APPROVED BY | DATE 4/27/92 | N | D

001753

FERNALD RI/FS

3043

5711

Monitoring Well/ PIEZOMETER INSTALLATION SHEET

PROJECT NAME FWMF
PROJECT NO. 602.03.01.04
BORING NO. 1754
CH 5/4/92 ~~PIEZOMETER~~ Monitoring Well NO. 1754

FIELD ENG./GEO. D. O'Brien DATE 4/27/92
CHECKED BY C. Grube DATE 5/4/92
DATE OF INSTALLATION 4/27/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 30	SIZE 8" FROM 0 TO 30'
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL stainless steel
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. CH 5/4/92 ~~4.0"~~ 4 3/8 in I.D. 4.0"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10' screen 20 ft riser
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD flush joint threaded
TOTAL PERFORATED AREA 10 ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION hinged locking cap
PROTECTIVE PIPE O.D. 10 3/4 inch	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0 ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 15.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 15.0	BOTTOM 30.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 18.0	BOTTOM 28.0	TOP	BOTTOM
PIEZOMETER TIP	CH 5/4/92 ~~28~~ 30.0			
BOTTOM OF BOREHOLE	30.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS Equip		
BORING NUMBER: 27 54	COORDINATES:	DATE 3/26/92	
ELEVATION:	GWL: Depth NA Date/Time 4-22-92	DATE STARTED: 3/26/92	
ENGINEER/GEOLOGIST. D.O'Brian	Depth Date/Time	DATE COMPLETED: 4/22/92	
DRILLING METHODS: Cable Tool		PAGE 1 OF 22	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1610 101632 3/26/92	2	4	Loose 10YR (4/6) Brownish yellow sand poorly graded w/some silt & organics. Dry	SP	NA	HNO = 0 ppm BG = 60 cpm
		3	0	No Recovery	NA	NA	
1		3	0	SAA	NA	NA	
		2	0	SAA	NA	NA	
2	1615 101633 101634 3/26/92	2	6	Soft 10YR (4/3) brown silty clay w/sand. No plasticity, dry.	CL	.5	HNO = 0 ppm BG = 40 cpm
	1615 101635 101636 3/26/92	3	6	V. Stiff. 10YR (3/4) Yellowish brown silty clay, little sand, low plasticity, slight moist.	CL	2.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Driller: Joe Barile
Craig Coulter

SAMPLES collected per ASTM Standard Penetration Test
Colors identified by using Munsell Color Chart

SAA - same as above
NA - not applicable
Bkgd: HNO = 0 ppm
BG - 40-60 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS EWMF		
BORING NUMBER: 2754	COORDINATES:		DATE 3/26/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST. D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/26/92
DRILLING METHODS: Cable Tool			PAGE 2 OF 22

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1615 1° 1637 101638 3/26/92	6	6	V. Stiff. 10YR (3/4) yellowish brown silty clay, low plasticity slightly moist	CL	2.5	
		9	0	No Recovery	NA	NA	
4	1620 101639 3/26/92	11	6	V. Stiff. 2.5Y (4/6) Olive yellow silty clay w/gravel no plasticity, slightly moist.	CL	3.5	HNU=0ppm BX=40cpm
		14	6	SAA	CL	4.0	
5		21	6	SAA	CL	3.25	
		29	0	No Recovery.	NA	NA	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment 43 Cyclone
Driller: Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE 3/26/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/26/92
DRILLING METHODS: Cable Tool			PAGE 3 OF 33

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1630 101639 101640 3/2/2/2	2	6	Soft. 2.5Y(6/6) Olive yellow silty clay w/gravel, low plasticity, slightly moist	CL	.5	HNU=0ppm BG=60cpm
		5	6	SAA, mod. stiff	CL	.75	
7		5	4	SAA, stiff	CL	1.5	
		13	0	No Recovery	NA	NA	
8	0830 101641 3/2/2/2		17	V. stiff. 2.5Y (6/6) Olive yellow clay w/gravel, low plasticity slightly moist	CL	2.5	HNU=0ppm BG=50cpm Archived Shelby

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Driller: Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS Ecum		
BORING NUMBER: 2754	COORDINATES:		DATE 3/27/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST. D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 4 OF 32

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1					
		2					
10		3					
		4		DSO (5/13/92) (6/6) Olive yellow			
		5		V. Stiff. 2.5Y Clay w/ gravel, low plasticity slightly moist	Cl	2.5	
11	0835 101642 3/27/92	8	6	V. Stiff. 10YR (6/3) Pale brown, silty clay low plasticity, slightly moist	Cl	2.0	HNU = 0 ppm BX = 40 cpm
		9	6	SAA	Cl	2.0	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Driller: Joe Basile
Craig Coulter

See p. 1

SAA - same as above
NA - not applicable

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE 3/27/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST. D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 5 OF 32

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		15	6	V. stiff 10YR(6/3) Pale brown ~~Slight~~ silty clay low plasticity, slightly moist	CL	2.0	
		29	6	SAA	CL	2.5	
13	0905 101642 101643 3/27/92	6	6	SAA	CL	3.25	HNU = 0 ppm Bg = 60 cpm
		12	6	SAA, hard	CL	4.0	
14	0905 101643 3/27/92	10	6	Stiff, 10YR(5/1) Gray silty clay, low plasticity slightly moist	CL	1.5	
		13	6	SAA	CL	1.5	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Driller: Joe Basile

Craig Coulter

See p. 1

SAA - same as above
NA - not applicable

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE: 3/27/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 6 OF 22

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0990 101645 101646 3/27/92	3	6	Stiff. 10YR(5/1) Gray clay, med. plasticity slightly moist.	CI	1.75	HNU = 0 ppm BG = 40 cpm
	0940 101647 101648 3/27/92	4	6	SAA, V. Stiff	CI	2.0	
16		6	0	No Recovery	NA	NA	
		8	0	No Recovery	NA	NA	
17	0955 101649 3/27/92	4	6	V. Stiff. 10YR(5/1) Gray clay, low plasticity slightly moist	CI	2.5	HNU = 0 ppm BG = 60 cpm
		7	6	SAA, Stiff	CI	1.0	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 43 Cyclone

Driller: Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE 3/27/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0955 101653 3/27/92	8	6	Stiff. 10YR(5/3) brown silty clay, low plasticity slightly moist	Cl	1.5	
		11	6	SAA	Cl	1.25	
19	1020 101651 101652 3/27/92		25	V.Stiff. 10YR(5/1) Gray gravelly clay, no plasticity slightly moist	Cl	3.75 1.75	HNu = 0 PPM RS = 40 cpm 050 3/27/92
		Refusal					
20		Shelby					

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 43 Cyclone

Driller: Joe Barile, Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE 3/27/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D.O'Brien	Depth:	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 8 OF 22

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		1					
	1010 101653 3/27/92	5		V. Stiff. 10YR(5/1) Gray gravelly clay, no plasticity slightly moist.	Cl	3.75	
22	1050 101654 3/27/92	4	6	V. Stiff 2.5Y(N4/1) Dark gray gravelly silty clay no plasticity, slightly moist	Cl	2.0	HNU=0ppm RS=60cpm
		8	6	SAA	Cl	2.0	
23		11	6	SAA	Cl	2.75	
		15	5	SAA	Cl	2.5	

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment 43 Cyclone
Driller: Joe Basile
Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Ellmt		
BORING NUMBER: 2754	COORDINATES:	DATE 3/27/92	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/26/92	
ENGINEER/GEOLOGIST: D.O'Brien	Depth Date/Time	DATE COMPLETED: 3/27/92	
DRILLING METHODS: Cable Tool		PAGE 9 OF 22	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1120 101654 3/27/92	12	4	Stiff. 2.5Y (N4/) Dark gray gravelly silty Clay, no plasticity slightly moist	CL	1.25	HNU=0 ppm BG=40cpm
		10	0	No Recovery	NA	NA	
25		13	0	No Recovery	NA	NA	
		12	0	No Recovery	NA	NA	
210	101659 101655	8	6	Stiff. 2.5Y (N4/) Dark gray gravelly silty clay no plasticity, slightly moist	CL	1.15	HNU = 0ppm BG = 50cpm
		4	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Driller: Joe Basile
Craig Coultis

SAA - same as above
NA - not applicable

See p. 1

402-11-06

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Elum		
BORING NUMBER: 27K4	COORDINATES:		DATE 3/30/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 3/22/92
DRILLING METHODS: Cable Tool			PAGE 10 OF 22

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		4	0	No Recovery	NA	NA	
		9	0	No Recovery	NA	NA	
28	0935 101651 101653 3/30/92	7	6	Very Dense. 5Y(5/1) Gray sand well graded slightly moist.	SW	NA	HNu = 0 ppm BZ = 40 cpm
	0935 101655 101657 3/30/92	11	6	SAA	SW	NA	
29		50	0	No Recovery	NA	NA	
		50/3	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 43 Cyclone

Driller: Joe Barile

Craig Coulter

SAA - same as above
NA - not applicable

See p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS Equip		
BORING NUMBER: 2754	COORDINATES:		DATE: 3/30/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D.O'Brien	Depth	Date/Time	DATE COMPLETED: 3/27/92
DRILLING METHODS: Cable Tool			PAGE 11 OF 33

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0950 101660 slab	18	6	Medium Dense 5Y (5/1) Gray well graded sand, slightly moist	SW	NA	HNU = 0 ppm RS = 50 cpm
		17	6	SAA	SW	NA	
31		13	6	Stiff. 5Y (5/1) Gray clayey silt, high plasticity slightly moist	ML et CB 5/4/92	1.0	
		15	6	SAA	ML et CB 5/4/92	1.25	
32	1000 101661 slab	7	6	Stiff. 5Y (5/1) Gray silty clay, ~~mod. pl~~ slab 92 some gravel, (mod. plasticity moist	CL	1.0	HNU = 0 ppm RS = 50 cpm
		7	6	SAA	CL	1.0	

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: 43 Cyclone

Driller: Joe Barile

Craig Coulter

SAA - same as above

NA - not applicable

See p. 1

402-11-46

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 402.03.01.04	PROJECT NAME: Fernald RI/FS FEMP		
BORING NUMBER: 2754	COORDINATES:		DATE 3/31/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Calyx Tool			PAGE 12 OF 22

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		10	6	Stiff. 5Y(5/1) Gray silty clay with gravel, mud, plasticity, moist	cl	1.25	
		16	6	SAA	cl	1.0	
34	0850 101662 3/31/92	3	6	DEO 3/31/92 SA Mud. Stiff. 5Y(5/1) Gray clayey silt with gravel mud. plasticity, moist	ML et 5/4/92	.75	HNU= 0ppm BZ= 40cpm
		8	2	SAA	ML et 5/4/92	.5	
35		7	0	No Recovery	NA	NA	
		15	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Dr Joe Barile

Craig Coulter

See p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS FLUMF	
BORING NUMBER: 2754	COORDINATES:	DATE 3/31/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS:		PAGE 13 OF 22

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0930 101683 3/31/92	13	6	Dense. 5Y(5/1) Gray clayey sand, poorly graded, moist	SC ~~SP~~ (M) 5/4/92	NA	HNU=0ppm RS=60cpm
		21	0	No Recovery	NA	NA	
37		15	0	No Recovery	NA	NA	
		25	0	No Recovery	NA	NA	
38	1000 101664 3/31/92	8	4	V. St. FF. 5Y(5/1) Gray gravelly clayey sand moist	SC ~~SP~~ (M) 5/4/92	NA	HNU=0 ppm RS=40cpm
		19	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment 43 Cyclone

Drillers Joe Barile
Craig Coulter

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 1122.03.01.04	PROJECT NAME. FUMF		
BORING NUMBER: 2734	COORDINATES:		DATE 3/31/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Cable Tool			PAGE 14 OF 22

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		35	0	No Recovery	NA	NA	
		36	0	No Recovery	NA	NA	
40	1018 101663 3/31/92	4	6	Stiff. 5Y (5/1) Gray, gravelly clay, no plasticity moist	CL	1.5	HNU = 0 ppm BG = 50 cpm
		7	6	SAA	CL	2.0	
41		17	0	No Recovery	NA	NA	
		27	0	No Recovery	NA	NA	

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment HB Cyclone

Dr Joe Parrill
Craig Carter

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 4.03.03.01.04	PROJECT NAME: Fernald RI/FS FUMF	
BORING NUMBER: 27H4	COORDINATES:	DATE 3/31/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/31/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Cable Tool		PAGE 15 OF 22

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1030 101666 3/31/92	8	6	V. Stiff. 10YR(3/3) Dark brown clayey silt with gravel & organics. No plasticity, slightly moist	ML	2.25	HNu = 0 ppm RD = 60 cpm
		10	6	SAA	ML	20	
43		23	6	SAA * Bottom of till at 43.5 Ft	ML	2.25	
		23	6	Dense. 5Y(5/1) Gray poorly graded sand, dry	SP	NA	
44	1045 101667 3/31/92	5	6	Dense. 5Y(5/1) Gray poorly graded sand, dry	SP	NA	HNu = 0 ppm RD = 60 cpm
		17	4	SAA	SP	NA	

NOTES:
Drilling Contractor: Penn Drill
Drilling Equipment: 43 Cyclone
Driller: Joe Basile, Craig Carter

SAA - same as above
NA - not applicable

See p. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.03.01.04	PROJECT NAME: Fernald RI/FS FUWAF	
BORING NUMBER: 2754	COORDINATES:	DATE 3/31/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/26/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Cable Tool		PAGE 16 OF 22

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		21	0	No Recovery	NA	NA	
		25	0	No Recovery	NA	NA	
46				Begin sampling every 5 ft.			
47							

NOTES:
Drilling Contractor Ann Drill
Drilling Equipment 43 Cyclone
Tom Boyle
Craig Coulter

SAA - same as above
NA - not applicable

see p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1002.03.01.04	PROJECT NAME: Fernald RI/FS FEMP		
BORING NUMBER: 2754	COORDINATES:		DATE 3/31/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Cable Tool			PAGE 17 OF 22

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1400 101668 3/31/92	[illegible]	6	V. Dense 5Y(5/1) Gray. Silty clayey sand, dry DSO 5/5/92	~~SM~~ SC	NA	HNU = 0ppm BG = 60cpm
55	1445 101669 3/31/92	22 [illegible] 46	10	V. Dense 5Y(5/1) Gray Silty sand poorly graded, dry DSO 5/5/92	~~SP~~ SM	NA	HNU = 0ppm BG = 60cpm
60	1520 101670 3/31/92	[illegible] 15	10	Med. Dense. 10YR(4/6) Dark yellowish brown, sand, fine poorly graded, dry	SP	NA	HNU = 0ppm BG = 60cpm
65	1545 101671 3/31/92	17 50/5	5	V. Dense, SAA	SP	NA	HNU = 0ppm BG = 40cpm
70	0910 101672 4/1/92	49 50/3	12	V. Dense. 10YR(4/6) Dark yellowish brown, coarse sand poorly graded slightly moist	SP	NA	HNU = 0ppm BG = 50cpm
75	0945 101673 4/1/92	9 17 50/5	8	V. Dense. 10YR(4/6) Dark yellowish brown, coarse sand w/ gravel poorly graded slightly moist	SP	NA	HNU = 0ppm BG = 40cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: 43 Cyclone
Driller: Joe Bond
Craig Cantor

SAA - same as above
NA - not applicable

See p. 1

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.03.01.04	PROJECT NAME. Fernald RI/FS Flume	
BORING NUMBER: 2754	COORDINATES:	DATE 4/1/92
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/24/92
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 4/22/92
DRILLING METHODS: Cable Tool		PAGE 18 OF 22

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
80	1015 101674 4/1/92	17 50/3	7	V. Dense 10YR (4/6) Dark yellowish brown coarse gravelly sand poorly graded, slightly moist	SP	NA	HNU = 0 ppm BS = 40 cpm
85	1415 101675 4/1/92	50/3	3	SAA Bottom 1" 5Y(5/1) Gray clayey sand w/gravel moist	SP	NA	HNU = 0 ppm BS = 60 cpm
90	1445 101676 4/1/92	B 50/B	8	Hard 5Y(4/3) Olive silty gravelly clay, no plasticity, slightly moist	CL	4.5	HNU = 0 ppm BS = 40 cpm
95	1015 101677 4/1/92	30 50/3	4 50/1	SAA	CL	4.5	HNU = 0 ppm BS = 60 cpm
100	1030 101678 4/2/92	37 49 50/2	12	SAA, mottled w/ gray	CL	4.5	HNU = 0 ppm BS = 60 cpm
105	1455 101679 4/2/92	10 25 37 50	3	Pod. V. Stiff 5Y(4/3) Olive silty clay w/ gravel, no plasticity, slightly moist	CL	2.25	HNU = 0 ppm BS = 60 cpm

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment HB Cyclone

Jay Brown

Craig Curtis

SAA - same as above
NA - not applicable

See p. 1

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 102.03.01.04	PROJECT NAME: ELWMF		DATE 4/2/92 4/2/92
BORING NUMBER: 2TH4	COORDINATES:		DATE STARTED: 3/31/92
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 4/2/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	PAGE 19 OF 22
DRILLING METHODS: Cable Tool			

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1018 101019 4/2/92	50/1	2	Stiff. 5Y(4/3) Olive mottled w/ gray gravelly clay low plasticity slightly moist	cl	1.0	HNU=0ppm RS=40cpm
115	1045 101431 4/2/92	38 50/1	8	Hard. 5Y(4/3) Olive weathered shale, dry	Sh	>4.0	HNU=0ppm RS=50cpm
				End soil boring at 117'. Core soft rock see Rock Log			
120							

NOTES:

Drilling Contractor: Ann Drill

Drilling Equipment: 43 Cyclone

Driller: Joe Barile, Craig Cauker

SAA - SAME AS ABOVE
NA - not applicable

See p. 1

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FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 1002.03.01.04 FIELD ENG./GEO D. O'Brien PAGE 20 OF 22

PROJECT NAME FUSF BORING NO. 2754

APPROX. ELEV. CORE SIZE 2 inch DATE 4/8/92

DRILLING METHOD Cable Tool / Auger DATE STARTED 4/8/92

COORDINATES DATE COMPLETED 4/8/92

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH

RUN NUMBER	DEPTH (FT)	RECOVERY (IN)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	MINIMUM	AVERAGE	REMARKS
1625 101682 4/8/92	115		6		Very hard. 5Y (5/1) Gray Clayey weathered shale, thinly laminated.				HNu = 0 ppm BX = 50 cpm
			6		SAA				
	116		6		SAA				
			6		SAA				
	117		6		SAA				
			6		SAA				
	118		6		SAA				
			6		SAA				
	119		6		SAA.				
			0		No Recovery				
	120				Boring terminated at 120'				

001774

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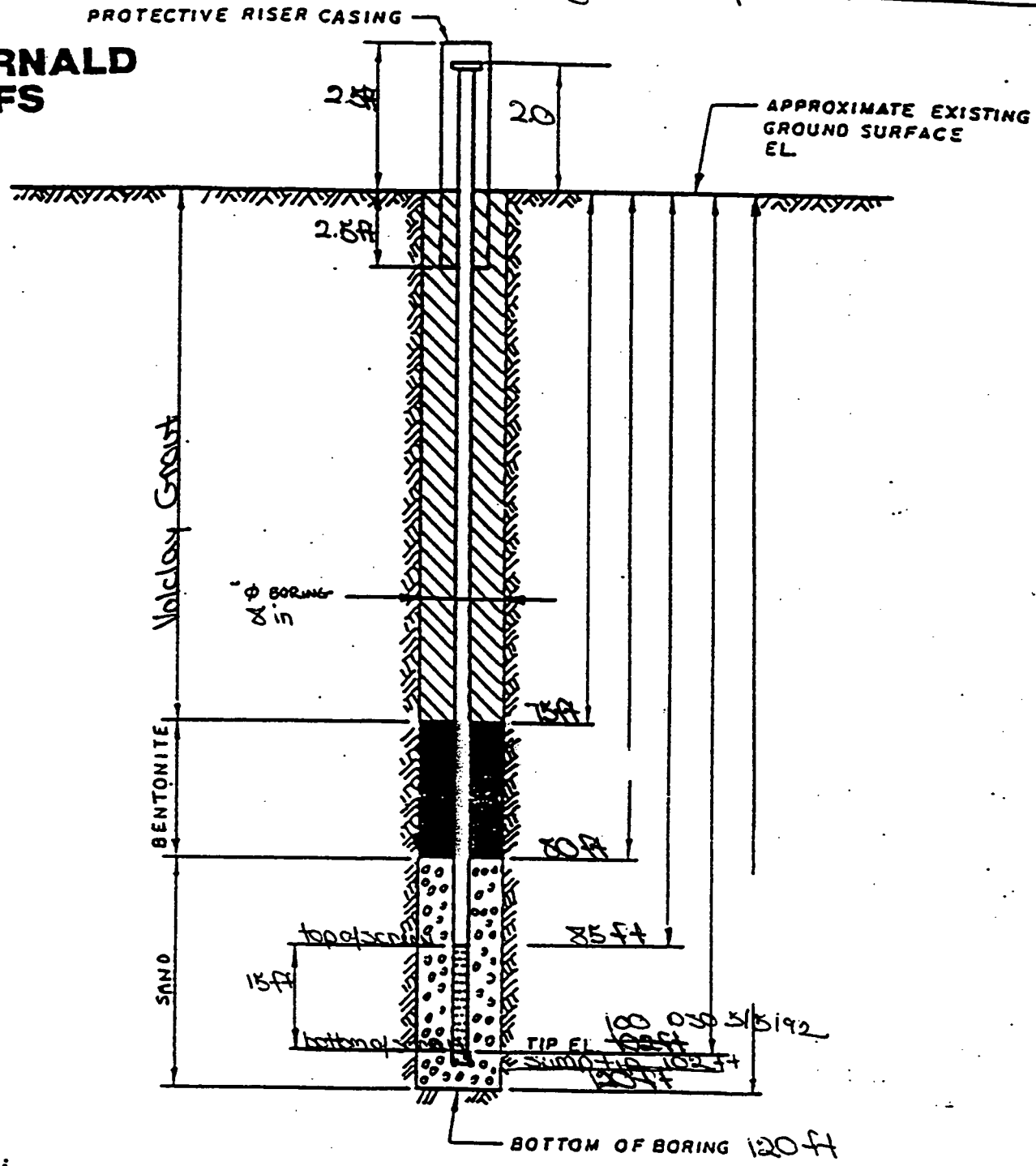
Hinge cover w/padlock

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DSO 4/22/92

DRAWN BY

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D. SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN. SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL NA Dry
5. WATER LEVEL READING ON 4/22/92

DSO 4/22/92 Materials used during drilling
11 bags sand
3 buckets bentonite
15 bags volclay
~1000 gal. water

16 Drums generated on this boring given to rig well

INSTALLATION DETAILS
MONITORING WELL 2754

PREPARED FOR EWMF

Geologist: D. O'Brien

001775

FERNALD RI/FS

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5711

MONITORING WELL/ PIEZOMETER INSTALLATION SHEET

PROJECT NAME Elmt FIELD ENG./GEO. D. O'Brien DATE 4/22/92
PROJECT NO. 402.03.01.04 CHECKED BY _____ DATE _____
BORING NO. 2754
(4) 5/4/92 ~~PIEZOMETER~~ Monitoring Well NO. 2754 DATE OF INSTALLATION 4/22/92

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Chum Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0 TO 120 Ft	SIZE 8.0 inch FROM 0 TO 115 Ft
FLUID NA FROM — TO —	SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL Stainless Steel
DIAMETER OF PERFORATED SECTION ~~0.010~~ 4.0 inch 5/30/92	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 Ft
AVERAGE SIZE OF PERFORATIONS 0.010 in	JOINING METHOD Flush mount threaded
TOTAL PERFORATED AREA 15 Ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 Ft	OTHER PROTECTION Hinged locking cover with padlock
PROTECTIVE PIPE O.D. 10 3/4 inch	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 75	TOP	BOTTOM
BENTONITE	TOP 75	BOTTOM 80	TOP	BOTTOM
SAND	TOP 80	BOTTOM 100	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 85	BOTTOM 100	TOP	BOTTOM
PIEZOMETER TIP	102'			
BOTTOM OF BOREHOLE	120'			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

001776

409-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1755	COORDINATES: NK		DATE: 3-16-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-16-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 3-16-92
DRILLING METHODS: HAND AUGER - 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	061622 061623 1215 3-16	NA	6 6	Soft, olive grey (5Y 4/2), homogeneous clayey silt, non-plastic, moist	ML		Field duplicate; Friable silt - Loess
1			6 6	Medium stiff, olive grey (5Y 4/2) w/ yellowish brown (10YR 5/8) mottling, clayey silt, low plasticity, moist	ML		
2			6				
3	061624 1245 3-16		6 6	Medium stiff, yellowish brown (10YR 5/8) w/ olive grey mottling (5Y 4/2), ~~silty clayey silt~~ silty clay w/ sand pebbles to less than 2mm (5%), med. plastic, moist	CL CH		Glacial
4	061625 1300 3-16		6 6	Yellowish brown (10YR 5/6), ~~clayey silt~~ homogeneous, clayey silt w/ sand pebbles < 3mm (5%), moist, med. plastic	CL CH		
				total depth 4.5 ft			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Ledford

Driller: NA

NA

Colors identified using Munsell Color Chart

001777

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1756	COORDINATES: NK		DATE: 3-16-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-16-92
ENGINEER/GEOLOGIST: T. Mulder	Depth NA	Date/Time NA	DATE COMPLETED: 3-16-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	61626 1355 3-16	NA	6	Soft, olive gray (5Y 4/2), homogeneous, clayey silt, low plastic, moist	ML		
			6	Soft, yellowish brown (10YR 5/6) w/ olive gray mottling, homogen., silty clay w/ sand, low plastic, moist	CL ~~CH~~ CH 4/10/92		Glacial till
1			6	Yellowish brown (10YR 5/6) w/ olive gray mottling, homogeneous, silty clay, med plastic, moist	CL ~~CH~~ CH 4/2/92		
			6				
2			6				
			6	Yellowish brown (10YR 5/6), homogen., silty clay w/ 10% pebbles to 1cm, med plastic, wet	CL ~~CH~~ CH 4/2/92		
3	61627 1415 3-16		6	Lt olive brown (2.5YR 5/4), homogen., clayey silt w/ pebbles to 3mm, med plastic, moist	ML ~~MH~~ CH 4/2/92		
			6	Lt olive brown (2.5YR 5/3), homog., clayey silt w/ sand/pebbles to 5mm, med plastic, wet	ML ~~MH~~ CH 4/2/92 ~~MH~~ CH		
4	61628 1430 3-16		6				
				Total depth 4.5 ft			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Ledford

Driller: NA

NA

Colors identified using Munsell Color Chart

001778

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1757	COORDINATES: NK		DATE: 3-19-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-19-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 3-19-92
DRILLING METHODS: HAND AUGER - 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	061629 0835 3-19	NA	6	Firm, dk grayish brown (2.5Y 4/2), homogeneous, clay, dilatancy none, toughness medium, low-med. plasticity, moist	CL		glacial till
1			6	Firm, olive brown (2.5Y 4/3), clay w/ fine gravel, homogeneous, dilatancy none, med. toughness, med. plasticity, moist.	CL ~~CH~~ CH 4/21/92		
			6				
2			6	Firm, olive yellow (2.5Y 6/6), clay w/ fine gravel, homogeneous, dilatancy none, med. toughness, med. plasticity, moist	CL ~~CH~~ CH 4/21/92		
			6	Firm, lt. yellowish brown (2.5Y 6/4), clayey fine sand w/ gravel to 4 cm, subrounded, moist.	SC		
3	061630 0855 3-19		6				
			6	Firm, gray (2.5Y N6/) w/ olive grey mottling (2.5Y 6/6), homogeneous, clayey silt w/ sand, dilatancy none, low plasticity, moist	ML		
4	061631 ~~061634~~ CH 4/21/92 0925 3-19		6				
				Total depth 54 inches			

NOTES:

Drilling Contractor NA

Drilling Equipment NA

Driller: NA

NA

Geologist: T. Mulder

Sample Tech: R. Ledford, J. Holtgrewe

Colors identified using Munsell Color Chart.

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1758	COORDINATES: NK		DATE: 3-19-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-19-92
ENGINEER/GEOLOGIST: T. Mulder	Depth NA	Date/Time NA	DATE COMPLETED: 3-19-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	61632 0 61633 1330 3-19	NA	6	Firm, olive (5Y 4/3), ~~homogeneous~~, clayey silt w/ gravel/cobbles to 4 in, homogeneous, dilatency none, medium toughness, high plasticity, moist (TM) 3-19-92	~~CH~~ MH ~~CH~~ ML	(TM) 3-19-92	Soil duplicate collected, extremely "sticky" material – difficult to mix well
1			6	Firm, Lt. olive brown (2.5Y 5/4), silty clay w/ gravel to 5 cm, homogeneous, dilatency none, med. toughness, high plasticity, wet	CH		glacial till
			6				
			6	V. Firm, pale olive (5Y 6/4), clay w/ cobbles to 5 in, blocky, dilatency none, toughness ~~high~~ med, ~~non-plastic~~ low plasticity, moist (TM) 3-19-92	CL		
			6	V. firm, gray (2.5Y N5/), clay, homogenous, dilatency none, non-plastic, moist	CL		
3	0 61634 1435 3-19		6				
4	~~61635~~ (TM) 3-19-92			~~Bott~~ 3-19-92 (TM) Total depth 36 inches 7 borings were made @ the location before eventually collecting the 36-42 inch interval. The presence of lmst flagstones ~~prevented~~ 3-19-92 made multiple borings necessary and prevented collection of the last sample interval. (TM)			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Leafford

Driller: NA

NA

001780 Colors identified using Munsell Color Chart

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY	
BORING NUMBER: 1759	COORDINATES: NK	DATE: 3-20-92
ELEVATION: NK	GWL: Depth NA Date/Time NA	DATE STARTED: 3-20-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA Date/Time NA	DATE COMPLETED: 3-20-92
DRILLING METHODS: HAND AUGER - 3 in. dia.		PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	61635 0840 3-20	NA	6	Firm, dark olive gray (5Y 3/2), clayey silt w/ high organic content, non-plastic, moist, homogeneous	ML		
			6	Soft, dark yellowish brown (10YR 4/6), homogeneous, silty clay, med-high plasticity, moist	CL		clay/silt/fn sand Till w/ gravel and cobbles to 8cm
1			6		CH		constituting less than 5% of soil
			6				
			6	Firm, dark yellowish brown (10 YR 3/4), blocky, silty clay w/ gravel to 2cm, low plasticity, moist	CL		
			6		34 in		
3	61636 0905 3-20		6	Firm, dark yellowish brown (10 YR 3/4), homogeneous, silty/sandy clay w/ gravel and high organic content, low plasticity, moist	CL		
			6		44 in		
4	61637 0930 3-20		6	olive yellow (2.5Y 6/6), homogeneous, silty fine sand, subrounded, moist	SM		
				Total depth 54 inches			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Ledford

NA

NA

Colors identified using Munsell Color Chart

001781

243B-3-86

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1760	COORDINATES: NK		DATE: 3-20-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-20-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 3-20-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	61638 1040 3-20	NA	6	Firm, Lt. olive brown (2.5Y 5/4), homogeneous, ~~non plastic~~ (TM) silty clay, non plastic, moist 3-20-92	CL		
			6	Firm, lt olive brown (2.5Y 5/6), homogeneous, silty clay, med. plasticity, moist	CL ~~CH~~ (CH) 4/6/92		Till of predominantly fines w/
1			6	Firm, Lt. olive brown (2.5Y 5/6), homogeneous, silty/sandy clay, low plasticity, moist	CL		gravel/cobbles to 12 cm.
							pebbles and cobbles
2				Lt. olive brown (2.5Y 5/6), homogeneous, clayey/sandy silt, subrounded, no plasticity, moist (TM) 3-20-92	ML		constitute less than 10% of soil
					33	in	
				Lt. yellowish brown (2.5Y 6/4), homogeneous, clayey/sandy silt, subangular, low plasticity, ~~moist~~ wet (TM) 3-20-92	ML ~~CL~~ (CL) 4/6/92		(TM) 3-20-92 ~~gravel to~~
3	61639 1510 3-20						
					45	in	
				Lt yellowish brown (2.5Y 6/3) homogeneous, sandy silt w/ clay, subangular, wet	~~CL~~ ML (CL) 4/6/92		
4	61690 (TM) 3-20-92			(TM) 3-20-92 Total depth 48 inches			

NOTES:

Drilling Contractor NA

Drilling Equipment NA

Driller: NA

NA

Geologist: T. Mulder

Sample Tech: R. Ledford

Colors identified using Munsell Color Chart

001782

243B-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1761	COORDINATES:		DATE: 3-23-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-23-92
ENGINEER/GEOLOGIST: T. Mulder	Depth NA	Date/Time NA	DATE COMPLETED: 3-23-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	61640	NA	6	Firm, Lt. olive brown (2.5Y 5/3), homog., silt, low plastic, moist	ML		Friable, easily mixed
0	61641 0925 3-23						
			6	Firm, yellowish brown (10YR 5/4), homogeneous, silty clay, low-med. plastic, moist	CL		glacial
1			6				
			6	Firm, yellowish brown (10YR 5/4), homogeneous, silty/sandy clay, low-med plasticity, moist	CL		
2			6				
			6				
3	0 61642 0945 3-23		6				
			6	Firm, Lt olive brown (2.5Y (5/4), homogeneous, silty/sandy clay, med plastic, moist	CL		
4	0 61643 0955 3-23		6	Lt. olive brown (2.5Y 5/4) w/ Lt. gray mottling, clayey/sandy fine sand, homogeneous, subangular, moist	SC		
				Total depth 4.5 ft.			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Ledford

Driller: NA

NA

001783 Colors identified using Munsell Color Chart

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1762	COORDINATES: N/K		DATE: 3-23-92
ELEVATION: N/K	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-23-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 3-23-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Soft			
0	061644 1100 3-23	NA	6 3-23-92	~~Firm~~, Olive (5Y 4/3), silty clay w/ high organic content, homogeneous, low-med plastic, moist (TM)	CL		
			6	Firm, Olive mottled (5Y 4/3 and 5/4), silty/sandy clay, homogen., med plastic, moist	CL		glacial-unsorted silts/clays/fn sands,
1			6	Firm, Olive brown (2.5Y 4/3), homogeneous, silty/sandy clay, med plastic, moist	CL		
			6				Occasional cobbles to 5cm
			6	Firm, Lt. olive brown (2.5Y 5/4), homogeneous, ~~silty/sandy clay~~, clayey/~~silty~~ sandy silt, ~~non-plastic~~, moist (TM) 3-23-92	ML	(TM) 3-23-92	
			6				
3	061645 1125 3-23		6	Firm, Lt. olive brown (2.5Y 5/4) homogeneous, clayey/silty fn sand, ~~sub~~angular, moist	SC/SM		
			6	Firm, lt. olive gray (2.5Y 5/6) w/ lt. olive gray (5Y 6/2) mottling, homogen, clayey/sandy silt, subangular, moist	45 inches		
4	061646 1145 3-23		6		~~SC~~ ML	CH 4/2/92	
				T.D. 4.5 ft			

NOTES:

Drilling Contractor NA

Drilling Equipment NA

Driller: NA

NA

Geologist: T. Mulder

Sample Tech: R. Ledford

Colors identified using Munsell Color Chart

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY	
BORING NUMBER: 1763	COORDINATES: NK	DATE: 3-24-92
ELEVATION: NK	GWL: Depth NA Date/Time NA	DATE STARTED: 3-24-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA Date/Time NA	DATE COMPLETED: 3-24-92
DRILLING METHODS: HAND AUGER – 3 in. dia.		PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	061647 0820 3-24	NA	6	Firm, Olive brown (2.5Y 4/3), homogeneous, silt, non plastic, moist	ML		loess
			6				
1			6	Firm, dark yellowish brown (10YR 4/6), homogeneous, clayey silt, non plastic, moist	ML		
			6		21	inches	
			6	Firm, dark yellowish brown (10YR 4/4), homogeneous, sandy/silty clay w/ pebbles to 1 cm, med plastic, moist	CL		Till
2			6				
			6	Firm, ~~dark~~ lt olive brown, (2.5Y 5/6), clayey/sandy silt w/ pebbles to 4 cm, low plastic, moist (TM 3-24-92)	ML		← spud bar used
3	061648 0845 3-24		6	Firm, olive yellow (5Y 6/6), homogen, sandy/clayey silt w/ pebbles to 4cm, low plastic, moist	ML		
			6				← spud bar used
4	061649 1000 3-24		6	Firm, Lt. olive brown (2.5Y 5/6) w/ gray (5Y 5/1) mottling, ~~silty~~ (TM 3-24-92), homogeneous, silty clay, med plastic, moist	CL		
				TD 4.5 ft			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. Ledford

Driller: NA

NA

001785 Colors identified using Munsell Color Chart

2438-3-86

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.46	PROJECT NAME: RCRA/CERCLA BACKGROUND SOIL STUDY		
BORING NUMBER: 1764	COORDINATES: NK		DATE: 3-24-92
ELEVATION: NK	GWL: Depth NA	Date/Time NA	DATE STARTED: 3-24-92
ENGINEER/GEOLOGIST: T. MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 3-24-92
DRILLING METHODS: HAND AUGER – 3 in. dia.			PAGE 1 OF 1

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	3-24-92 61650 (TM) ~~1305~~ 1305 3-24	NA	6	Firm, Olive brown (2.5Y 4/4), homogeneous, ~~non-low~~ (TM) 3-24-92 clayey silt, non-low plastic, wet	ML		
			6				
1			6	Firm, Lt olive brown (2.5Y 5/6) w/ olive brown mottling (2.5Y 4/4), homogeneous, clayey silt, non plastic moist	ML		
			6				loess
2			6	Firm, Lt. olive brown (2.5Y 5/4), homogeneous, silty/clayey med. sand w/ pebbles to 3 cm, sub angular, wet	SM/SC		Till
			6	Firm, Lt olive brown (2.5Y 5/4) ~~yellow~~ (TM) 3-24-92 w/ gray mottling, homogeneous, sandy/~~silty~~ clayey silt, sub angular, moist (TM) 3-24-92	ML		
3	0 61651 1330 3-24		6				
			6	Firm, Lt. olive brown (2.5Y 5/4) w/ gray mottling, homogeneous, silty/clayey fn sand w/ pebbles to 3cm, sub angular, moist	SM/SC		← Hit rock, Started new hole
4	0 61652 1355 3-24		6				
				T.D. 4.5 ft			

NOTES:

Drilling Contractor NA Geologist: T. Mulder

Drilling Equipment NA Sample Tech: R. L. Ledford

Driller: NA

NA

001786 Colors identified using Munsell Color Chart

2438-3-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25 3.15 ET 91	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1765 8/19/91	COORDINATES: N481,377.9 E1378291.2	DATE: 7/17/91	
ELEVATION: 580.7	GWL: Depth	Date/Time	DATE STARTED: 7/17/91
ENGINEER/GEOLOGIST: HARRIS/GARMAN	Depth	Date/Time	DATE COMPLETED: 7/25/91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1	63080 7/17 0950	2	6	HARD (7.5 YR, 5/4) BROWN SILTY CLAY LOW COHESION, LOW PLASTICITY, SLIGHTLY MOIST.	CL	2.0	NA	HNU 0; α 0; BZ 400 CPM
	63081 7/17 0950	7	6	HARD (10 YR 6/6) BROWNISH YELLOW CLAY LOW COHESION, MODERATE PLASTICITY, SLIGHTLY MOIST.	CL	3.0		HNU 0; α 0; BZ 1000 CPM
	63082 7/17 0950	10	6	HARD (10 YR 6/6) BROWNISH YELLOW GRADING INTO (10 YR 4/1) DARK GRAY CLAY, MODERATE COHESION & PLASTICITY SLIGHTLY MOIST.	CL	3.2		HNU 0; α 0; BZ 1900 CPM
2	63083 7/17 0955	7	6	FIRM (10 YR 3/2) VERY DARK GRAYISH BROWN SILTY CLAY LIKE MATERIAL, MODERATE COHESION LOW PLASTICITY, MOIST		2.0		HNU 0; α 0; BZ 2000 CPM
	63084 7/17 0955	11	6	SAA	CL	2.0		HNU 0; α 0; BZ 2300 CPM
3	63085 7/17 0955	13	6	SAA	CL	2.0		HNU 0; α 0; BZ 2100 CPM
	63086 7/17 1000	9	6	FIRM (10 YR 4/1) DARK GRAY MOTTLED WITH (2.5 YR, 4/4) REDDISH BROWN SILTY CLAY LIKE MATERIAL. LOW COHESION & PLASTICITY, MOIST.	CL	2.0		HNU 0; α 0; BZ 1400 CPM
4	63087 7/17 1000	4	6	SAA	CL	2.0		HNU 0; α 0; BZ 1400 CPM
	63088 7/17 1000	5	6	SAA	CL	2.0		HNU 0; α 0; BZ 1000 CPM
5	63089 7-17 1020	SHELBY TUBE PUSHED BLOW COUNTS DO NOT APPLY	24					SHELBY TUBE
6								
7	63090 7-18 0914	2	6	LOOSE (10 YR, 4/1) DARK GRAY MOTTLED WITH (2.5 YR 4/4) REDDISH BROWN CLAY-LIKE MATERIAL. MODERATE COHESION AND PLASTICITY. VERY MOIST.	CL	NA		HNU NA; α NA; BZ NA

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

001787

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

FT 8/4/91

PROJECT NUMBER: 602.25.97 3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1765	COORDINATES N481,377.9 E 1378791.2		DATE 7-18 / 7-25
ELEVATION: 580.7	GWL: Depth	Date/Time	DATE STARTED: 7-17-91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED: 7-25-91
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63091 7-18 0814	3	0	NR	NA	NA	NA	HNU NA; α NA; Bε NA
	63092 7-18 0814	4	0	NR	NA	NA		HNU NA; α NA; Bε NA
9, 10	63093 7-18 0830	SHELBY TUBE PUSHED BLOW COUNTS NOT APPLICABLE	0	SHELBY TUBE PUSHED FROM 8.5 TO 11.0 FT. NO RECOVERY AFTER 2 ATTEMPTS. MATERIAL WAS DISPLACED TO 11.0 FT, SO SPLIT SPOON SAMPLE COULD NOT BE OBTAINED.	NA	NA		↑ NA ↓
11	63094 7-18 0845	3	6	LOOSE (10YR,4/1) DARK GRAY CLAY-LIKE MATERIAL. POOR COHESION LOW PLASTICITY. PIECES OF PAPER INTERSPERSED IN MATERIAL. VERY MOIST.	CL	NA		HNU 0; α 0; Bε 1200 cpm
12	63095 7-18 0845	3	6	SAA	CL	NA		HNU 0; α 0; Bε 1500 cpm
	63096 7-18 0845	3	0	NR	NA	NA		HNU NA; α NA; Bε NA
13	63097 7-18 0900	2	6	LOOSE (10YR,5/1) GRAY CLAY-LIKE MATERIAL WITH TRACE OF (10YR,8/1) WHITE GRANULAR MATERIAL. POOR COHESION. MEDIUM PLASTICITY. VERY MOIST.	CL	NA		HNU 0; α 0; Bε 1200
	63098 7-18 0900	3	6	SAA	CL	NA		HNU 0; α 0; Bε 4000
	63099 7-18 0900	3	0	NR	NA	NA		HNU NA; α NA; Bε NA
14	63101 7/25 0845	SHELBY TUBE	-					HNU; α; Bε
15								HNU; α; Bε

NOTES.

Drilling Contractor: Pennsylvania Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. K. Myers

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25-91-315	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1765 ET 8-19-91	COORDINATES: N481,377.9 E1,378,291.2	DATE: 7/25	
ELEVATION: 580.7'	GWL: Depth / Date/Time		DATE STARTED: 7/17
ENGINEER/GEOLOGIST: HARRIS	Depth / Date/Time		DATE COMPLETED: 7/25
DRILLING METHODS: Hollow Stem Auger			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	WELL CONSTRUCTION	REMARKS
15	63101 7/25 0845 CONTINUED	SHELBY TUBE PUSHED	30		NA	NA	NA	SHELBY TUBE
16								
17	63102 7/25 0900	1	6	VERY LOOSE (10YR 4/1) DARK GRAY SILTY CLAY LIKE MATERIAL. GELATINOUS IN NATURE. GOOD PLASTICITY, FAIR COHESION. VERY MOIST	CL	•		HNU 0 α 0 BZ 1500
	63103 7/25 0940	1	6	SAA				HNU 0 α 0 BZ 1500
	63104 7/25 0940	2	6	VERY LOOSE (2.5Y, N6/) ~~WHITE~~ SILTY CLAY. PROBABLY ASH. GOOD PLASTICITY, GOOD COHESION VERY MOIST.				HNU 0 α 0 BZ 1500
18	63105 0940 7/25	1		SAA				HNU 0 α 0 BZ 1500
	63106 0955 0955	1		SAA				HNU 0 α 0 BZ 150
19	63107 7/25 0955	4		LOOSE (2.5Y N6/) WHITE SANDY SILT WITH LARGE GRAVEL. NO PLASTICITY OR COHESION WET.	GM			HNU 0 α 0 BZ 1500
	63108 7/25 1005	3	6	SAA	GM			HNU 0 α 0 BZ 1000
20	63109 1010 7/25	3	6	LOOSE (2.5Y N6/) WHITE GRAVELY SAND GRADING INTO (10YR 2/22) DARK GRAY SANDY CLAY LOW COHESION LOW PLASTICITY VERY MOIST PIECES OF PAPER INTERMIXED.	GM			HNU 0 α 0 BZ 800
	63110 7/25 1030	3	6	VERY LOOSE (10YR 5/1) COARSE SAND WITH SILTY MATRIX. LOW COHESION WET.				HNU 0 α 0 BZ 1200
21	63111 7/25 1130	4	6	LOOSE ~~COARSE~~ MEDIUM (10YR 5/1) COARSE SAND GRADING INTO (10 YR 3/22) DARK GRAYISH BROWN HARD CLAY NO COHESION, WET.				HNU 0 α 0 BZ 700
	63112 7/25 1135	7	6	LOOSE (2.5Y N7/) LIGHT GRAY COARSE SAND INTERBEDDED WITH 1/4" LENSE OF (2.5Y N8/) CLAY NO COHESION, WET.				HNU 0 α 0 BZ 1000
22	~~63113~~ 7/25 1150	12	6	HARD (2.5Y 5/2) GRAYISH BROWN CLAY GRADING INTO BROWN CLAY. (LIMEY) BOTTOM OF BOREHOLE AT 22.4'				

NOTES.

Drilling Contractor: Penn. Drilling

Drilling Equipment: Simco

Driller: E. Gardner

Asst: K. Myers

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE.

001789

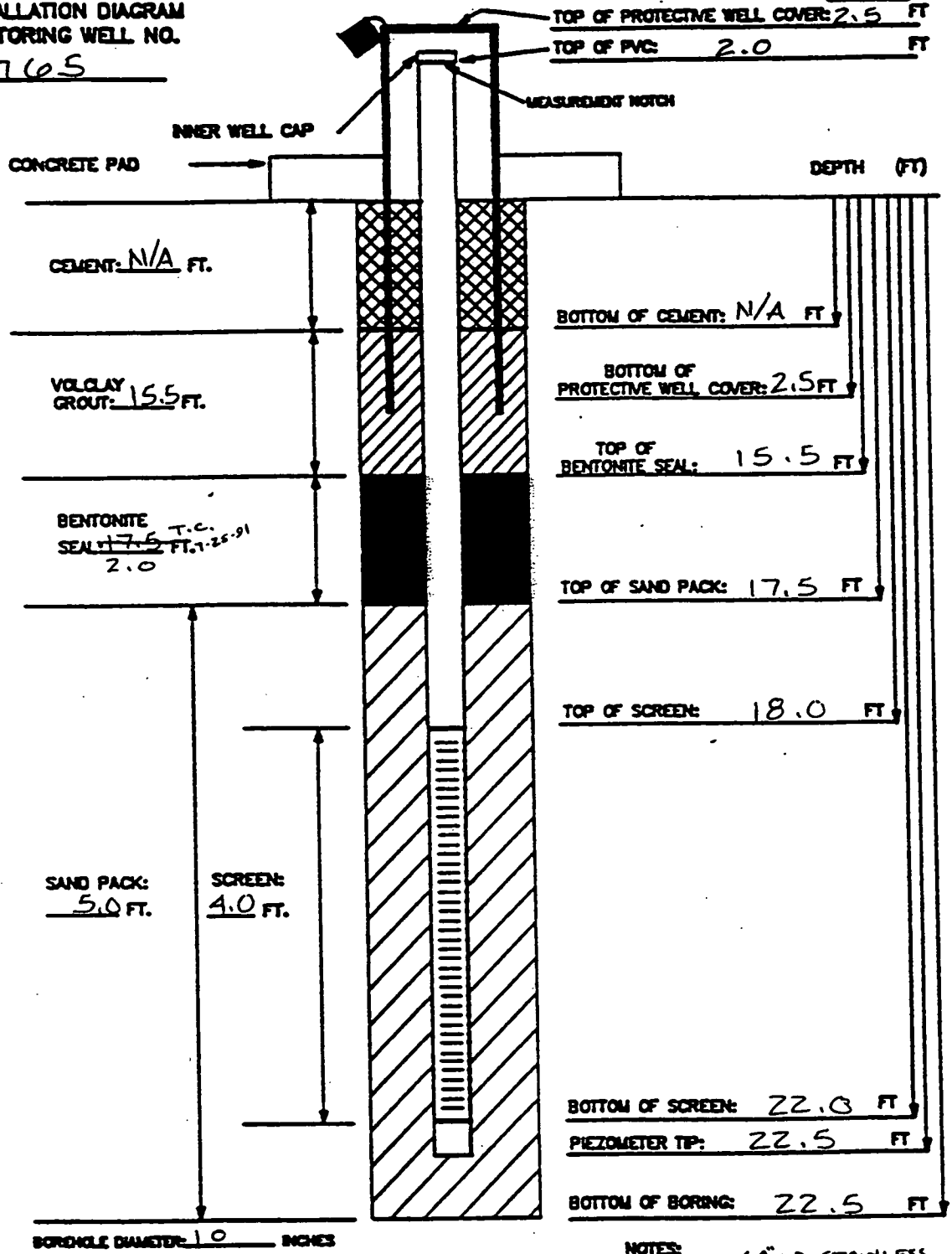
4/5

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1765

Stickups

INSTALLATION DATE: 7-25-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 1-80 lb. BAG 10/20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 3-50 lb. BAGS
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: 3'x3' CONCRETE PAD WILL BE INSTALLED

NOTES:

1) RISER PIPE IS ~~6-INCH SCHEDULE-40~~ 4.0" I.D. STAINLESS TC 7-25-91 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS ~~6-INCH-LG SCHEDULE-40~~ 4.0" I.D. STAINLESS PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (60-1) 602 ~~7-25-91~~ 3.15

GEOLOGIST/ENGINEER: HARRIS / GARMAN

ERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
FIELD ENG./GEO. HARRIS
DATE 7-25-91
PROJECT NO. 602.~~25.91~~ 3.15
CHECKED BY
DATE
BORING NO. 1765 ET 8-19-91
PIEZOMETER NO. 1765
DATE OF INSTALLATION 7-25-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~
SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 in
TOTAL PERFORATED AREA 4.0 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 10.0', 10.0', 5.0'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 10 3/4 IN.

OTHER PROTECTION HINGED LOCKING COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		580.7	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 15.5	TOP	BOTTOM
BENTONITE	TOP 15.5	BOTTOM 17.5	TOP	BOTTOM
SAND	TOP 17.5	BOTTOM 22.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 18.0	BOTTOM 22.0	TOP	BOTTOM
PIEZOMETER TIP	22.5			
BOTTOM OF BOREHOLE	22.5			
GWL AFTER INSTALLATION				

PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION.

5711

1765

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	7 / 17 / 91
NO.	NA1
SHEET	1 OF 1

PROJECT NAME: FMPC RI/FS OU-1 | PROJECT NO. C02-2~~3~~ 08-91 3.15

FIELD ACTIVITY SUBJECT: Drilling / Sampling

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0600 - Arrive at office

0700 - Arrive at facility

0730 - Arrive at waste pits H&S meeting

0800 - Crew suits up to drill

0830 - Drilling of borehole # 1765 begins.

0900 - Les Bunk (WMCO) visits site & observes operations

0930 - Mike Brabender, Dave (Bechtel Nelson QA) visits site and observes operations. They had no complaints or comments.

1100 - Drilling of the first interval (7') of borehole # 1765 complete. Good recovery in all spoons and shelby tube. HSL VOA collected at 4.0'-4.5' (sample # 63088). Other material archived or composited.

1130 - Break for lunch.

1300 - Crew returns to waste pit area

1330 - Called Hamel to tell him of our status

1400 - Cuttings drums prepared for shipping. John Vandine is called to pick up drums

1500 - Drums transported to building 64. (Drums - [B# 1767 - 10 drum] [B# 1766 - 4 drums]) Drums labeled improperly. Corrections will be made.

1600 - Samples screened for release.

1700 - Samples delivered to Larry Evans

1800 - Return to office

1900 - Went home

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
Les Bunk (WMCO) Mike Brabender Dave QA (WMCO)	Drums labeled wrong.
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
Clear / 94°	Hamel - status report.

PERSONNEL ON SITE: All Crew

SUPERVISOR: Marc Harris

001792

DATE: 7/17/91

FERNALD
RI/FS # 1765

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	7 / 18 / 91
NO.	NA
SHEET	1 OF 1

ET 8-19-91

SUBJECT NAME FMPC RI/FS OU-1 | PROJECT NO. 602-26-91 3.15

FIELD ACTIVITY SUBJECT: Drilling Sampling B# 1765

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700- ARRIVED AT OFFICE.

0730- ARRIVED AT WASTE PITS
KEN. BARNHART CONDUCTS H&S MEETING

0800- DRILLERS / SAMPLERS SUIT UP TO DRILL

0830- DRILLING OF 2nd INTERVAL BEGINS
SHELBY TUBE ATTEMPTED AT 8.5'-11.0' - NO RECOVERY.

0900- HSL VOA COLLECTED AT 13.0-13.5' S# 63098

1000- INTERVAL 2 COMPLETED.
DRILLING CEASES DUE TO HEAT STRESS

1030- HSL SAMPLES SMEARED FOR RELEASE.
AREA SECURED FOR 4 DAY BREAK.

1130- CREW SENT TO THE SHOWERS.

1300- CREW MEETS AT CAFETERIA FOR MEETING WITH WEMCO OU-1 STAFF. DILLS, BOWMAN & BURKE PRESENT.
WE DISCUSSED REPARATIONS, LACK OF WEMCO SUPPORT, DELAYS CAUSED BY WEMCO, etc.

1600- CREW GOES TO OFFICE.

1700- CREW GOES HOME.

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
—	MEETING WITH WEMCO OU-1 AT 1300.
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
CLEAR, HOT	NONE

PERSONNEL ON SITE:

SUPERVISOR: MARC HARRIS DATE: 8/18/91

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG
DATE 7 | 23 | 91
NO. NA
SHEET 1 OF 1

PROJECT NAME FMPC RI/FS OU-1 | PROJECT NO. 602.2541 3.15

FIELD ACTIVITY SUBJECT: #1765

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700- ARRIVE AT OFFICE
DOUG HAMMEL DISCUSSES/CONDUCTS FIELD ACTIVITIES MEETING.

0730- HAMMEL INFORMS ME THAT THE AIR TRUCK THAT I ORDERED WAS HANDED OVER TO IK-65 GAS TEST SAMPLING BECAUSE THEY ARE OUT OF AIR. HE SAID THAT ANOTHER AIR TRUCK WOULD ARRIVE TOMORROW MORNING.

0800- I CONDUCT AN OU-1 MEETING AND TALK TO CREW ABOUT INDIVIDUAL DUTIES.

0900- DRILLERS SENT TO TRAILERS
LOPELAND, McPHERSON SENT TO PROCURE MORE MISC. SUPPLIES.
WESTERMAN, CHERRY AND MYSELF WORK ON PAPERWORK.

00- BREAK FOR LUNCH.

1400- JENNY DOLLENMAYER + I MEET WITH GAIL GOLSTON (WEILER WELDING) TO DISCUSS FUTURE AIRTRUCK SUPPLY. THEY WOULD TRY TO ACQUIRE MORE'

1600- MEETING WITH HEATER + SPATTA TO DISCUSS SAMPLE PLAN.

1800- WENT HOME

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
	NO AIR - CAN'T DRILL
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
CLEAR HOT	NONE

PERSONNEL ON SITE: NO DRILLING

SUPERVISOR: Mark Harris

001794

DATE: 7/23/91

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	7 / 24 / 91
NO.	NA
SHEET	1 OF 1

PROJECT NAME: FMPC RI/FS OU-1

PROJECT NO.: 602.25 ATT. 3.15

FIELD ACTIVITY SUBJECT: 1765

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700 - ARRIVED AT OFFICE

0800 - AIR TRUCK HAS NOT YET ARRIVED

0900 - CREW SENT TO RESUPPLY OPERATION.

1000 - I CALL WEILER WELDING TO FIND THE STATUS OF AIR TRUCK.

1100 - WEILER CALLS AND SAYS THAT TRUCK LEFT CHICAGO AT 8:00 AM CENTRAL TIME. WON'T ARRIVE UNTIL LATE IN THE AFTERNOON.

1200 - BREAK FOR LUNCH.

1400 - CREW ASSEMBLES IN THE FIELD FOR CLEANUP + SITE RESTORATION.

1600 - AIRTRUCK FINALLY ARRIVES.
I: CALL HAMMEL TO INFORM HIM.

1700 - WENT HOME.

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
NONE	NO AIR - CAN'T DRILL
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
CLEAR, HOT	NONE

PERSONNEL ON SITE:

SUPERVISOR: MARC HARRIS

001795

DATE: 7/24/91

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	7 / 25 / 91
NO.	– / – / –
SHEET	1 OF 1

PROJECT NAME: RI/FS OU-1 | PROJECT NO. 602-25.97/3.15

FIELD ACTIVITY SUBJECT: WASTE PIT / DRILLING / SAMPLING # 1765

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0600 – ARRIVED AT OFFICE
0630 – LOADED EXPLORER
0700 – ARRIVED AT WEMCO
0730 – ARRIVED AT WASTE PITS. HELD H&S MEETING.
0800 – DRILLERS + SAMPLERS SHIT UP TO DRILL/SAMPLE.
D. MEREDITH (WEMCO QA) ARRIVES TO OBSERVE OPERATIONS.
0830 – DRILLING BEGINS ON 3rd INTERVAL OF 1765 AT 14'.
0900 – ARCHIVE TO 19.0'
1000 – HSL VOA COLLECTED AT 19.0 – 19.5'
TCLP VOA COLLECTED AT 19.5' – 20.0'
LINER ENCOUNTERED AT 20.5'
1030 – CLEAN AUGERS SET IN HOLE
DIRTY AUGERS TAKEN TO DE-CON
1100 – BREAK FOR LUNCH
1230 – RETURN FROM LUNCH.
1400 – DRILLERS BEGIN SETTING WELL
SAMPLERS COMPOSITE SAMPLES
1530 – SAMPLERS FINISH WITH COMPOSITES
1700 – WELL IS COMPLETED
1600 – AREA SECURED / GO TO SHOWERS.
1700 – OFFICE / HOME.

VISITORS ON SITE: DAVE MEREDITH – WEMCO QA/QC

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS: NONE

WEATHER CONDITIONS: CLEAN / HOT

IMPORTANT TELEPHONE CALLS: NONE

PERSONNEL ON SITE: AL COMER

SUPERVISOR: MARK HARRIS

DATE: 7/25/91

FERNALD RI/FS

Date	6-28	9-25-91	
Initial	8		
	1st Key In	2nd Key In	Verification

VISUAL CLASSIFICATION OF SOILS

Jw 9.9.91

PROJECT NUMBER: 602.25.91/3.15	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1766 (WASTE PIT #1)	COORDINATES: N 481,349.3 E 1,378,240.4	DATE: 7-13-91	
ELEVATION: 581.1	GWL: Depth	Date/Time	DATE STARTED: 7/13/91
ENGINEER/GEOLOGIST: GARMAN / HARRIS	Depth	Date/Time	DATE COMPLETED: 7-16-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63041 7-13 0955	8	6	MEDIUM DENSE (2.5Y, 4/3) OLIVE BROWN CLAYEY SILT. ROOTLETS. SLIGHTLY MOIST.	ML	NA	NA	HNU 0; α 0; BZ 2000
1	63042 7-13 0955	13	6	MEDIUM DENSE (2.5Y, N4/) DARK GRAY CLAY-SIZED POWDER. COHESION DUE TO MOISTURE-ND MEASURABLE PLASTICITY. TRACE YELLOW PRECIPITANT. SLIGHTLY MOIST.	NA	NA	NA	HNU 0; α 0; BZ 14,000
	63043 7-13 0955	16	4	MEDIUM DENSE (2.5Y, N5/) GRAY CLAY-SIZED POWDER WITH WAXY FILMY APPEARANCE. NO MEASURABLE PLASTICITY. SLIGHTLY MOIST.	NA	NA	NA	HNU 0; α 0; BZ 1500
2	63044 7-13 1005	12	6	MEDIUM DENSE (2.5Y, N4/) GRAY CLAY-SIZED POWDERY PARTICLES. NO PLASTICITY. SLIGHTLY MOIST.	NA	NA	NA	HNU 0; α 0; BZ 1500
	63045 7-13 1005	13	6	SAA	NA	NA	NA	HNU 0; α 0; BZ 2000
3	63046 7-13 1005	13	0	NR	NA	NA	NA	HNU NA; α NA; BZ NA
	63047 7-13 1010	17	6	MEDIUM DENSE (2.5Y, N4/) GRAY CLAY-SIZED POWDER. NO PLASTICITY LITTLE OR NO COHESION WHEN DRIED. SLIGHTLY MOIST.	NA	NA	NA	HNU 0; α 0; BZ 1500
HSL VOA 4	63048 7-13 1010	11	6	SAA	NA	NA	NA	HNU 0; α 0; BZ 1800
	63049 7-13 1010	10	6	SAA	NA	NA	NA	HNU 0; α 0; BZ 1800
5 6	63050 7-13 1040	SHELBY TUBE PUSHED BLOW COUNTS NOT APPLICABLE	22	SHELBY TUBE PUSHED FROM 4.5 TO 7.0 FT. ~22 INCHES RECOVERY. MATERIAL SAA.	NA	NA	NA	HNU 0; α 0; BZ 1000
7	63051 7-13 1500	24	6	MEDIUM DENSE (2.5Y, N4/) GRAY CLAYLIKE MATERIAL. LOW PLASTICITY - SLIGHT COHESION MODERATELY MOIST.	NA	NA	NA	HNU 0; α 0; BZ 1500

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: SIMCO

Driller: E.W. GARDNER

ASST: K. MYERS

NR = NO RECOVERY
SAA = SAME AS ABOVE
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0
α = 0
BZ = 60

001797 REVIEWED BY QA NR DATE 8-28-91

5711

FERNALD RI/FS

Date			
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91/3/5	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1766 (WASTE PIT #1)	COORDINATES: See p1		DATE: 7-13-91
ELEVATION: See p1	GWL: Depth NA	Date/Time NA	DATE STARTED: 7-13-91
ENGINEER/GEOLOGIST: HARRIS\GARMAN	Depth NA	Date/Time NA	DATE COMPLETED: 7-16-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
8	63052 7-13 1500	3	6	FIRM (10YR, 4/2) DARK GRAYISH BROWN SILTY CLAY-LIKE MATERIAL. MODERATE COHESION. MOIST.	CL	1.0		HNU 0, α 0, BY 2000
	63053 7-13 1500	2	6	FIRM (10YR, 4/2) DARK GRAYISH BROWN, MOTTLED WITH (10YR, 4/6) RED SILTY CLAY-LIKE MATERIAL. MODERATE COHESION. MOIST.	CL	1.0		HNU 0, α 0, BY 2500
9 10	63054 7-13 1520	SHELBY TUBE PUSHED BLOW COUNTS NOT APPLICABLE	24	SHELBY TUBE PUSHED FROM 8.5 TO 11.0 FT. - 24 INCHES RECOVERY. DESCRIPTION NOT AVAILABLE - BOTTOM CAPPED IMMEDIATELY TO PREVENT SPILLAGE.	NA	NA		HNU 0, α 0, BY 2000
11	63055 7-13 1530	1	6	FIRM (2.5Y, N3/) VERY DARK GRAY SILTY CLAY-LIKE. MODERATE COHESION. MODERATE PLASTICITY. MOIST.	CL	1.0		HNU 0, α 0, BY 1500
12	63056 7-13 1530	1	6	SAA	CL	1.0		HNU 0, α 0, BY 2000
	63057 7-13 1530	1	6	SAA	CL	1.0		HNU 0, α 0, BY 2000
13	63058 7-13 1540	1	6	FIRM (2.5Y, N3/) VERY DARK GRAY SILTY CLAY-LIKE MATERIAL. MODERATE COHESION. MODERATE PLASTICITY. MOIST.	CL	0.75		HNU 0, α 0, BY 1700
	63059 7-13 1540	4	6	SAA	CL	0.75		HNU 0, α 0, BY 1700
HSL VOA 14	63060 7-13 1540	3	6	SAA	CL	0.75		HNU 0, α 0, BY 1700
15	63062 7-14 0940	SHELBY TUBE		SHELBY TUBE PUSHED FROM 14.0 TO 16.5 FT.				

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: SIMCO

Driller: E.W. GARDNER

ASST: K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0ppm
α = 0cpm
BY = 100cpm

001798

REVIEWED BY QA DATE 8-28-91

FERNALD
RI/FS

	Date	Initial	1st Key In	2nd Key In	Hard Copy Verification
	8-28-91				

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91/3.15	PROJECT NAME: FMPC RI\FS (OU-1)		
BORING NUMBER: 1766 (WASTE PIT #1)	COORDINATES: See p1		DATE: 7-14-91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 7-13-91
ENGINEER/GEOLOGIST: HARIZIS \ GARMAN	Depth NA	Date/Time NA	DATE COMPLETED: 7-16-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15		PUSHED BLOW COUNTS NOT APPLICABLE	26	26 INCHES RECOVERY. DESCRIPTION NOT AVAILABLE - BOTTOM CAPPED IMMEDIATELY TO PREVENT SPILLAGE.	NA	NA		HNU 0, α 0, BY 1000
16								
	63063 7-14 0950	4	6	SOFT (2.5Y, N3/) VERY DARK GRAY CLAY-SIZED PARTICLES, CONSISTENCY SIMILAR TO GELATIN. LOW PLASTICITY. VERY MOIST.	CL	0.5		HNU 0, α 0, BY 1500
17	63064 7-14 0950	2	6	SAA	CL	0.5		HNU 0.5, α 0, BY 1700
	63065 7-14 0950	2	6	SAA	CL	0.5		HNU 0.5, α 0, BY 2000
18	63066 7-14 1000	3	6	SOFT (2.5Y, N3/) VERY DARK GRAY - GRADING INTO (2.5Y, N7/) LIGHT GRAY CLAY-LIKE MATERIAL. GELATIN-LIKE CONSISTENCY. LOW PLASTICITY. VERY MOIST.	CL	0.5		HNU 0.1, α 0, BY 1500
	63067 7-14 1345	3	6	SOFT (2.5Y, N3/) VERY DARK GRAY SILTY CLAY-LIKE MATERIAL. LOW PLASTICITY. VERY MOIST.	CL	0.5		HNU 0.1, α 0, BY 1700
19	63068 7-14 1350	3	6	SAA	CL	0.5		HNU 0.1, α 0, BY 1700
	63069 7-14 1400	3	6	SOFT (10YR, 4/2) DARK GRAYISH BROWN CLAY-LIKE MATERIAL MOTTLED WITH (10YR, 4/8) RED. SOME (2.5Y, 6/4) LIGHT YELLOW BROWN GRANULAR MATERIAL. LOW PLASTICITY. VERY MOIST.	CL	0.5		HNU 0.5, α 0, BY 2000
20	63070 7-14 1420	4	6	(20.0'-20.4') FIRM (10YR, 4/2) DARK GRAYISH BROWN SILTY CLAY-LIKE MATERIAL. MODERATE COHESION. MODERATE PLASTICITY. VERY MOIST.	CL	1.0		HNU 0, α 0, BY 1700
LINER				(20.4'-20.5') CLAY LINER: VERY HARD (10YR, 5/4) CLAY. HIGH PLASTICITY. LOW MOISTURE.	CL	>4.0		
				BOTTOM OF BORING AT 20.5 FT. PIEZOMETER INSTALLED PIEZOMETER TIP AT 20.5 FT.				

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: SIMCO

Driller: E.W. GARDNER

ASST: K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0 ppm
α = 0 cpm
BY = 80 cpm

REVIEWED BY QA [signature] DATE 8-28-91

001799

FERNALD RI/FS

COMPOSITE SAMPLING DIAGRAM

3 INTERVAL BOREHOLE

PROJECT NAME	FMPC RI/FS(OU-1)	BORING NUMBER	1766
PROJECT NUMBER	602.25.01/3.15	BORING LOCATION	WASTE PIT #1
DATE COLLECTED	7-13, 7-14, 7-15, 7-16-91		

INTERVAL 1

COMPOSITE SAMPLES

SAMPLE NUMBER	ANALYSES
63073	TREATABILITY

INTERVAL 2

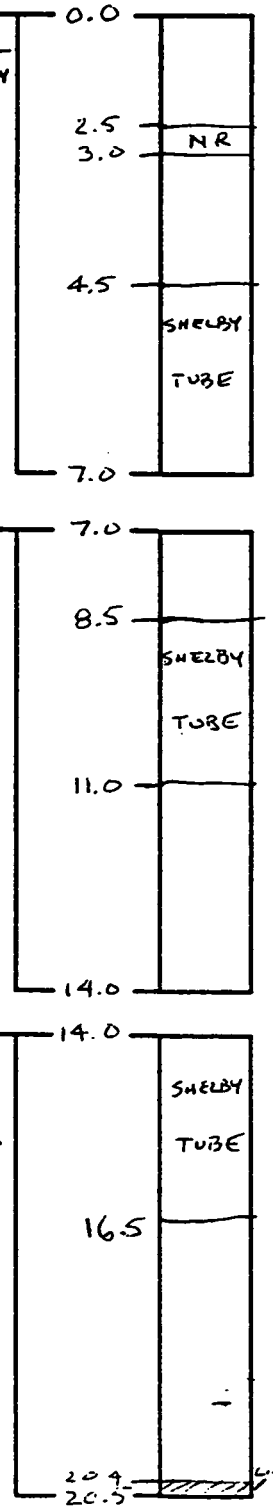
COMPOSITE SAMPLES

SAMPLE NUMBER	ANALYSES
63061	SCREEN; FULL HSL (LESS VOA) + DIOXINS, FURANS, TBP; FULL RAD
63074	TREATABILITY

INTERVAL 3

COMPOSITE SAMPLES

SAMPLE NUMBER	ANALYSES
63071	SCREEN; FULL HSL (LESS VOA) + DIOXINS, FURANS, TBP; FULL RAD
63075	TREATABILITY



ENTIRE BOREHOLE

COMPOSITE SAMPLES

SAMPLE NUMBER	ANALYSES
63072	SCREEN; TCLP (LESS VOA); FULL RAD; GSA; UDL; TOC
63076	TREATABILITY
B-1766 (DRUMS #1-4)	TREATABILITY/ ARCHIVE

REVIEWED BY QA MR DATE 8-28-91

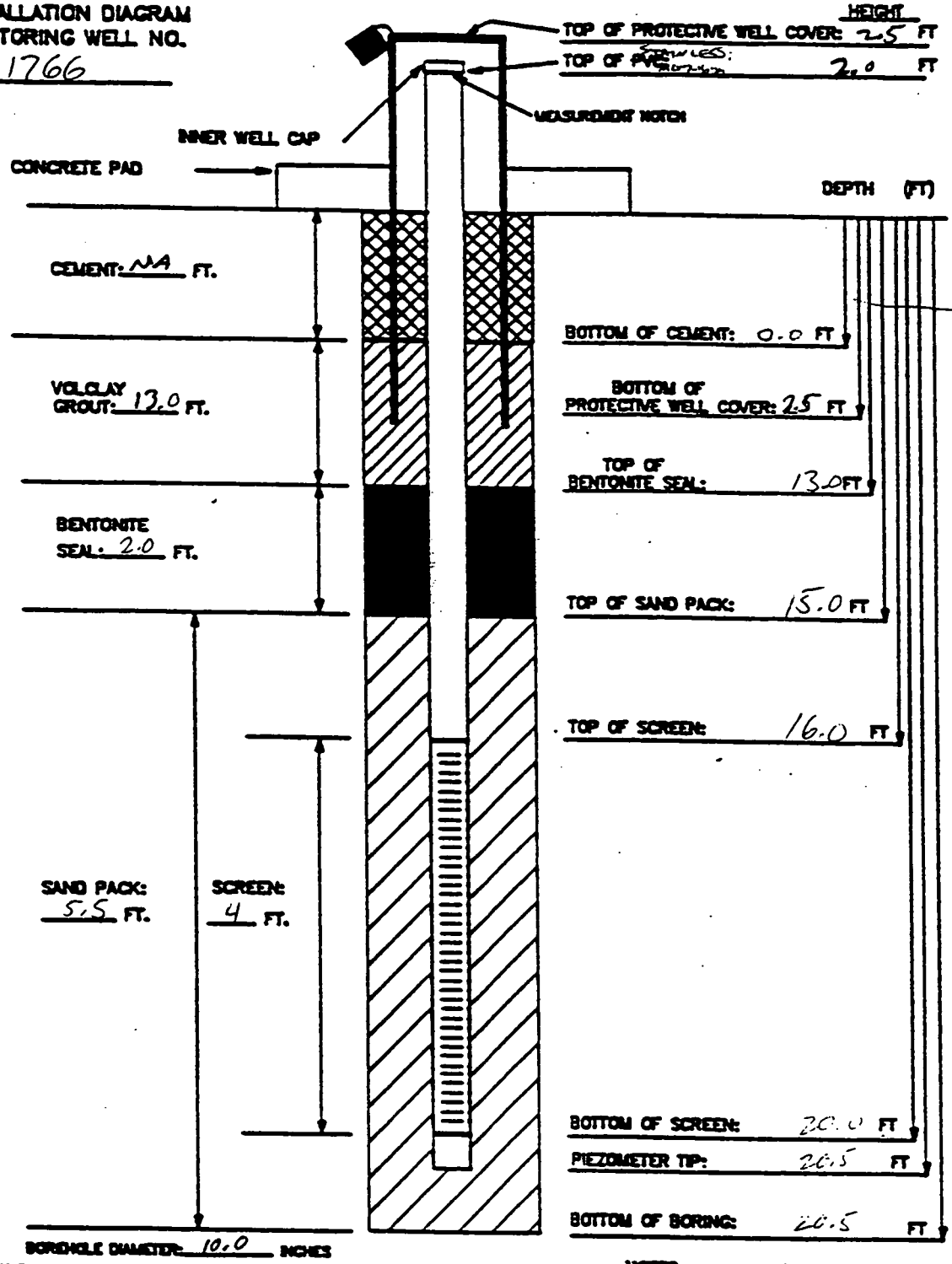
ASI FORM 0020 REV.(0) 06-13-91

JRW 8.8.91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1766

INSTALLATION DATE: 7/16/91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 1 80 lb bag 10/20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 2.5 50 lb bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 2 GALLONS
OTHER: 3'x3' CONCRETE PAD
DIAGRAM AS INSTALLED

NOTES: 4" STAINLESS STEEL
1) RISER PIPE IS 2-INCH-SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 7/10/91
2) SCREEN IS 2-INCH-I.D. SCHEDULE-40 4" NO STAINLESS PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 7.4 [illegible] 7-17-91

5.15

TASK: ([illegible]) 602.25.91 GEOLOGIST/ENGINEER: [illegible]

DATE 8 28 91

001801

REVIEWED BY QA MB

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS
PROJECT NO. 1007.25.91 3.15
BORING NO. 1766
PIEZOMETER NO. 1766

FIELD ENG./GEO. Marc Harris DATE 7/16/91
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7/16/91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID None FROM ~~TO~~
FLUID None FROM ~~TO~~

TYPE OF BIT Auger
CASING SIZE (S) USED:
SIZE None FROM ~~TO~~
SIZE None FROM ~~TO~~

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 in.
TOTAL PERFORATED AREA 4.0 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 10.0', 5.0', 2.0', 1.0'
JOINING METHOD Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged locking cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		583.1	
GROUND SURFACE	0.0		581.1	
BOTTOM OF PROTECTIVE PIPE	2.5		578.6	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 13.0	TOP 581.1	BOTTOM ~~568.1~~
BENTONITE	TOP 13.0	BOTTOM 15.0	TOP 568.1	BOTTOM 566.1
SAND	TOP 15.0	BOTTOM 20.5	TOP 566.1	BOTTOM ~~559.6~~ 560.6
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 16.0	BOTTOM 20.0	TOP 565.1	BOTTOM ~~560.1~~ 561.1
PIEZOMETER TIP	20.5			
BOTTOM OF BOREHOLE	20.5			
GWL AFTER INSTALLATION	7.41 @ TOC			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Wood plug used in auger bit during well installation

001802 REVIEWED BY QA [illegible] DATE 8-28-91

ERNALD
RI/FS

	Date	Initial	1st Key In	2nd Key In	2nd Key Verification
	8-27-91	8/28/91			

VISUAL CLASSIFICATION OF SOILS

8-8-91

PROJECT NUMBER: 602.25.91/3.15	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1767 (PIT 1)	COORDINATES: 1,481,288.72 1,339,274.19	DATE: 6-25-91	
ELEVATION: 580.5	GWL: Depth NA	Date/Time	DATE STARTED: 6-25-91
ENGINEER/GEOLOGIST: HARRIS/GARMAN	Depth NA	Date/Time	DATE COMPLETED: 7-2-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
	63001 6-25 1445	7	6	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN CLAYEY SILT. TRACE FINE GRAVEL. ROOTLETS. DRY.	ML	NA		HNU 0; α 0; BY 5000
1	63002 6-25 1445	20	6	DENSE (2.5Y, N5/) GRAY ASH-LIKE MATERIAL WITH A WAXY CONSISTENCY. CLAY-SIZED PARTICLES. NO MEASURABLE PLASTICITY. (TRACES OF GREEN SALT). MOIST.	NA	NA		HNU 0; α 0; BY 2600
	63003 6-25 1445	14	0	NR	NA	NA		HNU NA; α NA; BY NA
HSL VOA 2	63004 6-25 1500	11	6	MEDIUM DENSE (7.5YR, N6/) GRAY AND REDDISH PURPLE MOTTLED ASH-LIKE POWDERY MATERIAL WITH A WAXY CONSISTENCY. CLAY-SIZED PARTICLES. NO MEASURABLE PLASTICITY. MOIST.	NA	NA		HNU 0; α 0; BY 1200
	63005 6-25 1500	15	6	SAA	NA	NA		HNU 0; α 0; BY 1200
3	63006 6-25 1500	9	6	SAA	NA	NA		HNU 0; α 0; BY 1200
	63007 6-25 1500	14	3	SAA	NA	NA		HNU 0; α 0; BY 1800
4 5	63008 6-25 1510	SHELBY TUBE SAMPLE WAS PUSHED - NO BLOW COUNTS AVAILABLE	27	SHELBY TUBE PUSHED FROM 3.5 TO 6.0 FT. 27 INCHES RECOVERED. THE MATERIAL AT THE BOTTOM WAS AN ASH-LIKE POWDERY MATERIAL WITH A WAXY CONSISTENCY. COLOR WAS MOTTLED GRAY, WHITE, BLACK, AND YELLOW. MOIST.	NA	NA		HNU 0; α 0; BY 2000
6	63009 6-27 0840	2	6	VERY LOOSE WHITE CLAY-LIKE MATERIAL. TRACE BLACK GRANULES. NO MEASURABLE PLASTICITY. VERY MOIST.	NA	NA		HNU 0; α 0; BY 10,000
7	63010 6-27 0840	1	0	NR				HNU NA; α NA; BY NA
	63011 6-27 0840	2	0	NR				HNU NA; α NA; BY NA

NOTES.

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment SIMCO

Driller: E.W. GARDNER

ASST: K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0 ppm
α = 0 cpm
BY = 140 cpm

001803

REVIEWED BY QA MB DATE 8-28-91

FERNALD RI/FS

5711

	1st Key In	2nd Key In	Hard Copy Verification
Date			
Initial			

VISUAL CLASSIFICATION OF SOILS

8-8-91

PROJECT NUMBER: 602.25.91/3.18	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1767 (PIT 1)	COORDINATES: See attached pg		DATE: 6-27-91
ELEVATION: See pg	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 6-25-91
ENGINEER/GEOLOGIST: HARRIS / GARMAN	Depth	Date/Time	DATE COMPLETED: 7-2-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
8, 9	63012 6-27 0855	SHELBY TUBE WAS PUSHED BLOW COUNTS NOT APPLICABLE	0	SHELBY TUBE PUSHED FROM 7.5 TO 10.0 FT. NO RECOVERY AFTER 2 ATTEMPTS	NA	NA		HNU NA; α NA; BY NA
10	63013 6-27 0905	1	6	VERY LOOSE (2.5Y, N6/) GRAY CLAY-SIZED MATERIAL. SOME WHITE POWDERY MATERIAL. NO MEASURABLE PLASTICITY. VERY MOIST.	NA	NA		HNU 0; α 0; BY 15,000
	63014 6-27 0905	1	6	VERY LOOSE (2.5Y, N6/) GRAY SOUPY SLUDGE. (SIMILAR CONSISTENCY TO YOGURT GROUT). SOME COARSE GRAVEL. WET.	NA	NA		HNU 0; α 0; BY 26,000
11 (HSL VOA)	63015 6-27 0905	1	6	SAA	NA	NA		HNU 0; α 0; BY 30,000
12	63016 6-27 0905	1	3	SAA	NA	NA		HNU 0; α 0; BY 28,000
13, 14	63018 6-28 0900	SHELBY TUBE WAS PUSHED BLOW COUNTS NOT APPLICABLE	0	SHELBY TUBE PUSHED FROM 12.0 TO 14.5 FT. NO RECOVERY AFTER 2 ATTEMPTS.	NA	NA		HNU NA; α NA; BY NA
15	63019 6-28 0920	2	6	VERY LOOSE (2.5Y, N7/) LIGHT GRAY CLAY-SIZED SOUPY MATERIAL, SOME SILT AND SAND. SOME FINE GRAVEL. NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 22,000

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: SIMCO

Driller: E.W. GARDNER

ASST: K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0 PPM
α = 0 cpm
BY = 80-140 cpm

001804

REVIEWED BY QA MB DATE 8-28-91

FERNALD
RI/FS

Date			
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

VISUAL CLASSIFICATION OF SOILS

8.8.91

PROJECT NUMBER: 602.25.91/3.15	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1767 (PIT 1)	COORDINATES: see Attached p1		DATE: 6-28-91
ELEVATION: see p1	GWL: Depth	Date/Time	DATE STARTED: 6-25-91
ENGINEER/GEOLOGIST: GARMAN/HARRIS	Depth	Date/Time	DATE COMPLETED: 7-2-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6/IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	NA WELL CONSTRUCTION	REMARKS
15	63020 6-28 0920	2	6	SAA	NA	NA		HNU 0; α 0; BY 22,000
HSL VOA	63021 6-28 0920	0	3	VERY LOOSE (2.5Y, N7/) LIGHT GRAY SOUPY CLAY-SIZED MATERIAL WITH NEARLY 50% SILT, SAND AND GRAVEL. NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 22,000
16	63022 6-28 0930	1	6	VERY LOOSE LIGHT GREENISH GRAY SOUPY CLAY-SIZED MATERIAL. (HAS FOAMY, MERENGUE-LIKE APPEARANCE). ~40% SILT, SAND AND GRAVEL. NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 25,000
	63023 6-28 0930	2	6	SAA	NA	NA		HNU 0; α 0; BY 25,000
17 CLP VOA	63024 6-28 0930	2	6	SAA	NA	NA		HNU 0; α 0; BY 24,000
	63025 6-28 0940	2	6	VERY LOOSE (2.5Y, N8/) MOTTLED WHITE, GRAY, AND BLACK SOUPY CLAY-SIZED MATERIAL. SOME COARSE SAND AND GRAVEL (BLACK). NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 24,000
18	63026 6-29 0925	1	6	VERY LOOSE (5Y, 6/1) GRAY SILTY MATERIAL. SOME CLAY. TRACE BLACK GRAVEL. SOME WOOD CHIPS. NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 15,000
	63027 6-29 0940	4	5	VERY LOOSE (2.5Y, N6/) GRAY CLAYEY, SANDY SILT. TRACE FINE GRAVEL. NO MEASURABLE PLASTICITY. WET.	NA	NA		HNU 0; α 0; BY 22,000
19	63028 6-29 0950	3	6	VERY LOOSE (2.5Y, N6/) GRAY SANDY SILT. SOME FINE TO COARSE GRAVEL. TRACE CLAY. WET.	NA	NA		HNU 0; α 0; BY 33,000
	63029 6-29 1520	2	6	VERY LOOSE (2.5Y, N5/) GRAY CLAYEY SILT. SOME FINE TO COARSE BLACK GRAVEL. TRACE GREEN MATERIAL. PIECES OF STRING. VERY MOIST.	NA	NA		HNU 0; α 0; BY 23,000
20	63030 6-29 1530	3	5	VERY LOOSE (2.5Y, N5/) GRAY COARSE GRAVEL. SOME SANDY SILT. TRACE CLAY. VERY MOIST.	GM	NA		HNU 0; α 0; BY 22,000
VER	63031 6-29 1540	20	6	(20.5 TO 20.7 FT - SAA) 20.7 TO 21.0 FT - VERY HARD (2.5Y, 5/2) GRAYISH BROWN CLAY. SOME SILT. TRACE FINE GRAVEL. LOW PLASTICITY. LOW MOISTURE.	GM / CL	NA / >4.0		HNU 0; α 0; BY 20,000
21				BOTTOM OF BORING AT 21.0 FT. PIEZOMETER INSTALLED				

NOTES.

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment SIMCO

Driller: E. W. GARDNER

Asst: K. MYERS

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

BACKGROUND READINGS:
HNU = 0 ppm
α = 0 cpm
BY = 80-140 cpm

001805

REVIEWED BY QA [illegible] DATE 8-28-91

5711

FERNALD RI/FS

COMPOSITE SAMPLING DIAGRAM

3 INTERVAL BOREHOLE

PROJECT NAME	FMPC RI/FS OU-1	BORING NUMBER	1767
PROJECT NUMBER	602.25.91/3.15	BORING LOCATION	PIT NO. 1
DATE COLLECTED	6-25, 6-27, 6-28, 6-29, 6-30, 7-2-91		

INTERVAL 1

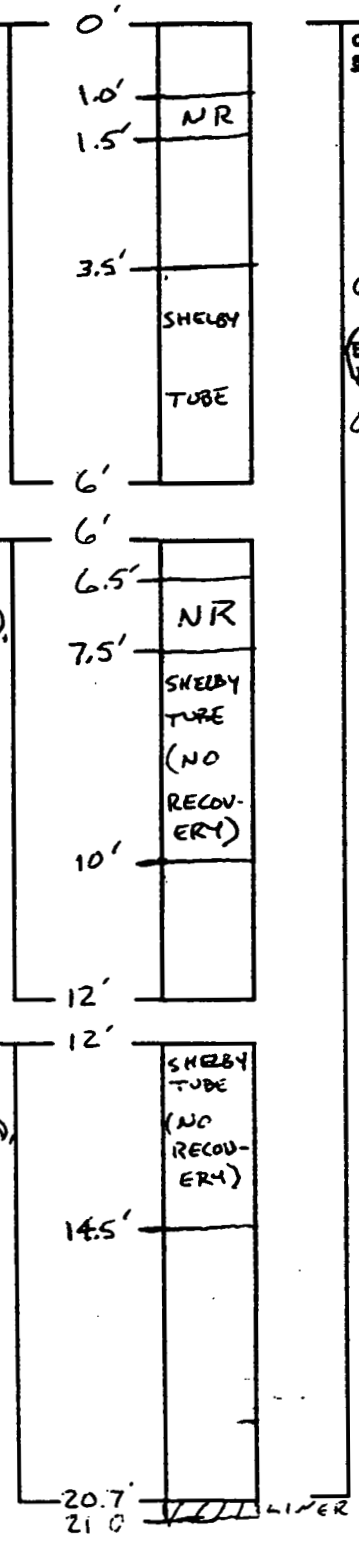
COMPOSITE SAMPLES SAMPLE NUMBER	ANALYSES
63034	ARCHIVE
63038	TREATABILITY

INTERVAL 2

COMPOSITE SAMPLES SAMPLE NUMBER	ANALYSES
63017	FULL RAD, FULL MSL(LESS VOA), SCREEN
63035	ARCHIVE
63039	TREATABILITY

INTERVAL 3

COMPOSITE SAMPLES SAMPLE NUMBER	ANALYSES
63032	FULL RAD, FULL MSL(LESS VOA), SCREEN
63036	ARCHIVE
63040	TREATABILITY



ENTIRE BOREHOLE

COMPOSITE SAMPLES SAMPLE NUMBER	ANALYSES
63033	FULL RAD, TCLP (LESS VOA), GRAIN SIZE ANALYSIS, TOC, URANIUM DIFFERENTIAL LEACHING, SCREEN
63037	ARCHIVE
(B-1767 DRUM #1)	TREATABILITY/ ARCHIVE
63078	TREATABILITY

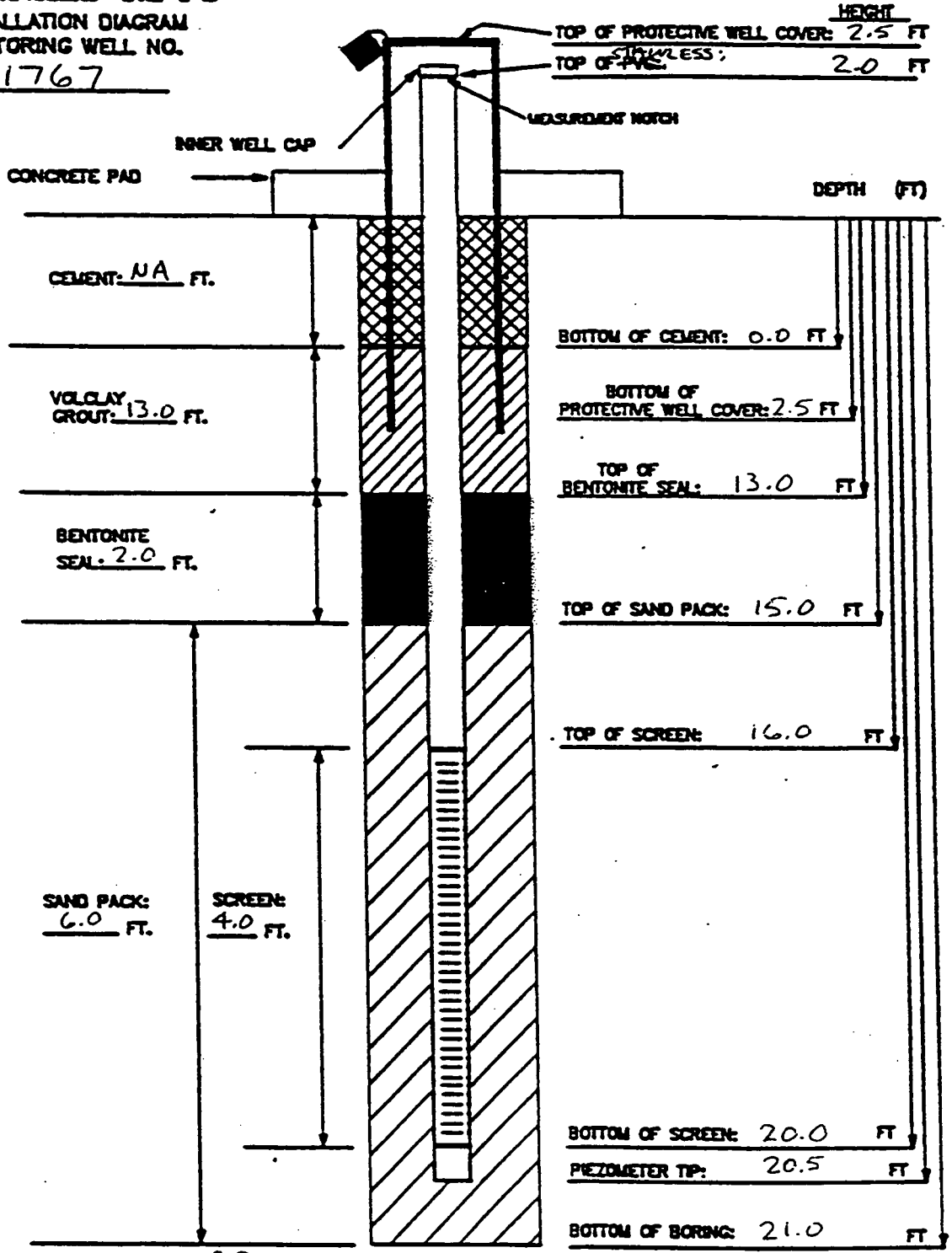
REVIEWED BY QA [illegible] DATE 8-28-91

ASI FORM 0020 REV.(0) 06-13-91
MORA_CSD3.DRW_FND

INSTALLATION DATE: 7/2/91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1767



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 2-80 lb. BAGS 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 2-50 lb. BAGS
AMOUNT OF CEMENT: NONE USED
AMOUNT OF WATER USED: 2 GAL.
OTHER: 3'x3' CONCRETE PAD WILL BE INSTALLED

NOTES:

1) RISER PIPE IS ~~2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS.~~ 4" STAINLESS STEEL AG 7-2-91
2) SCREEN IS ~~2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS.~~ 4" I.D. STAINLESS STEEL
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 6.65 @ TOC 7-11-91

TASK: 602.25.91

GEOLOGIST/ENGINEER:

8.8.91

FERNALD RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Initial			
Date			

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS (OU-1) FIELD ENG./GEO. HARRIS/GARMAN DATE 7-2-91
PROJECT NO. 602.25.91/3.15 CHECKED BY _____ DATE _____
BORING NO. 1767
PIEZOMETER NO. 1767 DATE OF INSTALLATION 7-2-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE ~~FROM~~ _____ ~~TO~~ _____
FLUID NONE ~~FROM~~ _____ ~~TO~~ _____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ _____ ~~TO~~ _____
SIZE NONE ~~FROM~~ _____ ~~TO~~ _____

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0 IN. I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 IN
TOTAL PERFORATED AREA 4.0 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 10.0', 5.0', 2.0', 1.0'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 10 3/4 IN.

OTHER PROTECTION HINGED LOCKING COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		582.5	
GROUND SURFACE	0.0		580.5	
BOTTOM OF PROTECTIVE PIPE	2.5		578.0	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 13.0	TOP	BOTTOM 567.5
BENTONITE	TOP 13.0	BOTTOM 15.0	TOP 567.5	BOTTOM 565.5
SAND	TOP 15.0	BOTTOM 21.0	TOP 565.5	BOTTOM 559.5
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 16.0	BOTTOM 20.0	TOP 564.5	BOTTOM ~~558.5~~ 560.5
PIEZOMETER TIP	20.5			
BOTTOM OF BOREHOLE	21.0			
GWL AFTER INSTALLATION	6.65 ∇ TOC.			

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS WOOD PLUG USED IN AUGER BIT DURING INSTALLATION TO CONTROL/PROHIBIT FLOW OF WASTE PIT MATERIALS INTO THE AUGERS.

001808

REVIEWED BY QA [illegible] DATE 8-28-91

FERNALD RI/FS

	1st Key In	2nd Key In	Data Entry Verification
Date			
Initial			

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1768	COORDINATES: N481391.3 E1378531.7	DATE: 8/22/91	
ELEVATION: 578.5	GWL: Depth	Date/Time	DATE STARTED: 8/22/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8/23/91
DRILLING METHODS: Hollow Stem Auger			PAGE OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0	63600 8/22 0924	7	6	FIRM (10YR 3/3) DARK BROWN SILTY CLAY. SOME ROUNDED GRAVEL. MODERATE PLASTICITY. MOIST.	CL			HNU 0; α 0; Bγ 600
	63601 8/22 0924	16	6	SAA	CL			HNU 0; α 0; Bγ 250
1	63602 8/22 0924	28	6	SAA	CL			HNU 0; α 0; Bγ 600
	63603 8/22 0924	9	4	FIRM (10YR 3/3) DARK BROWN CLAY WITH PIECES OF ANGULAR GRAVEL (ASPHALT?) MOIST.	CL			HNU 0; α 0; Bγ 2000
2	63604 8/22 0930	7	6	FIRM (10YR 3/2) VERY DARK GRAYISH BROWN CLAY, SOME ROUNDED GRAVEL. LOW PLASTICITY MOIST.	CL			HNU 0; α 0; Bγ 1000
	63605 8/22 0930	6	6	SOFT (7.5Y 5/8) STRONG BROWN CLAY LIKE MATERIAL WITH COARSE SAND. POOR PLASTICITY. MOIST	CL			HNU 0; α 0; Bγ 6000
3	63606 8/22 0930	6	6	SAA	CL			HNU 0; α 0; Bγ 4000
	63607 8/22 0930	4	6	SAA	CL			HNU 0; α 0; Bγ 3000
4	63608 8/22 0935	SHELBY TUBE PUSHED	9					HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA
5								
6	63609 8/22 0937	3	6	SOFT (5Y 8/1) WHITE CLAY SIZE MATERIAL. PASTEY CONSISTENCY. LOW PLASTICITY. MOIST	CL			HNU 0; α 0; Bγ 2500
	63610 8/22 0937	3	6	SAA	CL			HNU 0; α 0; Bγ 2000
7	63611 8/22 0945		6	SOFT (10YR 7/4) VERY PALE BROWN CLAY LIKE MATERIAL. PASTEY CONSISTENCY MOIST. VERTICAL LAYERING.	CL			HNU 0; α 0; Bγ 2000

USCS
YA
level 1
level 2

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Starpazon.

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

58' BACKGROUND = 120 cpm

REVIEWED BY QA [signature] DATE 9-20-91

FERNALD
RI/FS

Date			
Initial			
	1st Rev In	2nd Rev In	Hard Copy Verification

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1768	COORDINATES: See p1		DATE: 8/22/91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 8/22/91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED: 8/22/91
DRILLING METHODS: Hollow Stem Auger			PAGE OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63612 8/22 0947	1	6	SAA				HNU 0; α 0; Bγ 250
	63613 8/22 0947	1	6	SAA				HNU 0; α 0; Bγ 220
9	63614 8/22 0947	1	6	SAA				HNU 0; α 0; Bγ 2000
	63615 8/22 1000	1	0	NR				HNU NA; α NA; Bγ ~~1000~~ NA
10	63616 8/22 1000	1	0	NR				HNU NA; α NA; Bγ NA
	63617 8/22 1000	1	0	NR				HNU NA; α NA; Bγ NA
11	63618 8/22 1000	1	0	NR				HNU NA; α NA; Bγ NA
	63619 8/22 1007	SHELBY TUBE PUSHED OVER COUNTS NA	24					HNU NA; α NA; Bγ NA
12								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
13								HNU NA; α NA; Bγ NA
HSL 10A	63620 8/22 1014	1	6	VERY SOFT (2.54 NT) LIGHT GRAY CLAY SIZE MATERIAL INTERBEDDED WITH WHITE GRANULAR MATERIAL. WET PASTEY CONSISTENCY				HNU 0; α 0; Bγ 1000
UP 2A WALZ	63621 8/22 1014	1	6	SAA				HNU 0; α 0; Bγ 1000
14	63622 8/22 1030	1	6	SAA				HNU 0; α 0; Bγ 800
WAL 3	63623 8/22 1030	11	6	SAA PIECE OF GRAPHITE				HNU 0; α 0; Bγ 600
15								

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Strapparoni

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

REVIEWED BY QA [signature] DATE 9-20-91

FERNALD
RI/FS

Date	1/6/92	1/24/92	
Initial	[illegible]	[illegible]	
	1st Key In	2nd Key In	Hard Copy Verification

JW 9.9.91

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1768	COORDINATES: See p1		DATE: 8/22/91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 8/22/91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED: 8/23/91
DRILLING METHODS: Hollow Stem Auger			PAGE OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6,12)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USS)	WELL CONSTRUCTION	REMARKS
	63624 8/22 1030	17	6	DENSE (10YR 4/4) DARK YELLOWISH BROWN. CLEAN SILTY FINE SAND. MOIST				HNU 0 α 0 Bγ 500
HSL VOA 16	63625 8/23 1345	~~17~~ 17	6	SAA				HNU 0 α 0 Bγ 500
	63626 8/23 1346	13	6	SAA				HNU 0 α 0 Bγ 200
	63627 8/23 1355	12	6	SAA				HNU 0 α 0 Bγ 200
17	63628 8/23 1410	21	6	VERY HARD (10YR 5/2) GRAYISH BROWN CLAY SAND MIXTURE. LOW PLASTICITY MOIST. THIS WAS DETERMINED TO BE THE LOWER				HNU 0 α 0 Bγ 200
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Stradarelli

REVIEWED BY QA [illegible] DATE 9-20-91

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

Fmw

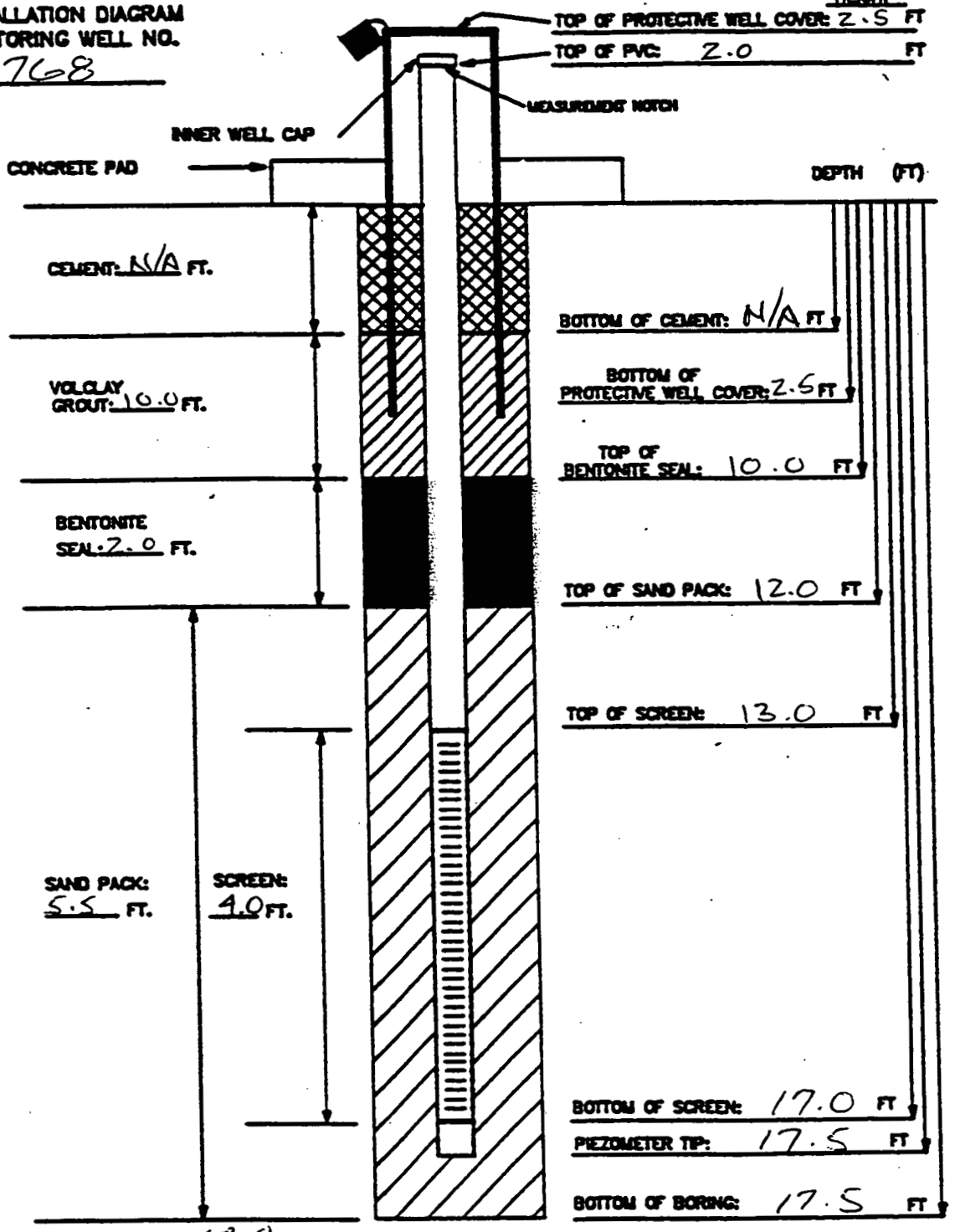
5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1768

Stickups

INSTALLATION DATE: 8-23-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 4 BAGS 50 lb bags 10/20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 3 - 50 lb bags
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 3 gals
OTHER: 3x3 CONCRETE PAD WILL BE INSTALLED

NOTES: 4.0" I.D. STAINLESS
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. 4.0" I.D. STAINLESS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (OU...) GX-2.3.15 GEOLOGIST/ENGINEER: M. HARRIS

001812

REVIEWED BY QA MB DATE 9-20-91

FERNALD
RI/FS

	1st Key In	2nd Key In	Hard Copy Verification
Initial	[illegible]	[illegible]	
Date	[illegible]	[illegible]	

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS (OU-11) FIELD ENG./GEO. M. HARRIS DATE 8-23-91
PROJECT NO. 602.3.15 CHECKED BY [illegible] DATE 9.9.91
BORING NO. 1768
PIEZOMETER NO. 1768 DATE OF INSTALLATION 8-23-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ——— TO ———
FLUID NONE FROM ——— TO ———

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ——— TO ———
SIZE NONE FROM ——— TO ———

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01"
TOTAL PERFORATED AREA 4.0 FEET

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in
LENGTH OF PIPE SECTIONS 19.5'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'
PROTECTIVE PIPE O.D. 10 3/4"

OTHER PROTECTION HINGED LOCKING COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0'			
GROUND SURFACE	0.0		578.5	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 10.0	TOP	BOTTOM
BENTONITE	TOP 10.0	BOTTOM 12.0	TOP	BOTTOM
SAND	TOP 12.0	BOTTOM 17.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 13.0	BOTTOM 17.0	TOP	BOTTOM
PIEZOMETER TIP	17.5			
BOTTOM OF BOREHOLE	17.5		561.0	
GWL AFTER INSTALLATION				

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
AS A SENSITIVITY ~~TEST~~ PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS WOOD PLUG USED ~~DURING~~ DRILLED IN AUGER DURING WELL INSTALLATION

001813

REVIEWED BY QA [illegible] DATE 9-20-91

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

9.9.91

PROJECT NUMBER: 602.25.91 TASK 3-15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1769	COORDINATES: N2814778.0 E 1378469.0		DATE: 8/20/91
ELEVATION: 580.5	GWL: Depth	Date/Time	DATE STARTED: 8/20/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8/21/91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63500 8/20 1500	3	6	DENSE (10YR 5/6) YELLOWISH BROWN SILTY CLAY. SOME SPARSE ANGULAR GRAVEL MODERATE CONSISTENCY. POOR PLASTICITY VERY MOIST.	CL			HNU 0 α 0 BZ 2800
	63501 8/20 1500	17	6	SAA				HNU 0 α 0 BZ 2200
1	63502 8/20 1500	14	6	DENSE (10YR 2/1) BLACK SILT WITH SPARSE (5Y 6/8) YELLOW MATERIAL AND SOME CLEAR CRYSTALLINE NODULES. POOR CONSISTENCY & PLASTICITY.	CL			HNU 0 α 0 BZ 15,000
	63503 8/20 1500	17	6	SAA	CL			HNU 0 α 0 BZ 200
2	63504 8/20 1507	16	6	DENSE (2.5Y 4/3) OLIVE BROWN CLAY GOOD CONSISTENCY & PLASTICITY. VERY MOIST.	CL			HNU 0 α 0 BZ 2000
	63505 8/20 1507	20	6	DENSE (2.5Y 4/3) OLIVE BROWN CLAY MIXED WITH FRAGMENTS OF CONCRETE. WET.	CL			HNU 0 α 0 BZ 2000
3	63506 8/20 1507	16	0	LARGE PIECES OF CONCRETE - NR				HNU NA α NA BZ NA
4	63507 8/20 1507	17	0	NR				HNU NA α NA BZ NA
	63508 8/20 1515	SHELBY TUBE PUSHED	0	SHELBY TUBE PUSHED 24" TWO ATTEMPTS MADE. NO RECOVERY MATERIAL WAS DISPLACED				HNU NA α NA BZ NA
5								HNU NA α NA BZ NA
								HNU NA α NA BZ NA
6								HNU NA α NA BZ NA
	63509 8/20 1530	5	6	VERY SOFT (2.5Y 6/6) OLIVE YELLOW CLAY GOOD PLASTICITY. WET	CL			HNU 0 α 0 BZ 2000
	63510 8/20 1530	4	6	SAA	CL			HNU 0 α 0 BZ 1200
7	63511 8/20 1530	3	0	SAA	CL			HNU 0 α 0 BZ 1000

NOTES.

Drilling Contractor: PENN DRILLING CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAMBAZON.

SAA = SAME AS ABOVE

NA = NOT APPLICABLE

NR = NO RECOVERY

BZ BACKGROUND = 100 PPM

001844

REVIEWED BY QA [illegible] DATE 9-20-91

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1769	COORDINATES: See p1		DATE: 8/20/91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 8/20/91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Hollow Stem Auger			PAGE OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63512 8/20 1530	3	6	SAA	CL			HNU 0; α 0; Bγ 1000
	63513 8/20 1540	22	6	VERY DENSE (2.5Y 5/4) LIGHT OLIVE BROWN SANDY CLAY WITH ANGULAR GRAVEL GRADING INTO (2.5Y N2/) BLACK GRAVEL. SOME YELLOW MATERIAL SOME METAL. POOR PLASTICITY. WET	GC			HNU 0; α 0; Bγ 2000
	63514 8/20 1540	33	6		GC			HNU 0; α 0; Bγ 2000
9	63515 8/20 1540	25	0	NR				HNU NA; α NA; Bγ NA
	63516 8/20 1540	8	0	NR				HNU NA; α NA; Bγ NA
10	63517 8/21 0833	31	6	VERY DENSE (2.5Y 4/3) OLIVE BROWN CLAY WITH COARSE ANGULAR GRAVEL [CONCRETE]. GOOD PLASTICITY. WET	GC			HNU 0; α 0; Bγ 900
	63518 8/21 0833	5	6	SAA	GC			HNU 0; α 0; Bγ 1100
11	63519 8/21 0833	4	0	NR				HNU NA; α NA; Bγ NA
	63520 8/21 0833	3	0	NR				HNU NA; α NA; Bγ NA
12	63521 8/21 0850	SHELBY TUBE PUSHED	24"					HNU NA; α NA; Bγ NA
13								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
14								HNU NA; α NA; Bγ NA
	63522 8/21 0856	1	6	VERY LOOSE (5Y 6/3) PALE OLIVE, CLAY LIKE MATERIAL. PASTEY CONSISTENCY. WET				HNU 0; α 120; Bγ 5000 cpm
	63523 8/21 0856	1	6	SAA				HNU 0; α 80; Bγ 2000

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Stamatoni

SAA = SAME AS ABOVE

NA = NOT APPLICABLE

NR = NO RECOVERY

Bγ BACKGROUND = 80 CPM

REVIEWED BY QA [signature] DATE 9-20-91

001815

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1769	COORDINATES: See p1		DATE: 8/21/91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 8/20/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8/21/91
DRILLING METHODS: Hollow Stem Auger			PAGE 3 OF

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6/N)	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
HSL VOA	15	63524 8/21 0856	1	6	VERY SOFT (5Y 8/1) WHITE CLAY LIKE MATERIAL WITH SOME THIN LAYERS	CL			HNU 0; α 50; Bγ 1500
TCLP VOA Manual 2		63525 8/21 0856	1	6	OF BLACK MATERIAL. PASTEY CONSISTENCY VERY MOIST.	CL			HNU 0; α 20; Bγ 1000
Manual 3	16	63526 8/21 0905	1	6	VERY SOFT (2.5Y 6/4) LIGHT YELLOWISH BROWN CLAY LIKE MATERIAL. PASTEY CONSISTENCY, WET.	CL			HNU 0; α 20; Bγ 1000
		63527 8/21 0905	1	6	SAA	CL			HNU 0; α 60; Bγ 1400
	17	63528 8/21 0905	1	6	VERY SOFT (5Y 8/1) WHITE CLAY SIZE MATERIAL WITH LAYERS OF BLACK. PASTEY CONSISTENCY WET.	CL			HNU 0; α 20; Bγ 1000
		63529 8/21 0905	11	6	SOFT (5Y 6/3) PALE OLIVE CLAY SIZE MATERIAL PASTEY AND LUMPY. WET.	CL			HNU 0; α 20; Bγ 800
	18	63530 8/21 0937	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED 24". FULL RECOVERY				HNU NA; α NA; Bγ NA
	19								HNU NA; α NA; Bγ NA
									HNU NA; α NA; Bγ NA
									HNU NA; α NA; Bγ NA
HSL VOA	20	63531 8/21 0952	13	6	VERY SOFT (5Y 8/1) WHITE CLAY SIZE MATERIAL WITH SOME BLACK STREAKING PASTEY CONSISTENCY WET.	CL			HNU 0; α 20; Bγ 1000
		63532 8/21 0952	15	6	SAA	CL			HNU 0; α 80; Bγ 1400
	21	63533 8/21 0952	17	6	VERY HARD (2.5Y 4/3) OLIVE BROWN CLAY. VERY MOIST.	CL			HNU 0; α 0; Bγ 1000
		63534 8/21 0952	17	6	THIS IS THE LINER	CL	>5.0		HNU 0; α 0; Bγ 500
	22					CL			HNU α Bγ

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Stamboazoni

SAA = SAME AS ABOVE

NA = NOT APPLICABLE

NR = NO RECOVERY

Bγ = BACKGROUND = 120 CPM

α " = 0 CPM

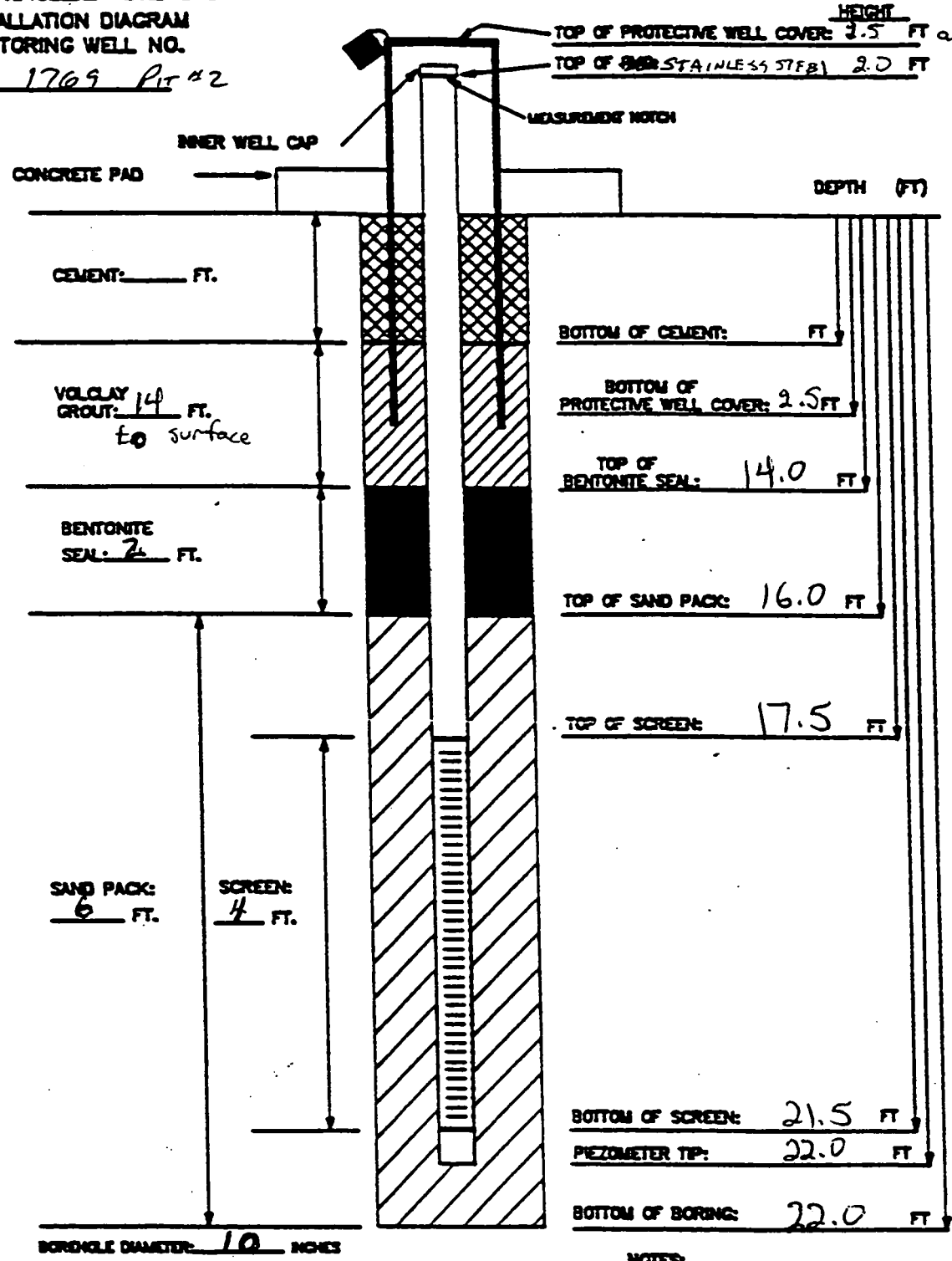
REVIEWED BY QA [illegible] DATE 9-20-91

001816

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1769 Pit #2

INSTALLATION DATE: 8-21-91



MATERIALS USED:
SAND TYPE AND QUANTITY: 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: —
AMOUNT OF WATER USED: 40 gals.
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK:

GEOLOGIST/ENGINEER:

well set 15:09

001817

REVIEWED BY QA MR DATE 9-20-91

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS (OU-1) FIELD ENG./GEO. M. HARRIS DATE 8-21-91
PROJECT NO. 602.3.15 CHECKED BY J. Wheat DATE 9-9-91
BORING NO. 1769
PIEZOMETER NO. 1769 DATE OF INSTALLATION 8-21-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE FROM ~~TO~~	SIZE NONE FROM ~~TO~~
FLUID NONE FROM TO	SIZE NONE FROM TO

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0" I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4.0"
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS
AVERAGE SIZE OF PERFORATIONS 0.01"	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 4.0'	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'	OTHER PROTECTION HINGED LOCKING
PROTECTIVE PIPE O.D. 10 3/4"	COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		580.5	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 14.0	TOP	BOTTOM
BENTONITE	TOP 14.0	BOTTOM 16.0	TOP	BOTTOM
SAND	TOP ~~17.5~~ 16.0 TG 8-26-91	BOTTOM 22.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 17.5'	BOTTOM 21.5'	TOP	BOTTOM
PIEZOMETER TIP	22.0'			
BOTTOM OF BOREHOLE	22.0'			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS WOOD PLUG USED IN AUGER DURING WELL INSTALLATION.

REVIEWED BY QA [illegible] DATE 9-20-91

001818

FERNALD
RI/FS

REVIEWED BY QA MB DATE 10-8-91

VISUAL CLASSIFICATION OF SOILS

3.15 TC 8-20-91 JPW 12-2-91

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES: N481,681.6 E1378159.5		DATE: 8/11/91
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8-12-91
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 6

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0	63320 8/11 0913	4	6	MEDIUM DENSE (10YR 5/8) YELLOWISH BROWN SILTY CLAY, MODERATE COHESION & PLASTICITY. SLIGHTLY MOIST.	SL	NA	N/A	HNU 6; α 0; Bγ 200
	63321 8/11 0913	7	6	SAA				HNU 0; α 0; Bγ 200
1	63322 8/11 0913	9	3	LOOSE (10YR 2/1) BLACK FINE SAND MODERATE TO POOR COHESION. SLIGHTLY MOIST.	SL			HNU 0; α 0; Bγ 1500
	63323 8/11 0913	18	0	NR				HNU NA; α NA; Bγ NA
2	63324 8/11 0916	5	6	MEDIUM DENSE (10YR 2/1) BLACK MEDIUM TO FINE SAND. MODERATE COHESION SLIGHTLY MOIST TO MOIST.	SL			HNU 0; α 0; Bγ 200
	63325 8/11 0916	7	6	SAA				HNU 0; α 0; Bγ 200
3	63326 8/11 0916	4	6	SAA				HNU 0; α 0; Bγ 200
	63327 8/11 0916	3	6	SAA				HNU 0; α 0; Bγ 200
4	63328 8/11 0928	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED 24" FULL RECOVERY				HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
5								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
6								HNU NA; α NA; Bγ NA
	63329 8/11 0944	1	6	LOOSE (10YR 2/1) BLACK MEDIUM SAND WITH SPARSE ANGULAR GRAVEL. POOR COHESION. VERY WET	SL			HNU; α; Bγ 500
	63330 8/11 0944	2	6	SAA				HNU; α; Bγ 1000
7	63331 8/11 0944	1	3	SAA			N/A	HNU; α; Bγ 120

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST ~~L. MYERS~~

NR = NO RECOVERY

SAA - SAME AS ABOVE

NA - NOT APPLICABLE

Bγ - BACKGROUND = 120 cpm

FERNALD
RI/FS

REVIEWED BY QA MB DATE 10-8-91

5711

VISUAL CLASSIFICATION OF SOILS

3.15 TC 82091 JW 10.2.91

PROJECT NUMBER: 602.~~25~~-91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES: N481,681.6 E378,159.5		DATE: 8/11/91
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-12-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (FT)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63332 8/11 0944	1	0	NR			N/A	HNU NA; α NA; Bγ NA
	63333 8/11 0952	1	0	NR				HNU NA; α NA; Bγ NA
9	63334 8/11 0952	1	0	NR				HNU NA; α NA; Bγ NA
	63335 8/11 0952	1	0	NR				HNU NA; α NA; Bγ NA
10	63336 8/11 0952	1	0	NR				HNU NA; α NA; Bγ NA
	63337 8/11 1012	1	6	DENSE (2.5Y 4/3) OLIVE BROWN CLAY. MODERATE COHESION, MOIST.	ML			HNU 0; α 0; Bγ 500
11	63338 8/11 1012	1	6	SOFT (10R 4/8) RED CLAY LIKE MATERIAL PASTEY CONSISTENCY, GOOD COHESION, MOIST.	NA			HNU 0; α 0; Bγ 1000
	63339 8/11 1012	1	0	NR				HNU NA; α NA; Bγ NA
ML 12	63340 8/11 1012	1	0	NR				HNU NA; α NA; Bγ NA
	63341 8/11 1019	1	6	SOFT (10R 4/8) RED CLAY LIKE MATERIAL PASTEY CONSISTENCY, GOOD COHESION MOIST.	NA			HNU 0; α 0; Bγ 350
13	63342 8/11 1019	1	0	NR				HNU NA; α NA; Bγ NA
	63343 8/11 1019	1	0	NR				HNU NA; α NA; Bγ NA
14	63344 8/11 1019	1	0	NR				HNU NA; α NA; Bγ NA
	63345 8/11 1050	1	6	VERY LOOSE (10R 4/8) RED CLAY LIKE MATERIAL MOTTLED WITH BLACK + BROWN MATERIAL. PASTEY CONSISTENCY, GOOD PLASTICITY VERY MOIST.	NA			HNU; α; Bγ 1000
	63346 8/11 1050	1	6	SAA			N/A	HNU; α; Bγ 1000

NOTES.

Drilling Contractor _____

Drilling Equipment _____

Other: _____

FERNALD
RI/FS

REVIEWED BY QA MB DATE 10-8-91

VISUAL CLASSIFICATION OF SOILS

3.15 TC 82091 Jun 10.24,

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES: N 481,681.6 E 1378,159.5		DATE: 8/11/91
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-12-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (PER 6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15	63347 8/11 1030	1	6	SAA			N/A	HNU 0; α 0; Bγ 1000
	63348 8/11 1030	1	6	SAA				HNU 0; α 0; Bγ 400
16	63349 8/11 1332	1	6	VERY LOOSE (10R 4/8) RED CLAY LIKE MATERIAL. GOOD COHESION & PLASTICITY. A PASTEY TO PUDDING LIKE CONSISTENCY. VERY MOIST.	NA			HNU 0; α 0; Bγ 2200
	63350 8/11 1332	1	6	SAA				HNU 0; α 0; Bγ 4500
17	63351 8/11 1332	1	6	SAA				HNU 0; α 0; Bγ 2500
	63352 8/11 1332	1	6	SAA				HNU 0; α 0; Bγ 2000
	63353 8/11 1340	1	6	VERY LOOSE (2.5YR 4/8) RED CLAY LIKE MATERIAL MOTTLED WITH (2.5Y 6/4) LIGHT YELLOWISH BROWN MATERIAL. POOR CONSISTENCY, GOOD PLASTICITY, PUDDING LIKE CONSISTENCY. WET.	NA			HNU 0; α 0; Bγ 1100
19	63354 8/11 1340	1	6					HNU 0; α 0; Bγ 1100
	63355 8/11 1340	1	6	SAA				HNU 0; α 0; Bγ 1100
20	63356 8/11 1340	1	6	SAA				HNU 0; α 0; Bγ 1000
	63357 8/11/91 1410	SHELBY TUBE PUSHED	24	24" SHELBY TUBE PUSHED. 24" RECOVERY				HNU NA; α NA; Bγ NA
21								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
22	63358 8/11 1425	1		VERY LOOSE (2.5YR 4/8) RED CLAY LIKE MATERIAL PUDDING CONSISTENCY. VERY MOIST.	NA		N/A	HNU 8.4; α; Bγ 1500

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAMBAZONA

001821

FERNALD
RI/FS

5711

REVIEWED BY QA NR DATE 10-8-91

VISUAL CLASSIFICATION OF SOILS

3.15 TEC 82691

Jan 10.2.91

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES: N 481,681.6 E 1376,159.5		DATE: 8/11/91
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED: 8-12-91
DRILLING METHODS: Hollow Stem Auger			PAGE 4 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6/2")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
23	63359 8/11 1425	1	6	VERY LOOSE (2.5YR 4/8) RED MOTTLED WITH (2.5Y 6/3) LIGHT YELLOWISH BROWN. CLAY LIKE MATERIAL. PASTEY CONSISTENCY. VERY MOIST.	NA		N/A	HNU 17PPM; α 0; Bγ 1500
	63360 8/11 1425	1	6	SAA				HNU 5PPM; α 0; Bγ 1800
24	63361 8/11 1425	1	6	LOOSE (10YR 7/1) LIGHT CLAY CLAY LIKE MATERIAL. PASTEY CONSISTENCY. MOIST.	NA			HNU 2PPM; α 0; Bγ 800
25	63362 8/11 1520	1	6	VERY LOOSE (2.5YR 4/8) RED CLAY LIKE MATERIAL. PASTEY CONSISTENCY GOOD PLASTICITY. VERY MOIST	N/A			HNU 0; α 0; Bγ 2000
	63363 8/11 1520	1	6	SAA				HNU 0; α 0; Bγ 2000
	63364 8/11 1520	1	6	SAA				HNU 0; α 0; Bγ 1700
26	63365 8/11 1520	1	6	SAA				HNU 0; α 0; Bγ 1200
	63366 8/11 1540	1	6	SAA				HNU 0; α 0; Bγ 700
27	63367 8/11 1540	1	6	VERY LOOSE (10YR 7/3) VERY PALE BROWN CLAY LIKE MATERIAL. PASTEY CONSISTENCY MOIST.	NA			HNU 0; α 0; Bγ 800
	63368 8/11 1540	1	6	VERY LOOSE (2.5YR 3/6) DARK RED WITH THIN LAYERS (1/16") OF LIGHT CLAY MATERIAL PASTEY CONSISTENCY. MOIST TO VERY MOIST	NA			HNU 0; α 0; Bγ 900
28	63369 8/11 1540	1	6	SAA				HNU 0; α 0; Bγ 1000
29	63370 8/11 1600	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED 24". FULL RECOVERY			N/A	HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner
J. Stradazzoni

SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

Bγ BACKGROUND = 120 CPM

001822

FERNALD
RI/FS

REVIEWED BY QA MB DATE 10-8-91

VISUAL CLASSIFICATION OF SOILS

3.15 TC 82091

Jw 10.2.91

PROJECT NUMBER: 602.25-91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES: N481,681.6 E1,378,159.5		DATE: 8/11/91
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8-12-91
DRILLING METHODS: Hollow Stem Auger			PAGE 5 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63371 8/11 1610	1	6	VERY LOOSE (2.5 YR 4/6) RED CLAY LIKE MATERIAL. PASTEY CONSISTENCY VERY MOIST	NA		N/A	HNU 0 α 0 BZ 1500
	63372 8/11 1610	1	6	SAA				HNU 0 α 0 BZ 1200
31	63373 8/11 1610	1	6	SAA				HNU 0 α 0 BZ 1500
	63374 8/11 1610	1	6	SAA				HNU 0 α 0 BZ 1200
32	63375 8/12 0825	1	6	VERY LOOSE (2.5YR 5/8) RED CLAY-LIKE MATERIAL. PASTEY CONSISTENCY. VERY MOIST	NA			HNU 0 PPM α 0 BZ 1000
	63376 8/12 0825	1	6	SAA				HNU 7 PPM α 0 BZ 1000
33	63377 8/12 0825	1	6	SAA				HNU 10 PPM α 0 BZ 1000
	63378 8/12 0825	1	6	VERY LOOSE (10YR 7/3) VERY PALE BROWN CLAY LIKE MATERIAL. PASTEY. VERY MOIST	NA			HNU 0 α 0 BZ 1000
34	63379 8/12 0835	1	6	VERY LOOSE (2.5 YR 5/8) RED CLAY LIKE MATERIAL. PASTEY CONSISTENCY. VERY MOIST TO WET.	NA			HNU 5 PPM α 0 BZ 800
	63380 8/12 0835	1	6	SAA				HNU 2 PPM α 0 BZ 900
35	63381 8/12 0835	1	6	SAA				HNU 4 PPM α 0 BZ 900
	63382 8/12 0835	1	6	SAA				HNU 2 PPM α 0 BZ 900
36	63383 8/12 0845	1	6	VERY LOOSE (7.5 YR 6/8) REDDISH YELLOW CLAY LIKE MATERIAL. PUDDING LIKE CONSISTENCY. WET.	NA			HNU 0 α 0 BZ 1700
	63384 8/12 0845	1	6	SAA				HNU 0 α 0 BZ 1200
37	63385 8/12 0845	1	6	SAA			N/A	HNU 0 α 0 BZ 1500

NOTES.

Drilling Contractor: PENN DRILLING

Drilling Equipment: SIMCO

Driller: E. GARDNER

J. STRAPPAZZON

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

001823

5711

FERNALD RI/FS

REVIEWED BY QA MB DATE 10-8-91

VISUAL CLASSIFICATION OF SOILS

3.15 TC 82091

Jm 10-2-91

PROJECT NUMBER: 602.~~25~~.9T	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1770	COORDINATES N481,681.6 E 1378,157.5	DATE 8/12/91	
ELEVATION: 587.5	GWL: Depth	Date/Time	DATE STARTED: 8/11/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8/12/91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 6 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6,6,6)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
38'	63386 8/12 0845	1	6	SAA			N/A	HNU α Bγ 0 0 1500
	63387 8/12 0855	1	6	VERY LOOSE (2.5YR 5/6) RED CLAYEY MATERIAL PASTEY CONSISTENCY. VERY MOIST.	NA			HNU α Bγ 0 0 1000
39	63388 8/12 0855	1	6	VERY LOOSE (2.5Y 8/3) PALE YELLOW CLAYEY MATERIAL. PASTEY, MOIST	NA		N/A	HNU α Bγ 1 PPM 0 1400
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ

NOTES.

Drilling Contractor PENN DRILLING CO.

Drilling Equipment SIMCO

Driller: C. GARDNER

T. STAMPAZONI

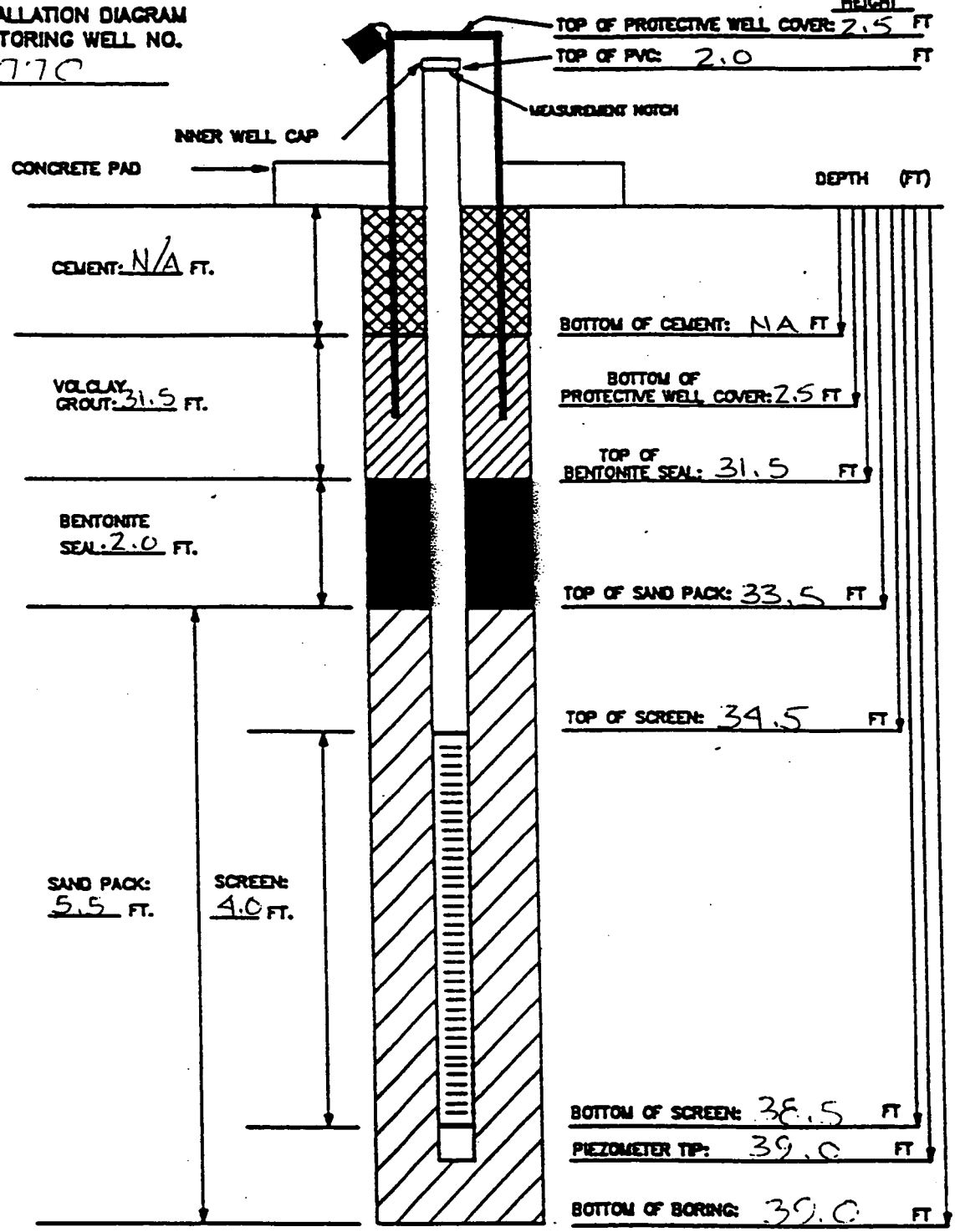
001824

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
17TC

Stickups

INSTALLATION DATE: 8-12-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 1-20 lb bag 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 3 5-50 lb bags
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 3 GALLONS
OTHER: 3'x3' CONCRETE PAD WILL BE INSTALLED

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 4.0" I.D. STAINLESS
2) SCREEN IS 2-INCH-I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS. 4.0" I.D. STAINLESS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 3.15 TC 8-26-91

001825

TASK: (6U.1) 602-5-13 GEOLOGIST/ENGINEER: M. HARRIS

FERNALD
RI/FS

REVIEWED BY QA WB DATE 10-8-91

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. HARRIS DATE 8-11-91
PROJECT NO. 6CZ.~~25~~ 9T3.15 TC 8-20-91 CHECKED BY [illegible] DATE 10-2-91
BORING NO. 1770
PIEZOMETER NO. 1770 DATE OF INSTALLATION 8-12-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE FROM ← TO →	SIZE NONE FROM ← TO →
FLUID NONE FROM ← TO →	SIZE NONE FROM ← TO →

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0" I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4.0"
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 41.0'
AVERAGE SIZE OF PERFORATIONS 0.01 INCH	JOINING METHOD FLUSH JOINT THREADED
TOTAL PERFORATED AREA 5 FEET	

TECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.	OTHER PROTECTION HINGED LOCKING
PROTECTIVE PIPE O.D. 10 3/4"	COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		589.5	
GROUND SURFACE	0.0		587.5	
BOTTOM OF PROTECTIVE PIPE	2.5		585.0	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 31.5	TOP 587.5	BOTTOM 556
BENTONITE	TOP 31.5	BOTTOM 33.5	TOP 556	BOTTOM 554
SAND	TOP 33.5	BOTTOM 39.0	TOP 554	BOTTOM 548.5
GRAVEL NONE	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 34.5	BOTTOM 38.5	TOP 553	BOTTOM 549
PIEZOMETER TIP	39.0		548.5	
BOTTOM OF BOREHOLE	39.0		548.5	
GWL AFTER INSTALLATION				

HE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

EMARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION.

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

3.15 T.C 8-20-91 JAN 10.2.91

PROJECT NUMBER: 602.25.91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1771	COORDINATES: N481637.8 E1378298.9		DATE: 8/13/91
ELEVATION: 589.7	GWL: Depth	Date/Time	DATE STARTED: 8/13/91
ENGINEER/GEOLOGIST: HANNS	Depth	Date/Time	DATE COMPLETED: 8/14/91
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 in)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1	G3400 8/13 0938	6	6	MEDIUM DENSE (7.5YR 4/4) DARK BROWN SILTY CLAY. SOME SANDS ANGULAR GRAVEL AND ORGANIC MATERIAL (ROOTLETS) MODERATE COHESION + PLASTICITY. SLIGHTLY MOIST.	ML	NA	N/A	HNU 0 α 0 Bγ 700
	G3401 8/13 0938	9	6	SAA				HNU 0 α 0 Bγ 250
	G3402 8/13 0938	11	6	LOOSE (7.5YR N2/) BLACK MEDIUM SAND POOR COHESION, NO PLASTICITY. SLIGHTLY MOIST	SC			HNU 0 α 0 Bγ 260
2	G3403 8/13 0938	13	0	NR				HNU NA α NA Bγ NA
	G3404 8/13 0942	7	6	LOOSE (7.5YR N2/) BLACK MEDIUM SAND POOR COHESION, NO PLASTICITY. SLIGHTLY MOIST	SC			HNU 0 α 0 Bγ 180
3	G3405 8/13 0942	6	6	SAA				HNU 0 α 0 Bγ 250
	G3406 8/13 0942	2	6	MEDIUM DENSE (10R 5/6) RED CLAY LIKE MATERIAL. GOOD COHESION + PLASTICITY. PUTTY LIKE CONSISTENCY. SLIGHTLY MOIST	NA			HNU 0 α 0 Bγ 1500
4	G3407 8/13 0942	2	0	NR				HNU NA α NA Bγ NA
5	G3408 8/13 0949	SHELBY TUBE PUSHED	0	SHELBY TUBE PUSHED 24". NO RECOVERY				HNU NA α NA Bγ NA; HNU NA α NA Bγ NA; HNU NA α NA Bγ NA; HNU NA α NA Bγ NA
6	G3409 8/13 0953	1	6	MEDIUM DENSE (10R 5/6) RED CLAY LIKE MATERIAL. GOOD COHESION + PLASTICITY PUTTY LIKE CONSISTENCY. SLIGHTLY MOIST.	NA			HNU 0 α 0 Bγ 1800
7	G3410 8/13 0953	1	6	SAA				HNU 0 α 0 Bγ 1500
	G3411 8/13 0953	1	6	SAA			N/A	HNU 2 α 0 Bγ 1600

NOTES

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: CME 75

Driller: E. Gardner

Asst: T. Scarpazzini

SAA = SAME AS ABOVE
NA = NOT APPLICABLE
NR = NO RECOVERY

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

3.15 TS 8/20/91 Fm 10/3/91

PROJECT NUMBER: 602.25-91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1771	COORDINATES: N481,607.8 E1,378,298.4	DATE: 8-13-91	
ELEVATION: 589.7	GWL: Depth / Date/Time	DATE STARTED: 8/13/91	
ENGINEER/GEOLOGIST: Harris	Depth / Date/Time	DATE COMPLETED: 8-14-91	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63412 8/13 0850	1	6	SAA	NA	NA	N/A	HNU 6; α 0; Bγ 1500
	63413 8/13 1000	1	6	SAA				HNU 3; α 0; Bγ 1000
9	63414 8/13 1000	1	6	SAA				HNU 0; α 0; Bγ 1000
	63415 8/13 1000	1	6	SAA				HNU 0; α 0; Bγ 1200
10	63416 8/13 1000	1	6	SAA				HNU 0; α 0; Bγ 1200
	63417 8/13 1050	1	0	NR				HNU NA; α NA; Bγ NA
11	63418 8/13 1030	2	0	NR				HNU NA; α NA; Bγ NA
	63419 8/13 1030	3	0	NR				HNU NA; α NA; Bγ NA
12	63420 8/13 1030	1	0	NR				HNU NA; α NA; Bγ NA
	63421 8/13 1045	1	6	VERY LOOSE (10R 4/8) RED CLAY LIKE MATERIAL. GOOD COHESION & PLASTICITY PASTEY CONSISTENCY. MOIST	NA			HNU 0; α 0; Bγ 1500
13	63422 8/13 1045	1	6	SAA				HNU 0; α 0; Bγ 1500
	63423 8/13 1045	1	6	SAA				HNU 0; α 0; Bγ 2000
14	63424 8/13 1045	1	6	SAA				HNU 0; α 0; Bγ 2000
	63425 8/13 1056	1	6	SAA				HNU 0; α 0; Bγ 1000
	63426 8/13 1056	1	6	SAA			N/A	HNU 0; α 0; Bγ 1200

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

3.15 TC 8/20/91 JAN 12.2.91

PROJECT NUMBER: 602.8[illegible]	PROJECT NAME: FMPC M/GS OU-1		
BORING NUMBER: 1771	COORDINATES: N481,637.8 E 1,378,298.9	DATE: 8/13/91	
ELEVATION: 569.7	GWL: Depth / Date/Time	DATE STARTED: 8/13/91	
ENGINEER/GEOLOGIST: Hagans	Depth / Date/Time	DATE COMPLETED: 8/14/91	
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 6	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (ft)	WELL CONSTRUCTION	REMARKS
15	63427 8/13 1056	1	6	SAA		NA	N/A	HNU 0 / α 0 / BZ 1200
	63428 8/13 1050	1	6	SAA				HNU 0 / α 0 / BZ 1200
16	63429 8/13 1105	1	6	SAA				HNU 0 / α 0 / BZ 700
	63430 8/13 1105	1	6	SAA				HNU 0 / α 0 / BZ 1100
17	63431 8/13 1105	1	6	VERY LOOSE (2.5Y 3/2) VERY DARK GRAYISH BROWN CLAY LIKE MATERIAL GOOD COHESION & PLASTICITY GOOD. PUDDING LIKE CONSISTENCY. WET	NA			HNU 20 / α 0 / BZ 1100
	63432 8/13 1105	1	6	SAA				HNU 30 / α 0 / BZ 1000
18	63433 8/13 1110	1	6	SAA				HNU 0 / α 0 / BZ 1400
	63434 8/13 1110	1	6	VERY LOOSE (2.5Y 4/4) OLIVE BROWN MOTTLED WITH BLACK. CLAY LIKE MATERIAL GOOD COHESION & PLASTICITY. PASTEY CONSISTENCY. VERY MOIST.	NA			HNU 0 / α 0 / BZ 1200
19	63435 8/13 1110	1	6					HNU 0 / α 0 / BZ 1100
	63436 8/13 1110	1	6	SAA				HNU 0 / α 0 / BZ 1000
20	63437 8/13 1405	1	6	SAA				HNU 0 / α 0 / BZ 600
	63438 8/13 1405	1	6	VERY LOOSE (10YR 8/2) WHITE STAINED WITH DARK BROWN & BLACK. CLAY LIKE MATERIAL. GOOD COHESION & PLASTICITY PASTEY CONSISTENCY. VERY MOIST.	NA			HNU 1 / α 0 / BZ 1200
21	63439 8/13 1405	1	6	SAA				HNU 0 / α 0 / BZ 1200
	63440 8/13 1405	1	6	SAA				HNU 0 / α 0 / BZ 1000
22	63441 ↓					↓	N/A	

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Strasbaugh

FERNALD
RI/FS

REVIEWED BY QA [illegible] DATE 10-10-91

5711

VISUAL CLASSIFICATION OF SOILS

3.15 TC 8-26-91

PROJECT NUMBER: 602.25-91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1771	COORDINATES N 481,637.8 E 1378,298.4		DATE: 8/13/91
ELEVATION: 589.7	GWL: Depth	Date/Time	DATE STARTED: 8/13/91
ENGINEER/GEOLOGIST: HARRIS	Depth	Date/Time	DATE COMPLETED: 8/14/91
DRILLING METHODS: Hollow Stem Auger			PAGE 4 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS BY HANDS	MEASURED GAMMA RADIATION (CPM)	WELL CONSTRUCTION	REMARKS
23	63441 8/13 1410	Shelby Tube (HD)	0	Shelby Tube pushed 24". No recovery.		NA	N/A	HNU NA, α NA, BZ NA; HNU NA, α NA, BZ NA; HNU NA, α NA, BZ NA
24	63442 8/13 1433	1	6	Very loose (2.5 YR 4/8) red clay like material and cohesion and plasticity. Pasty consistence very moist.	NA			HNU 0, α 0, BZ 400
	63443 8/13 1433	1	6	Very loose (10 YR 2/1) black sand grading into (5Y 8/1) white clay like material with some yellow. Pasty consistency, moist.	NA			HNU 2 ppm, α 0, BZ 490
25	63444 8/13 1433	1	6	Very loose (10 YR 5/4) yellowish brown streaked with (10 YR 8/2) white. Clay like material. Pasty consistency, moist.	NA			HNU 1, α 0, BZ 600
	63445 8/13 1433	1	6	SAA				HNU 0, α 0, BZ 600
26	63446 8/13 1442	1	6	Very loose (5Y 8/1) white streaked with black. Clay like material. Pasty consistency. Very moist.	NA			HNU 0, α 0, BZ 900
	63447 8/13 1442	1	6	SAA				HNU 0, α 0, BZ 900
27	63448 8/13 1442	1	6	Very loose (10 YR 4/6) dark yellowish brown (caramel candy) streaked with thin layers of black. Clay like material. Pasty consistency, very moist.	NA			HNU 0, α 0, BZ 900
	63449 8/13 1442	1	6	SAA				HNU 0, α 0, BZ 800
28	63450 8/13 1449	1	6	Very loose (7.5 YR 4/8) red clay like material. Low cohesion & plasticity. Pasty consistence. Very moist.	NA			HNU 0, α 0, BZ 900
	63451 8/13 1449	1	6	SAA				HNU 0, α 0, BZ 900
29	63452 8/13 1449	1	6	SAA				HNU 0, α 0, BZ 900
	63453 8/13 1449	1	6	Very loose (5Y 8/1) white streaked with some black. Clay like material. Pasty consistency. Very moist.	NA		N/A	HNU 0, α 0, BZ 900
30								

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Stamparzeni

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE.

FERNALD
RI/FS

- 5711

VISUAL CLASSIFICATION OF SOILS

3.15 TC 8-20-91 JMW 10-2-91

PROJECT NUMBER: 602.25.94	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1771	COORDINATES: N481,637.8 E1,378,298.4		DATE: 8/13/91
ELEVATION: 589.7	GWL: Depth	Date/Time	DATE STARTED: 8/13/91
ENGINEER/GEOLOGIST: HAZZIS	Depth	Date/Time	DATE COMPLETED: 8/14/91
DRILLING METHODS: Hollow Stem Auger			PAGE 5 OF 6

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63454 8/13 1515	1	6	VERY LOOSE (10 YR 7/4) VERY PALE BROWN STREAKED WITH BLACK. CLAY LIKE MATERIAL PASTEY CONSISTENCY. VERY MOIST	NA	NA	N/A	HNU 0 α 0 BY 800
	63455 8/13 1515	1	6	SAA				HNU 0 α 0 BY 600
31	63456 8/13 1515	1	6	SAA				HNU 0 α 0 BY 700
	63457 8/13 1515	1	6	SAA				HNU 0 α 0 BY 600
32	63458 8/13 1523	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED 24". FULL RECOVERY				HNU NA α NA BY NA
33								HNU NA α NA BY NA
								HNU NA α NA BY NA
34								HNU NA α NA BY NA
	63459 8/13 1530	1	6	VERY LOOSE (2.5 YR 4/8) RED CLAY LIKE MATERIAL STREAKED WITH BLACK AND SPARSE (5Y 8/4) PALE YELLOW MATERIAL. PASTEY CONSISTENCY VERY MOIST.	NA			HNU 0 α 0 BY 500
	63460 8/13 1530	1	6	SAA				HNU 0 α 0 BY 500
35	63461 8/13 1530	1	6	SAA				HNU 0 α 0 BY 1000
	63462 8/13 1530	1	6	SAA				HNU 0 α 0 BY 800
36	63463 8/13 1550	1	6	SAA				HNU 0 α 0 BY 600
	63464 8/13 1550	1	6	VERY LOOSE (10 YR 4/6) DARK YELLOWISH BROWN (CARAMEL) PASTEY CONSISTENCY. VERY MOIST.	NA			HNU 0 α 0 BY 400
37	63465 8/13 1550	1	6	SAA			N/A	HNU 0 α 0 BY 600

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Starpazini

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

3.15 TO 8/20/91 — JRW 10/2/91

PROJECT NUMBER: 602.25-91	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1771	COORDINATES: N481,637.8 E1,376,788.4		DATE: 5/13/91
ELEVATION: 589.7	GWL: Depth	Date/Time	DATE STARTED: 5/13/91
ENGINEER/GEOLOGIST: Harris	Depth	Date/Time	DATE COMPLETED: 8/14/91
DRILLING METHODS: Hollow Stem Auger			PAGE 6 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
38	63466 5/13 1550	1	6	VERY LOOSE (5Y 2.5/1) BLACK CLAY LIKE MATERIAL. PASTEY CONSISTENCY VERY MOIST.	NA	NA	N/A	HNU 0 α 0 Bγ 800
	63467 5/13 1600	1	6	VERY LOOSE (10YR 4/6) DARK YELLOWISH BROWN (CARAMEL) PASTEY CONSISTENCY VERY MOIST.	NA			HNU 0 α 0 Bγ 800
	63468 5/13 1600	1	6	SAA				HNU 0 α 0 Bγ 900
39	63469 5/13 1600	1	6	SAA				HNU 0 α 0 Bγ 1000
	63470 5/13 1600	1	6	SAA				HNU 0 α 0 Bγ 1700
40	63471 8/14 0825	1		VERY LOOSE (2.5YR 6/8) LIGHT RED CLAY LIKE MATERIAL. PASTEY CONSISTENCY. VERY MOIST	NA			HNU 0 α 0 Bγ 3500
	63472 8/14 0825	6		VERY LOOSE (10YR 7/4) VERY PALE BROWN CLAY LIKE MATERIAL. PASTEY CONSISTENCY VERY MOIST.	NA			HNU 0 α 0 Bγ 3000
41				WELL SET AT 41.0'. NO LINER ENCOUNTERED.			N/A	HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ

NOTES.

Drilling Contractor: Penn Drilling Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Strapazoni

SAA = SAME AS ABOVE

NR = NO RECOVERY

NA = NOT APPLICABLE

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS (OU-1) FIELD ENG./GEO. M. HARRIS DATE 8-14-91
PROJECT NO. 602.3.15 CHECKED BY JAW DATE 10-2-91
BORING NO. 1771
PIEZOMETER NO. 1771 DATE OF INSTALLATION 8-14-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ~~TO~~
FLUID NONE ~~FROM~~ ~~TO~~

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE ~~FROM~~ ~~TO~~
SIZE NONE ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 IN.
TOTAL PERFORATED AREA 4.0 FEET

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0"
LENGTH OF PIPE SECTIONS 43.0 FEET
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 10 3/4"

OTHER PROTECTION HINGED LOCKING COVER WITH PADLOCK

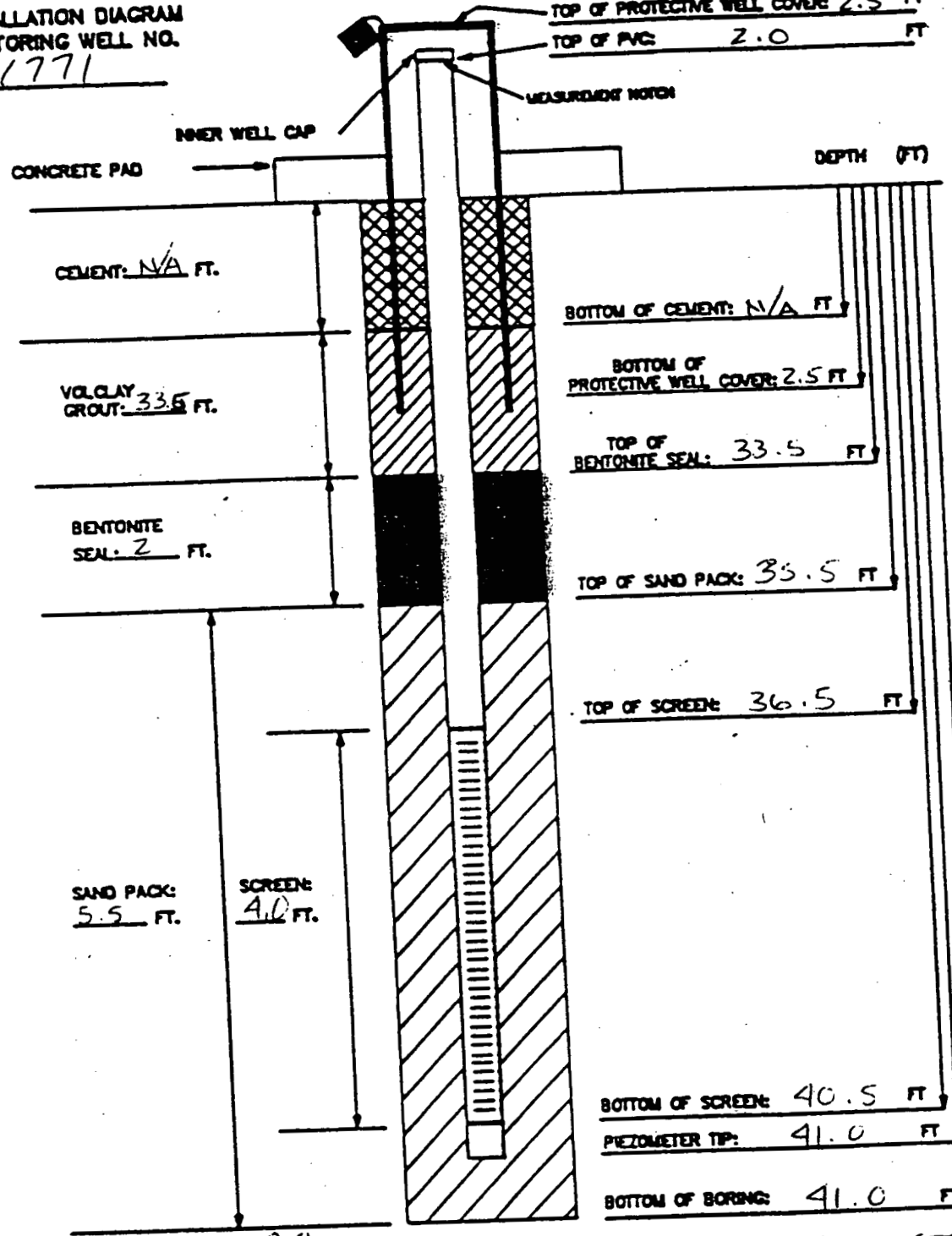
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		589.7	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 33.5	TOP NA	BOTTOM 556.2
BENTONITE	TOP 33.5	BOTTOM 35.5	TOP 556.2	BOTTOM 554.2
SAND	TOP 35.5	BOTTOM 41.0 TC ~~35.5 TC~~	TOP 554.2	BOTTOM 548.7
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 36.5	BOTTOM 40.5	TOP 553.2	BOTTOM 549.2
PIEZOMETER TIP	41.0		548.7	
BOTTOM OF BOREHOLE	41.0		548.7	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION.

INSTALLATION DATE: 8-19-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1771



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 1 50lb bag 10/20
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 4 - 50 lb bags
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 3 GALLONS
OTHER: 3' x 3' CONCRETE PAD WILL BE INSTALLED

NOTES: 4.0" I.D STAINLESS
1) RISER PIPE IS 3-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 3-INCH ID, SCHEDULE 40 4.0" I.D. STAINLESS PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (00.)602.3.15

GEOLOGIST/ENGINEER: M. HARRIS

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JMW 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC		
BORING NUMBER: 1772	COORDINATES: N481,772.2 E1378502	DATE: 8-7-91	
ELEVATION: 583.5'	GWL: Depth / Date/Time	DATE STARTED: 8-7-91	
ENGINEER/GEOLOGIST: M. HARRIS	Depth / Date/Time	DATE COMPLETED: 8-8-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0	63240 8-7 0905	4	6	MEDIUM DENSE (2.5Y4/4) OLIVE BROWN SILT. ROOTLETS AT THE TOP. GOOD COHESION & PLASTICITY MOIST.	ML CL	NA	NA	HNU 0; α 0; Bγ 100
	63241 8-7 0905	11	6	SAA				HNU 0; α 0; Bγ 100
1	63242 8-7 0905	16	6	MEDIUM DENSE (2.5Y N2/) BLACK, FINE SAND WITH A NODULE OF CLEAR CRYSTALLINE MATERIAL (RECEIVER) MODERATE COHESION, POOR PLASTICITY, MOIST.	SC			HNU 0; α 0; Bγ 2300-5000
	63243 8-7 0915	18	6	VERY DENSE (2.5Y N2) BLACK FINE SAND OVERLYING WOOD.				HNU 0; α 0; Bγ 2000
2	63244 8-7 0915	116	0	NR - WOOD				HNU NA; α NA; Bγ NA
	63245 8-7 0915	10	0	NR				HNU NA; α NA; Bγ NA
	63246 8-7 0925	400	0	NR - WOOD				HNU NA; α NA; Bγ NA
4	63247 8-7 0940	SHELBY TUBE PUSHED BY NA	0	SHELBY TUBE PUSHED 12" UNTIL RESISTANCE WAS MET. NO RECOVERY				HNU NA; α NA; Bγ NA HNU NA; α NA; Bγ NA
5	63248 8-7 0950	40	0	NR - WOOD				HNU 0; α 0; Bγ 1200
	63249 8-7 0950	80	0	NR - WOOD				HNU 3PPM; α 0; Bγ 1200
6	63250 8-7 1020	30	0	NR - WOOD				HNU 0; α 0; Bγ 1000
	63251 8-7 1020	30	6	VERY DENSE, (2.5Y N3/) VERY DARK GRAY SILT, INTERMIXED WITH WOOD. POOR COHESION, POOR PLASTICITY. MOIST	NA			HNU 0; α 0; Bγ 1200
7	63252 8-7 1020	55	6	SAA				HNU 0; α 0; Bγ 1200
	63253 8-7 1030	27	0	NR				HNU NA; α NA; Bγ NA

NOTES.

Drilling Contractor PENN DRILLING CO.

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST K. MYERS

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

Jw 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1772	COORDINATES: N481772, E 1376502.1		DATE: 8-7-91
ELEVATION: 583.5	GWL: Depth	Date/Time	DATE STARTED: 8-7-91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-8-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63259 8-7 1045	18	6	MEDIUM DENSE (2.5Y N3/) VERY DARK GRAY SILT, WITH MANY WOOD FRAGMENTS, POOR COHESION, WET	NA	NA	NA	HNU 0 / α 0 / Bγ 1200
	63255 8-7 1045	12	6	SAA				HNU 0 / α 0 / Bγ 1200
	63256 8-7 1045	15	0	NR				HNU NA / α NA / Bγ NA
9	63257 8-7 1110	7	6	MEDIUM DENSE (2.5Y 4/4) OLIVE BROWN CLAY WITH ANGULAR GRAVEL AND WOOD FRAGMENTS. MOIST.	NA			HNU 0 / α 0 / Bγ 1200
	63258 8-7 1110	6	6	SAA				HNU 0 / α 0 / Bγ 2000
10	63259 8-7 1110	6	0	NR				HNU NA / α NA / Bγ NA
	63260 8-7 1115	10	0	NR - WOOD FRAGMENTS				HNU NA / α NA / Bγ NA
11	63261 8-7 1115	10	0	NR				HNU NA / α NA / Bγ NA
	63262 8-7 1115	9	0	NR				HNU NA / α NA / Bγ NA
12	63263 8-7 1120	8	0	NR - WOOD FRAGMENTS				HNU NA / α NA / Bγ NA
	63264 8-7 1120	6	0	NR				HNU NA / α NA / Bγ NA
13	63265 8-7 1120	6	0	NR				HNU NA / α NA / Bγ NA
	63266 8-7 1130	5	6	MEDIUM DENSE (5Y 3/2) DARK OLIVE GRAY, SILT WITH WOOD FRAGMENTS. NO COHESION. VERY WET.	NA			HNU 0 / α 0 / Bγ 2000
14	63267 8-7 1130	7	6	SAA				HNU 0 / α 0 / Bγ 3500
	63268 8-7 1130	8	6	DENSE (2.5Y 4/4) OLIVE BROWN CLAY MOTTLED WITH GRAY CLAY. GOOD COHESION, MOIST.	NA			HNU 0 / α 0 / Bγ 2500
15								

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

E. GARDNER

ASST. K. MYERS

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JAN 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1772	COORDINATES: N. 481772.2 E. 1378.502.1		DATE: 8-8-91
ELEVATION: 583.5	GWL: Depth	Date/Time	DATE STARTED: 8-7-91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-8-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15	63269 8-7 1435	4	6	LOOSE, (2.5Y 4/3) OLIVE BROWN FINE SAND AND CLAY WITH NODULES OF FLYASH (BLACK). WET	NA	NA	NA	HNU 0; α 0; Bδ 1500
	63270 8-7 1435	4	6	SAA				HNU 0; α 0; Bδ 1500
16	63271 8-7 1435	5	0	NR				HNU NA; α NA; Bδ NA
	63272 1445 8-7	6	6	MEDIUM DENSE (2.5Y 7/6) OLIVE-YELLOW CLAY WITH SILT AND SPARSE GRAVEL. MOIST	NA			HNU 0; α 0; Bδ 450
17	63273 1445 8-7	5	6	MEDIUM DENSE (5Y 3/3) DARK OLIVE ~~GRAY~~ FINE SAND WITH FLYASH (~ 20%). MOIST	NA			HNU 0; α 0; Bδ 300
	63274 1445 8-7	5	6	SAA				HNU 0; α 0; Bδ 250
18	63275 1450 8-7	6	6	MEDIUM DENSE (5Y 4/3) OLIVE SILT WITH SPARSE SAND, LOW COHESION, WET	CL			HNU 0; α 0; Bδ 1800
	63276 1450 8-7	6	6	SAA				HNU 0; α 0; Bδ 1500
19	63277 1450 8-7	5	6	MEDIUM DENSE, (5Y 2.5/1) BLACK, FINE SAND WITH ROOTLETS - MEDIUM COHESION, MOIST, PROBALY FLY ASH.	NA			HNU 0; α 0; Bδ 800
20	63278 1525 8-7	SHELBY TUBE PUSHED BLOWS NA	12	SHELBY TUBE COLLECTED 12 INCHES RECOVERY				HNU NA; α NA; Bδ NA
21								
22	63279 8-7 1645	2	6	LOOSE (5Y 2.5/1) BLACK FINE TO MEDIUM SAND. POOR COHESION. WET.	SC			HNU 0; α 0; Bδ 1200

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller E. GARDNER

ASST. K. MYERS

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JMW 10.3.91

SCT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1772	COORDINATES: N 481,772.2 E 1,378,502		DATE: 8-8-91
ELEVATION: 583.5'	GWL: Depth	Date/Time	DATE STARTED: 8-7-91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-8-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
23	63280 8-7 1645	3	6	LOOSE (5Y 2.5/1) BLACK FINE TO MEDIUM SAND, POOR COHESION, WET	SC	NA	NA	HNU 0 / α 0 / BZ 3000
	63281 8-7 1645	3	6	SAA				HNU 0 / α 0 / BZ 4000
24	63282 8-7 1655	5	6	SAA				HNU 0 / α 0 / BZ 5000
	63283 8-7 1655	5	6	SAA				HNU 0 / α 0 / BZ 6000
	63284 8-7 1655	5	6	SAA				HNU 0 / α 0 / BZ 8000
25	63285 8-7 1705	7	6	LOOSE, (5Y 2.5/1) BLACK MEDIUM SAND POOR COHESION, VERY WET, SOME ROOTLETS	SC			HNU 0 / α 0 / BZ 1000
	63286 8-7 1705	7	6	SAA				HNU 0 / α 0 / BZ 1000
26	63287 8-7 1705	6	0	NR				HNU 0 / α 0 / BZ 1000
27	63288 8-7 1720	7	6	LOOSE, (5Y 2.5/1) BLACK MEDIUM SAND POOR COHESION, VERY WET	SC			HNU 0 / α 0 / BZ 2000
	63289 8-7 1720	8	6	SAA				HNU 0 / α 0 / BZ 4000
28	63290 8-7 1720	6	0	NR				HNU 0 / α 0 / BZ 10000
	63291 8-8 0835	2	6	LOOSE (5Y 2.5/1) BLACK MEDIUM SAND				HNU 0 / α 0 / BZ 1000
29	63292 8-8 0835	2	6	SOFT (10YR 7/5) YELLOW CLAY MATERIAL MOTTLED WITH (10YR 8/3) VERY PALE BROWN CLAY LIKE ATTITUDE, MOIST	NA			HNU 0 / α 0 / BZ 1000
	63293 8-8 0840	2	6	SAA				HNU 0 / α 0 / BZ 2000
30	63294 8-8 0900	2	6	SOFT (2.5YR 8/0) PALE YELLOW CLAY LIKE MATERIAL. PASTEY CONSISTENCY. SOME WHITE GRANULAR MATERIAL. MOIST	NA			HNU 0 / α 0 / BZ 2400

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST. K. MYERS

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

CMW 12.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1772	COORDINATES: N481,772.2 E1378,802.4		DATE: 8-8-91
ELEVATION: 583.5'	GWL: Depth	Date/Time	DATE STARTED: 8-7-91
ENGINEER/GEOLOGIST: M. HARRIS	Depth	Date/Time	DATE COMPLETED: 8-8-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 5 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63295 8-8 0930	2	6	SOFT (2.5YR/8-4) PALE-YELLOW CLAY-LIKE MATERIAL WITH (10YR 4/6) CARMEL COLORED LAYERING INTERSPERSED IN THE MATERIAL. PASTEY CONSISTENCY.	NA	NA	NA	HNU 0 / α 0 / Bγ 1500
	63296 8-8 0930	3	6	SAA				HNU 0 / α 0 / Bγ 1800
31	63297 8-8 0935	2	6	SAA				HNU 0 / α 0 / Bγ 2500
	63298 8-8 0935	4	6	SAA				HNU 0 / α 0 / Bγ 2500
32	63299 8-8 0950	2	6	SOFT (10YR 8/4) VERY PALE BROWN, CLAY LIKE MATERIAL. LOOKS LIKE LIME SLUDGE MOIST. PASTEY CONSISTENCY.	NA			HNU 0 / α 0 / Bγ 1800
	63300 8-8 0950	3	6	SAA				HNU 0 / α 0 / Bγ 1800
33	63301 8-8 1000	2	6	SAA				HNU 0 / α 0 / Bγ 3000
	63302 8-8 1000	3	6	SAA				HNU 0 / α 0 / Bγ 2200
34	63303 8-8 1015	2	6	SOFT (7.5YR 5/8) STRONG BROWN CLAY LIKE MATERIAL SHOWING SOME STRATIFICATION PASTEY CONSISTENCY. MOIST.	NA			HNU 0 / α 0 / Bγ 2000
	63304 8-8 1015	3	6	SAA				HNU 0 / α 0 / Bγ 1800
35	63305 8-8 1015	4	6	SAA				HNU 0 / α 0 / Bγ 1200
	63306 8-8 1030	6	6	SAA				HNU 0 / α 0 / Bγ 1000
36	63307 8-8 1030	20	6	VERY DENSE (5Y 4/2) OLIVE GRAY CLAY WITH SPARSE, ROUNDED GRAVEL	CL			HNU 0 / α 0 / Bγ 1000
37								

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST. K. MYERS

SAA - SAME AS ABOVE

NR - NO RECOVERY

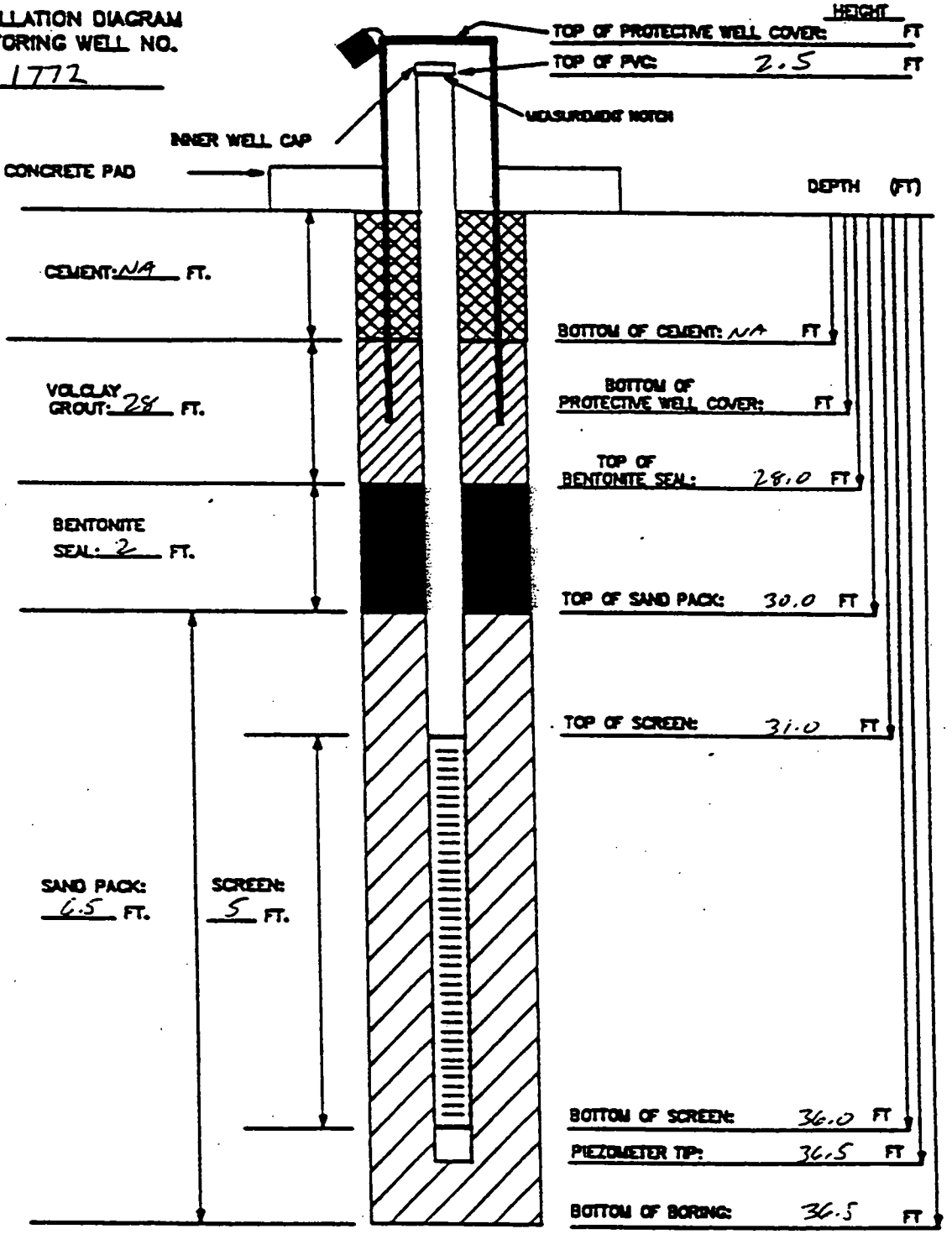
NA - NOT APPLICABLE

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1772

OU-1 Pit #3

INSTALLATION DATE: 8/8/91



BOREHOLE DIAMETER: _____ INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: BEST SILICA SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 1 BUCKET
BAGS OF VOLCLAY GROUT: 1 BUCKET 4.50 lb BAGS
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED:
OTHER: 3x3' CONCRETE PAD TO BE INSTALLED

NOTES:
1) RISER PIPE IS 4-INCH-SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS. 4.0" I.D. STAINLESS T.C. 8.0 ft
2) SCREEN IS 3-INCH-I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. 4.0" I.D. T.C. 8.0 ft
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (OU-1) 602.3.15

GEOLOGIST/ENGINEER: M. HARRIS

:ERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

OJECT NAME FMPC RI/FS (OU-1) FIELD ENG./GEO. M. HARRIS DATE 8-8-91
PROJECT NO. 6002.3.15 CHECKED BY Jm DATE 10-3-91
BORING NO. 1772
PIEZOMETER NO. 1772 DATE OF INSTALLATION 8-8-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ——— TO ———
FLUID NONE FROM ——— TO ———

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ——— TO ———
SIZE NONE FROM ——— TO ———

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 in.
TOTAL PERFORATED AREA 5 FEET

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0"
LENGTH OF PIPE SECTIONS 38.5'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FEET
PROTECTIVE PIPE O.D. 10 3/4"

OTHER PROTECTION HINGED LOCKING COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		583.5	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 28.0	TOP 583.5	BOTTOM 555.5
BENTONITE	TOP 28.0	BOTTOM 30.0	TOP 555.5	BOTTOM 553.5
SAND	TOP 30.0	BOTTOM 36.5	TOP 553.5	BOTTOM 547
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 31.0	BOTTOM 36.0	TOP 582.5	BOTTOM 547.5
PIEZOMETER TIP	36.5		547	
BOTTOM OF BOREHOLE	36.5		547	
GWL AFTER INSTALLATION				

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
AS SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
ARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION.

FERNALD RI/FS

5711

JMW 10-2-91

VISUAL CLASSIFICATION OF SOILS

E 1,378,865.1

PROJECT NUMBER: 602.~~25.91~~ 3.15	PROJECT NAME: FMPC RI/FS OU1		
BORING NUMBER: 1773	COORDINATES: N 481657.3 ~~E 1,378,865.1~~		DATE: 9-5-91
ELEVATION: 589.0	GWL: Depth	Date/Time	DATE STARTED: 9-5-91
ENGINEER/GEOLOGIST: HARRIS / CASSEDAY	Depth	Date/Time	DATE COMPLETED: 9-5-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS (Background = 50) HNU	BZ	BH
0	63725 9:18 9-5-91	7	6	VERY DENSE (2.5Y,N5/) GRAY CLAY WITH SMALL PEBBLES MIXED THROUGHOUT. SLIGHTLY MOIST, LITTLE COHESION	CL	NA	NA	0	0	0
	63726 9:18 9-5-91	14	6	SAA				50	0	800
1	63727 9:18 9-5-91	20	0	NR				NA	NA	NA
	63728 9:18 9-5-91	20	0	NR				NA	NA	NA
2	63729 9:24 9-5-91	23	6	SAA, BUT LARGER GRAVEL PIECES BEGIN TO APPEAR. POCKETS OF GRANUAAR (10YR,5/6) YELLOWISH BROWN SANDY MATERIAL APPEAR.	CL			0	0	2000
	63730 9:24 9-5-91	23	6	SAA				0	0	2000
3	63731 9:24 9-5-91	26	6	SAA				0	0	2000
	63732 9:24 9-5-91	29	6	SAA, BUT COLOR CHANGES TO (2.5Y,N6/) GRAY				0	0	2000
4	63733 9:41 9-5-91	10	6	DENSE (10YR,4/1) DARK GRAY CLAY WITH LARGE PIECES OF CONCRETE INTERMIXED (2-5 cm), DRY, WITH SOME SMALL PIECES OF NATURAL GRAVEL.	NA			0	0	6000
	63734 9:41 9-5-91	17	6	SAA				0	0	4000
5	63735 9:41 9-5-91	26	6	SAA * NOTE: SPOON ONLY DRIVEN 1.5 ft.				0	0	2000
	63736 10:08 9-5-91	30	6	VERY DENSE (10YR,4/1) DARK GRAY CLAY MIXED WITH LARGE (2-7cm) CONCRETE PIECES AND SANDY MATERIAL (10YR,6/4) LIGHT YELLOWISH BROWN DRY.	NA			0	0	2000
6	63737 10:08 9-5-91	60	6	SAA				0	0	2000
	63738 10:08 9-5-91	36	0	NR				NA	NA	NA
7	63739 10:08 9-5-91	24	0	NR				NA	NA	NA

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

001842

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JRW 10-2-91

PROJECT NUMBER: 602.~~25.91~~ 3.15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1773	COORDINATES: See p 1		DATE: 9-5-91
ELEVATION: See p 1	GWL: Depth	Date/Time	DATE STARTED: 9-5-91
ENGINEER/GEOLOGIST: HARRIS / CASSEDAY	Depth	Date/Time	DATE COMPLETED: 9-5-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS (BR = SD)		
8	63740 10:19 9-5-91		0	NR				HNU NA	α NA	Bγ NA
	63741 9-5-91 10:51	52	6	DENSE (10 YR, 5/2) GRAYISH BROWN SILTY CLAY WITH CONCRETE PIECES INTERMIXED DRY	CL			HNU 30	α 0	Bγ 200
SL 60A VAL 1	63742 9-5-91 10:51	26	6	SAA	CL			HNU 40	α 0	Bγ 200
9 VAL 2	63743 9-5-91 11:06	8	0	NR				HNU NA	α NA	Bγ NA
	63744 9-5-91 11:06	8	0	NR				HNU NA	α NA	Bγ NA
10	63745 9-5-91 11:06	5	0	NR				HNU NA	α NA	Bγ NA
	63746 9-5-91 11:06	5	0	NR				HNU NA	α NA	Bγ NA
11	63747 14:27 9-5-91	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED 24" RECOVERY				HNU NA	α NA	Bγ NA
12								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
13	63748 9-5-91 14:36	36	6	DENSE (2.5Y N2/) BLACK, CLAYEY, SLUDGE MATERIAL WITH FLECKS OF PURPLE, YELLOW AND GREEN MATERIAL INTERSPERSED THROUGHOUT VERY WET CONSISTENCY OF USED MOTOR OIL FLOWS LIKE MUD SOME LARGE CHUNKS OF MATERIAL	CL			HNU 0	α 0	Bγ 120000
	63749 9-5-91 14:36	32	6	SAA	CL			HNU 0	α 0	Bγ 120000
14	63750 9-5-91 14:36	12	6	SAA	CL			HNU 0	α 0	Bγ 120000
	63751 9-5-91 14:36	4	6	SAA	CL			HNU 0	α 0	Bγ 120000
15				NOTE - METAL IN SPOON - MAY HAVE PIERCED DRUM						

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JAW 10.2.91

PROJECT NUMBER: 602.~~25.91~~ 3.15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1773	COORDINATES: See p1		DATE: 9-5-91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 9-5-91
ENGINEER/GEOLOGIST: HARRIS / CASSEDAY	Depth	Date/Time	DATE COMPLETED: 9-5-91
DRILLING METHODS: Hollow Stem Auger			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS HNU	OVA	PID
15	63752 14:52	6	6	MEDIUM DENSE (10YR, 2/2) VERY DARK BROWN CLAYEY SLUDGE - CONTAINS STRINGY MATERIAL (HUMMHEAD), VERY WET - FLOWS	CL			0	0	100000
	63753 14:52	4	6	SAA, BUT CONTAINS BROWN PAPER TRASH	CL			0	0	100000
16	63754 14:52	4	6	SAA, BUT INTERVENED WITH GREEN AND WHITE GRANULAR MATERIAL.	CL			0	0	100000
	63755 14:52	7	0	NR				NA	NA	NA
17	63756 15:00 9-5-91	13	6	DENSE (7.5Y, N4/) DARK GRAY CLAY LIKE MATERIAL, INTERSPERSED WITH BROWN GRANULAR DEPOSITS, VERY WET - PLASTIC - FLOWS.	CL			0	0	80000
	63757 15:00 9-5-91	15	6	SAA	CL			0	0	90000
18	63758 15:00 9-5-91	18	6	SAA - BUT CONTAINS LENSES OF GOOEY WHITE MATERIAL - VERY WET - TAR LIKE CONSISTENCY.	CL			0	0	100000
	63759 15:00 9-5-91	10	6	SAA	CL			0	0	60000
19	63760 15:12 9-5-91	5	6	DENSE (7.5Y, N4/) DARK GRAY CLAY MATERIAL WITH LARGE GRAINS & PEBBLES INTERSPERSED, MORE GARBAGE, VERY WET, TAR-LIKE.	CL			0	0	80000
	63761 15:12 9-5-91	4	0	NR				NA	NA	NA
20	63762 15:12 9-5-91	4	0	NR				NA	NA	NA
	63763 15:12 9-5-91	3	0	NR				NA	NA	NA
21	63764 15:24 9-5-91	4	6	LOOSE (7.5Y, N4/) DARK GRAY CLAY-LIKE MATERIAL LESS GARBAGE (LE. PAPER), STILL CONTAINS PEBBLES. WET - FLOWING.	CL			0	0	90000
	63765 15:24 9-5-91	4	6	SAA	CL			0	0	90000
22	63766 15:24 9-5-91	4	6	SAA	CL			0	0	60000

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASSC. J. STRAPPAZON

001844

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

SAW 10.2.91

PROJECT NUMBER: 602.~~25~~.91 3.15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1773	COORDINATES: See p1		DATE: 9-5-91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 9-5-91
ENGINEER/GEOLOGIST: HARRIS / GOSSEDAY	Depth	Date/Time	DATE COMPLETED: 9-5-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63767 15:29 9-5-91	4	~~6~~ 0	~~SAA~~ NR				HNU ~~0~~ NA; α ~~0~~ NA; Bγ ~~Scan~~ NA
23	63768 15:37 9-5-91	4	6	LOOSE (7.5Y, N4/) DARK GRAY CLAY-LIKE MATERIAL CONTAINS PEBBLES (2-3 cm), LITTLE GARBAGE, WET FLOWS, TAR LIKE CONSISTENCY.	NA			HNU 0; α 0; Bγ Scan
	63769 9-5-91 15:37	4	6	SAA				HNU 0; α 0; Bγ Scan
24	63770 9-5-91 15:37	5	6	SAA				HNU 0; α 0; Bγ 7000
	63771 9-5-91 15:37	4	6	SAA				HNU 0; α 0; Bγ 5000
25	~~63772~~ 16:02 9-5-91	SHELBY TUBE PUSHED	0	SHELBY TUBE PUSHED NO RECOVERY				HNU NA; α NA; Bγ NA
26								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
27	63772 16:21 9-5-91	7	6	MEDIUM DENSE, SOFT (2.5Y, N3/) VERY DARK GRAY CLAY LIKE MATERIAL. CONTAINS AREAS OF WHITE MATERIAL (SAME CONSISTENCY) VERY WET AND PLASTIC. FLOWS - TAR LIKE	NA			HNU 0; α 0; Bγ 12000
	63773 16:21 9-5-91	5	6	SAA				HNU 0; α 0; Bγ 18000
28	63774 16:21 9-5-91	4	6	SAA, but increased amounts of white material				HNU 0; α 0; Bγ 19000
	63775 16:21 9-5-91	4	6	SAA				HNU 0; α 0; Bγ 12000
29	63776 16:34 9-5-91	5	6	MEDIUM DENSE (2.5Y, N3/) VERY DARK GRAY CLAY-LIKE MATERIAL WITH SOME SILT. LITTER OTHER DEBRIS. VERY WET, FLOWING	NA			HNU 0; α 0; Bγ 1000
	63777 16:34 9-5-91	7	6	SAA				HNU 0; α 0; Bγ 500
30								

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZONE

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JW 10.2.91

PROJECT NUMBER: 602.25-91 3.15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1773	COORDINATES: See p1		DATE: 9-5-91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 9-5-91
ENGINEER/GEOLOGIST: HARRIS / CASSEDAY	Depth	Date/Time	DATE COMPLETED: 9-5-91
DRILLING METHODS: Hollow Stem Auger			PAGE 5 OF 5

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63778 16:34 9-5-91	9	6	SAA				HNU 0 α 0 Bγ 4500
	63779 16:34 9-5-91	17	6	DENSE, HARD (10YR, 5/1) GRAY CLAY WITH SOME SAND AND PEBBLES. SLIGHTLY MOIST (LINER)	CL			HNU α 0 Bγ 3000
31								HNU α Bγ
								HNU α Bγ
32								HNU α Bγ
								HNU α Bγ
33								HNU α Bγ
								HNU α Bγ
34								HNU α Bγ
								HNU α Bγ
35								HNU α Bγ
								HNU α Bγ
36								HNU α Bγ
								HNU α Bγ
37								HNU α Bγ

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. SIRAPPAZONE

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

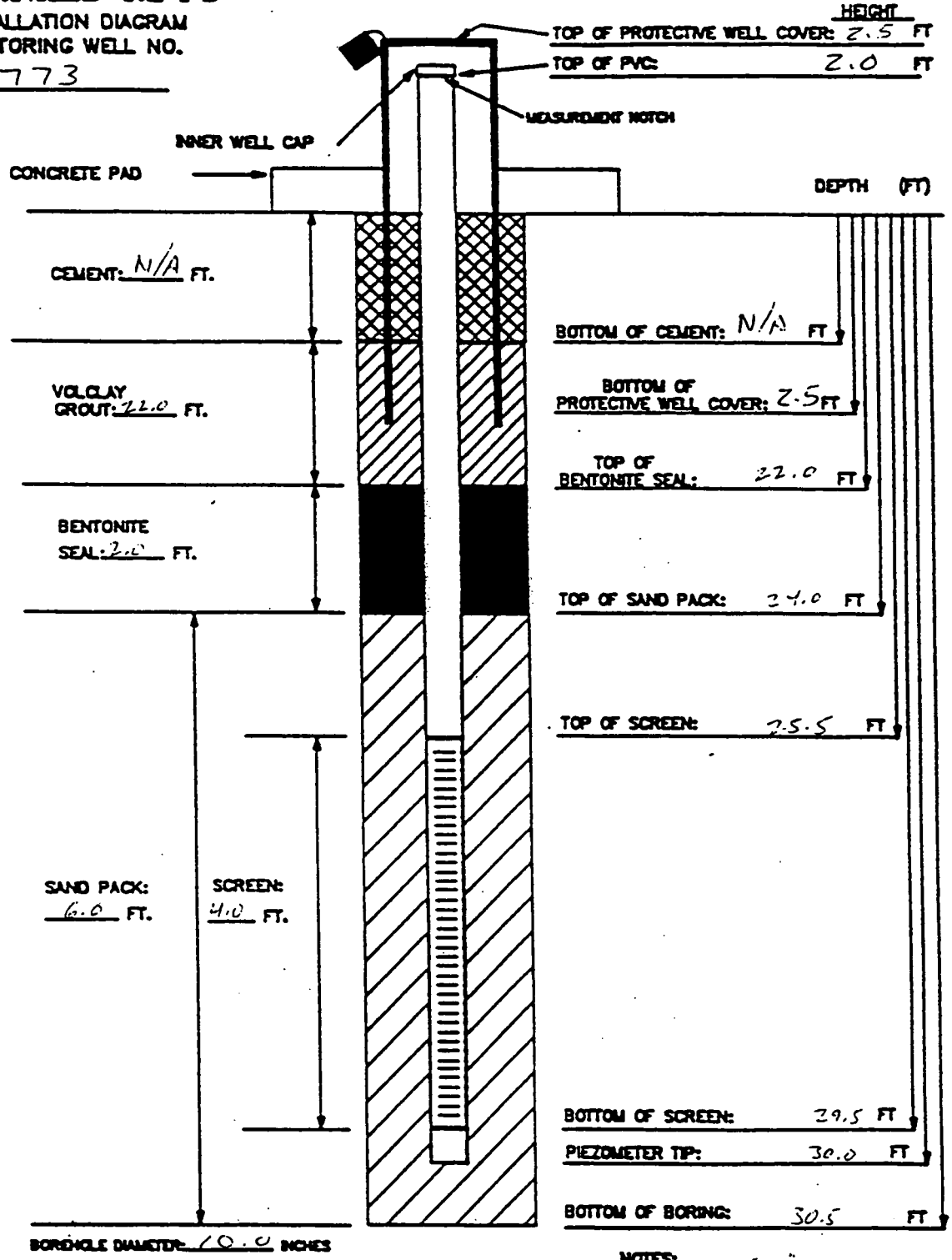
001846

GRW 10-2-91

INSTALLATION DATE: 9/5/91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1773



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 3 50lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1 5gal bucket
BAGS OF VOLCLAY GROUT: 2 50 lb bags
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED:
OTHER:

NOTES: 4.0" I.D. STAINLESS
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS. SDA
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (GW-1) GC2.3.15 GEOLOGIST/ENGINEER: M. HARRIS

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC R/FS
FIELD ENG./GEO. M. HARRIS DATE 9/6/91
PROJECT NO. 6002.3.15
CHECKED BY JRW DATE 10.2.91
BORING NO. 1773
PIEZOMETER NO. 1773
DATE OF INSTALLATION 9/6/91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.01 IN
TOTAL PERFORATED AREA ____

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0"
LENGTH OF PIPE SECTIONS ____
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0' (FEET)
PROTECTIVE PIPE O.D. 10 3/4"

OTHER PROTECTION HINGED LOCKING COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE				
GROUND SURFACE	0.0		589.0	
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP SURFACE 0.0	BOTTOM 22.0	TOP 589.0	BOTTOM 567
BENTONITE	TOP 22.0	BOTTOM 24.0	TOP 567	BOTTOM 565
SAND	TOP 24.0	BOTTOM 30.5	TOP 565	BOTTOM 559
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 25.5	BOTTOM 29.5	TOP 563.5	BOTTOM 559.5
PIEZOMETER TIP	30.0		558.5	
BOTTOM OF BOREHOLE	30.5		558.5	
GWL AFTER INSTALLATION				

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS WOOD PLUG USED IN AUGER DURING WELL INSTALLATION.

001848

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

Jm 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS (OU-1)		
BORING NUMBER: 1774	COORDINATES: N481,766.0 E1,378,912.0		DATE: 8-26-91
ELEVATION: 590.8'	GWL: Depth	Date/Time	DATE STARTED: 8-26-91
ENGINEER/GEOLOGIST: HARRIS/CASSEDAY	Depth	Date/Time	DATE COMPLETED: 8-27-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED GROUNDWATER (FT)	WELL CONSTRUCTION	REMARKS BZ BA - CO		
0	63650 8-26 7:32	12	0	NR	NA	NA	DA	HNU NA	α NA	BZ NA
1	63651 8-26 7:32	16	6	VERY DENSE (10YR, 6/2) LIGHT BROWNISH GRAY CLAY WITH SOME LARGE ANGULAR GRAVEL (CEMENT) SLIGHTLY MOIST TO DRY	CL			HNU 5.6	α 0	BZ 20
	63652 8-26 7:32	16	6	SAA	CL			HNU 5.7	α 0	BZ 40
2	63653 8-26 7:32	12	6	SAA	CL			HNU 5.7	α 0	BZ 60
	63654 8-26 7:42	32	0	NR	NA			HNU NA	α NA	BZ NA
	63655 8-26 7:42	34	6	VERY DENSE (10YR, 6/2) LIGHT BROWNISH GRAY CLAY WITH SOME LARGE ANGULAR GRAVEL (CEMENT) SLIGHTLY MOIST TO DRY	CL			HNU 0	α 0	BZ 0
	63656 8-26 7:42	35	6	SAA	CL			HNU 0	α 0	BZ 0
4	63657 8-26 7:42	38	6	SAA	CL			HNU 0	α 0	BZ 100
	63658 8-26 7:55	20	6	SAA	CL			HNU 2.0	α 0	BZ 900
5	63659 8-26 7:55	18	6	SAA	CL			HNU 2.0	α 0	BZ 1200
	63660 8-26 7:55	15	6	SAA	CL			HNU 2.0	α 0	BZ 1200
	63661 8-26 7:55	13	6	SAA	CL			HNU 2.0	α 0	BZ 900
6	63662 8-26 8:07	11	6	SAA	CL			HNU 0	α 0	BZ 200
7	63663 8-26 8:07	26	6	SAA	CL			HNU 0	α 0	BZ 900
	63664 8-26 8:07	31	6	VERY DENSE (10YR, 6/8) BROWNISH-YELLOW, SANDY, CLAY LIKE MATERIAL, DRY.	CL			HNU 0	α 0	BZ 2000

NOTES.

Drilling Contractor PENN DRILLING CO.

Drilling Equipment SIMCO

E. GARDNER

ASST J. STRAPPAZONI

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA NOT APPLICABLE

001849

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JTM 12-3-91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1774	COORDINATES: N481,766.0 E 1,378,912.0		DATE: 8-26-91
ELEVATION: 590.8'	GWL: Depth	Date/Time	DATE STARTED: 8-26-91
ENGINEER/GEOLOGIST: HARRIS/CASSEDAY	Depth	Date/Time	DATE COMPLETED: 8-27-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63665 8:07 8:26	56	6	VERY DENSE (5Y, 3/1) VERY DARK, GRAY, SLATY, SILTY MATERIAL, DRY.	CL	D	D	HNU 0; α 0; Bγ 30000
	63666 8:26 8:42	10	6	MEDIUM DENSE (10 YR, 6/1) GRAY CLAY INTERSPERSED WITH POCKETS OF WHITE CLAY-LIKE MATERIAL, SLIGHTLY MOIST.	CL			HNU 0; α 0; Bγ 200
9	63667 8:26 8:42	10	6	SAA	CL			HNU 0; α 0; Bγ 2000
	63668 8:26 8:42	7	6	SAA	CL			HNU 0; α 0; Bγ 2000
	63669 8:26 8:42	6	6	SAA	CL			HNU 0; α 0; Bγ 8000
10								
11	63670 8:26 9:06	NA	24	SHELBY TUBE PUSHED 24 INCHES				HNU NA; α NA; Bγ NA
12	63671 8:26 9:13	8	6	MEDIUM DENSE (2.5Y, N3) VERY DARK, GRAY CLAYEY (SILTY) MATERIAL. VERY MOIST TO WET, JELLY-LIKE CONSISTENCY, (RUBBERY) WAXY APPEARANCE	NA			HNU 0; α 0; Bγ 1200
	63672 8:26 9:13	7	6	SAA				HNU 0; α 0; Bγ 1000
13	63673 8:26 9:13	7	6	SAA				HNU 0; α 0; Bγ 1000
	63674 8:26 9:13	7	6	SAA				HNU 0; α 0; Bγ 1000
14	63675 8:26 9:17	8	6	SAA				HNU 0; α 0; Bγ 1000
	63676 8:26 9:17	20	6	SAA				HNU 0; α 0; Bγ 1100
15								

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

Jan 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1774	COORDINATES: N481,766.0 E1,374,912.0		DATE: 8-26-91
ELEVATION: 590.8	GWL: Depth	Date/Time	DATE STARTED: 8-26-91
ENGINEER/GEOLOGIST: HARRIS/CASSEDAY	Depth	Date/Time	DATE COMPLETED: 8-27-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS
15	63677 8:26 9:19	13	6	SAA		NA	NA	HNU/C α/C Bδ/1000
	63678 8:26 9:19	20	6	SAA				HNU/C α/C Bδ/1000
16	63679 8:26 9:43	12	6	SAME AS PREVIOUSLY BUT LESS MOIST, INTERSPERSED WITH POCKETS OF YELLOW, SUGARY, TEXTURED, MATERIAL.	NA			HNU/C α/C Bδ/1200
	63680 8:26 9:43	16	6	SAA				HNU/C α/C Bδ/1000
17	63681 8:26 9:03	15	6	SAA				HNU/C α/C Bδ/1200
	63682 8:26 9:43	13	6	SAA				HNU/C α/C Bδ/1000
	63683 8:26 13:30	8	6	MEDIUM DENSE (2.5Y, N3/) CLAY-LIKE MATERIAL, INTERSPERSED WITH SMALL BROWN DEPOSITS OF GRAINY MATERIAL WET WITH A GREASY APPEARANCE, TRASH AS PAPER PRESENT.	NA			HNU/C α/C Bδ/1000
	63684 8:26 13:30	7	6	SAA				HNU/C α/C Bδ/1000
19	63685 8:26 13:30	4	6	SAA				HNU/C α/C Bδ/1000
	63686 13:30 8:26	4	6	SAA				HNU/C α/C Bδ/1000
20	63687 8:26 13:59	NA	24	SHELBY TUBE PUSHED 24 INCHES				HNU/NA α/NA Bδ/NA
22	63688 8:26 13:58	5	6	DENSE (2.5Y, N3/) CLAY-LIKE MATERIAL CONSISTENT THROUGH OUT, UNIFORMALY MOIST, GREASY CONSISTENCY	NA			HNU/C α/C Bδ/800

NOTES.

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller E. GARDNER

ASST. J. SOTRAPPAZONI

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

001851

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JW 10.3.91

PROJECT NUMBER: 602.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1774	COORDINATES: N 981,766.0 E 1,376,912.0'		DATE: 8-26-91
ELEVATION: 590.8'	GWL: Depth	Date/Time	DATE STARTED: 8-26-91
ENGINEER/GEOLOGIST: HARRIS/CASSEDAY	Depth	Date/Time	DATE COMPLETED: 8-27
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
23	63689 8-26-91 13:56	4	6	SAA		NA	NA	HNU 0 / α 0 / Bγ 800
	63690 8-26 13:58	4	6	SAA				HNU 0 / α 0 / Bγ 800
	63691 8-26 13:58	5	6	SAA				HNU 0 / α 0 / Bγ 800
24	63692 8-26 14:05	3	6	MEDIUM DENSE (7.5YR, N3) VERY DARK, GRAY CLAY, VERY MOIST, CONSISTENT, GREASE-LIKE	NA			HNU 0 / α 0 / Bγ 200
	63693 8-26 14:05	2	6	SAA				HNU 0 / α 0 / Bγ 400
25	63694 8-26 14:05	5	6	MEDIUM DENSE (7.5YR, N3) GRAY, CLAY-LIKE MATERIAL, SIMULAR TO ABOVE, VERY MOIST GREASY.	NA			HNU 0 / α 0 / Bγ 600
	63695 8-26 14:05	11	6	MEDIUM DENSES (7.5YR, N3) VERY DARK GRAY MATERIAL AS DESCRIBED BEFORE.	NA			HNU 0 / α 0 / Bγ 800
26	63696 8-26 14:24	7	6	MEDIUM DENSE (2.5Y, N3/) VERY DARK GRAY MATERIAL WITH POCKETS OF WHITE AND LIGHT BROWN CLAY MATERIAL, VERY MOIST AND GREASY.	NA			HNU 0 / α 0 / Bγ 800
	63697 8-26 14:24	5	6	SAA, BUT LACKING THE WHITE AND BROWN MATERIAL, SUGARY TEXTURE IN PLACES.	NA			HNU 0 / α 0 / Bγ 1000
27	63698 8-26 14:24	7	6	SAA				HNU 0 / α 0 / Bγ 1000
	63699 8-26 14:24	8	6	SAA				HNU 0 / α 0 / Bγ 1000
28	63700 8-26 14:32	5	6	MEDIUM DENSE (2.5Y, N3/) VERY DARK GRAY CLAYEY MATERIAL WITH TRASH (PAPER) THROUGHOUT, WET. PUDDING LIKE APPEARANCE.	NA			HNU 0 / α 0 / Bγ 200
	63701 8-26 14:32	8	6	SAA				HNU 0 / α 0 / Bγ 600
29	63702 8-26 14:32	9	6	SAA				HNU 0 / α 0 / Bγ 800
	63703 8-26 14:32	11	6	SAA				HNU 0 / α 0 / Bγ 800
30								

NOTES.

Drilling Contractor PENN DRILLING CO.

Drilling Equipment SIMCO

E. GARDNER

ASST. J. STRAPPAZONI

SAA - SAME AS ABOVE
NR - NO RECOVERY
NA - NOT APPLICABLE

001852

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6.02.3.15	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1774	COORDINATES: N481,766.6 E1,378,912.0	DATE: 8-~~26~~-91	
ELEVATION: 590.8'	GWL: Depth / Date/Time	DATE STARTED: 8-26-91	
ENGINEER/GEOLOGIST: HARRIS / CASSEDAY	Depth / Date/Time	DATE COMPLETED: 8-27-91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 5 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63704 8-27 8:25	5	6	VERY DENSE (2.5Y, N2/) BLACK CLAY-LIKE MATERIAL. VERY WET. FLOWING CONSISTENCY OF OLD MOTOR OIL. PAPER TRASH INTERSPERSED.	NA	NR	NR	HNU 0 / α 0 / β γ 800
	63705 8-27 8:25	7	6	SAA	NA			HNU 0 / α 0 / β γ 800
31	63706 8-27 8:25	26 27	6	VERY DENSE (10YR, 6/1) GRAY CLAY WITH SILT AND SAND MATERIAL MIXED IN. SLIGHTLY MOIST. VERY HARD.	CL			HNU 0 / α 0 / β γ 600
32								

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZONI

SAA - SAME AS ABOVE

NR - NO RECOVERY

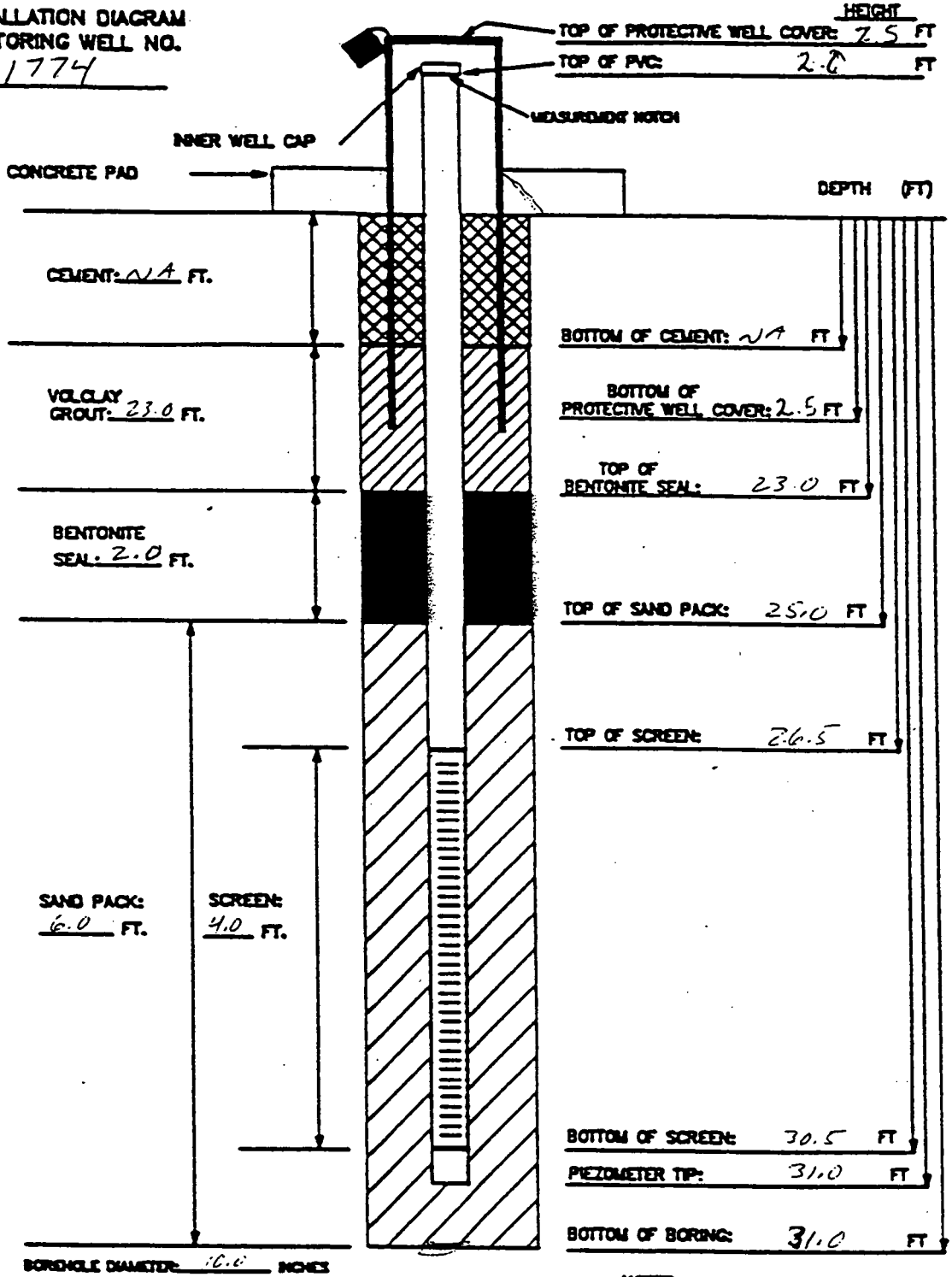
NA - NOT APPLICABLE

Fm 10.3. 5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1774

INSTALLATION DATE: 8/27/91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED:
OTHER: 3'x3' CONCRETE PAD WILL BE INSTALLED.

NOTES: 4.0" I.D. STAINLESS STEEL.
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS. 4.0" I.D. STAINLESS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.15

GEOLOGIST/ENGINEER: Harris

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS (OU-1) FIELD ENG./GEO. M. HARRIS DATE 8-27-91
PROJECT NO. 602.3.15 CHECKED BY [illegible] DATE 10.3.91
BORING NO. 1774
PIEZOMETER NO. 1774 DATE OF INSTALLATION 8-27-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE FROM ____ TO ____	SIZE NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____	SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0" I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4.0"
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 33.0'
AVERAGE SIZE OF PERFORATIONS 0.01	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 4.0 FEET	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ~~2.0 FEET~~ 2.5 FEET 10-4-91	OTHER PROTECTION HINGED LOCKING
PROTECTIVE PIPE O.D. 10 3/4 INCH	COVER WITH PAD LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		592.8	
GROUND SURFACE	0.0		590.8'	
BOTTOM OF PROTECTIVE PIPE	2.5		588.3	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 23.0	TOP 590.8	BOTTOM 567.8
BENTONITE	TOP 23.0	BOTTOM 25.0	TOP 567.8	BOTTOM 565.8
SAND	TOP 25.0	BOTTOM 31.0	TOP 565.8	BOTTOM 559.8
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 26.5	BOTTOM 30.5	TOP 564.3	BOTTOM 560.3
PIEZOMETER TIP	31.0		559.8	
BOTTOM OF BOREHOLE	31.0		559.8	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS WOOD PLUG USED IN AUGER DURING WELL INSTALLATION

001855

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

JAN 10-3-91

PROJECT NUMBER 602 ~~25-97~~ 3.15	PROJECT NAME FMPC RI/FS OU-1		
BORING NUMBER 1775	COORDINATES N 48/688.1 E 1378834.4	DATE 9-9-91	
ELEVATION 588.6	GWL: Depth	Date/Time	DATE STARTED: 9-9-91
ENGINEER/GEOLOGIST HARRIS / CASSIDAY	Depth	Date/Time	DATE COMPLETED
DRILLING METHODS HOLLOW STEM AUGER			PAGE OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS (BR = 40)
0	63800 9-9-91 8:47	10	6	VERY DENSE (2.5Y, 5/2) GRAYISH BROWN CLAY WITH INTERMIXED PEBBLES, SOME SILT AND SAND PRESENT. DRY	CL	NA	NA	HNU 0 / α 0 / BZ 100
	63801 9-9-91 8:47	17	6	SAA				HNU 0 / α 0 / BZ 120
1	63802 9-9-91 8:47	26	6	SAA				HNU 0 / α 0 / BZ 100
	63803 9-9-91 8:47	33	0	NR				HNU NA / α NA / BZ NA
2	63804 9-9-91 8:54	48	6	VERY DENSE, VERY HARD (2.5Y, N5/) GRAY CLAY INTERMIXED WITH VARIOUS PEBBLES. LITTLE OR NO SAND OR SILT. DRY	CL			HNU 0 / α 0 / BZ 100
	63805 9-9-91 8:54	45	6	SAA				HNU 0 / α 0 / BZ 120
3	63806 9-9-91 8:54	26	6	SAA				HNU 0 / α 0 / BZ 120
	63807 9-9-91 8:54	23	6	SAA, BUT MORE SAND AND SILT INTERMIXED WITH THE CLAY, GIVING A (2.5Y, 5/2) GRAYISH BROWN COLOR	SC			HNU 0 / α 0 / BZ 140
4	63808 9:05 9-9-91	15	6	DENSE, VERY HARD (2.5Y, 5/2) GRAYISH BROWN CLAY WITH WHITE CONCRETE INTERSPERSED. DRY. NOT VERY COHESIVE	CL			HNU 0 / α 0 / BZ 120
	63809 9-9-91 9:05	18	6	SAA				HNU 0 / α 0 / BZ 120
5	63810 9-9-91 9:05	22	6	SAA, BUT SOME SANDY MATERIAL APPEARS.				HNU 0 / α 0 / BZ ~~1000~~ 1000 PC
	63811 9-9-91 9:05	17	6	SAA, BUT BEGINNING TO SEE BLACK (2.5Y N2/) CLAY-LIKE MATERIAL. STILL DRY	NA			HNU 0 / α 0 / BZ ~~[illegible]~~ 600 PC
6	63812 9-9-91 9:26	8	6	MEDIUM DENSE, FIRM (2.5Y, 5/2) GRAYISH BROWN CLAY. CONTAINS SOME SILT & SAND, FEW PEBBLES, DRY	CL			HNU 0 / α 0 / BZ 200
	63813 9-9-91 9:26	9	6	SAA				HNU 0 / α 0 / BZ 200
7	63814 9-9-91 9:25	8	6	SAA				HNU 0 / α 0 / BZ 200

NOTES

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

5711

JAW 10-3-91

PROJECT NUMBER: 602.~~25-91~~ 3.15	PROJECT NAME: FMPC RI/FS OU-1		
BORING NUMBER: 1773	COORDINATES: See p1		DATE: 9.9.91
ELEVATION: See p1	GWL: Depth	Date/Time	DATE STARTED: 9.9.91
ENGINEER/GEOLOGIST: Harris/Cassady	Depth	Date/Time	DATE COMPLETED: 9.9.91
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS		
8	63815 9.9.91 9:26	8	6	SAA, BUT CONTAINS SOME GARBAGE, MOSTLY BLACK (2.5Y, N2) CHUNKS (WOOD).	NA	NA	NA	HNU 0	α 0	Bγ 200
9	63840 9.9.91 10:07			DRILLED THROUGH CONCRETE NO SAMPLES TAKEN OF DEBRIS				HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
10	63816 9.9.91 10:12	50	6	SAA				HNU 0	α 0	Bγ 140
11	63817 9.9.91 10:15	7	6	VERY DENSE, HARD (2.5Y, 3/3) LIGHT OLIVE BROWN CLAY WITH PEBBLES AND CONCRETE DEBRIS DRY	NA			HNU 0	α 0	Bγ 3000
	63818 9.9.91 10:15	13	6	DENSE, HARD (2.5Y, N3/) VERY DARK GRAY CLAY MIXED ~~WITH~~ WITH WHITE GRANULAR SANDY MATERIAL SOME PEBBLES SLIGHTLY MOIST	NA			HNU 0	α 0	Bγ 3000
	63819 9.9.91 10:15	28	6	SAA				HNU 0	α 0	Bγ 10000
12	63820 9.9.91 10:15	38	0	NR				HNU NA	α NA	Bγ NA
13	63821 9.9.91 10:22	25	6	VERY DENSE, HARD (2.5Y, 3/3) VERY DARK GRAY CLAY-LIKE MATERIAL. LOWER 1/3 CONTAINS GREEN GRANULAR SAND-LIKE MATERIAL. DRY, COHESIONLESS. * NOTE - DRUM PIERCED.	NA			HNU 0	α 0	Bγ 15000
	63822 9.9.91 10:22	37	0	NR				HNU NA	α NA	Bγ NA
	63823 9.9.91 10:22	63	0	NR				HNU NA	α NA	Bγ NA
14	63824 9.9.91 10:23	50	0	NR				HNU NA	α NA	Bγ NA
15	63825 9.9.91 10:25	—	0	NR				HNU NA	α NA	Bγ NA

NOTES.

Drilling Contractor: Penn Drill Co.

Drilling Equipment: Simco

Driller: E. Gardner

Asst. J. Strapperson

SAA - Same As Above

NR - No Recovery

NA - Not Applicable

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.~~25~~ 97 3.15	PROJECT NAME FMPC RI/FS OU-1		
BORING NUMBER 1775	COORDINATES See p1		DATE 9-9-91
ELEVATION See p1	GWL: Depth	Date/Time	DATE STARTED 9-9-91
ENGINEER/GEOLOGIST HARRIS / CASSEDAY	Depth	Date/Time	DATE COMPLETED 9-9-91
DRILLING METHODS HOLLOW STEM AUGER			PAGE 3 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONDUCTIVITY (µS)	WELL CONSTRUCTION	REMARKS		
	63826 9-9-91 10:46	SHELBY TUBE PUSHED	24	SHELBY TUBE PUSHED FULL RECOVERY		NA	NA	HNU NA	α NA	Bγ NA
16								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
								HNU NA	α NA	Bγ NA
17	63827 10:55 9-9-91	1	6	LOOSE, VERY SOFT (2.5Y, N3/) VERY DARK GRAY CLAY LIKE MATERIAL WITH STREAKS OF YELLOW GREEN GRAINY MATERIAL THROUGHOUT. WET, FLOWING JELLO-LIKE	NA			HNU 0	α 0	Bγ 30000
	63828 9-9-91 10:55	1	6	SAA				HNU 0	α 0	Bγ 30000
18	63829 9-9-91 10:55	3	6	SAA, ONLY GRAINY STREAKS ARE ABSENT				HNU 0	α 0	Bγ 20000
	63830 10:55 9-9-91	3	6	SAA				HNU 0	α 0	Bγ 10000
EXVAL 2 TERVAL 3 19	63831 9-9-91 13:58	3	6	MEDIUM DENSE, SOFT (2.5Y, N3/) VERY DARK GRAY CLAY LIKE MATERIAL, TAR-LIKE APPEARANCE AND CONSISTENCY VERY WET-FLOWING.	NA			HNU 0	α 0	Bγ 18000
	63832 9-9-91 13:58	6	6	SAA, BUT NOT AS WET WITH FLECKS OF BROWN GRANULAR MATERIAL.	NA			HNU 0	α 0	Bγ 10000
20	63833 9-9-91 13.58	6	6	SAA				HNU 0	α 0	Bγ 4000
	63834 9-9-91 13.58	7	6	SAA				HNU 0	α 0	Bγ 2000
21	63835 9-9-91 14:05	10	6	MEDIUM DENSE, SOFT (2.5Y, N3/) VERY DARK GRAY CLAY-LIKE MATERIAL. VERY WET, FLOWS NO NOTICABLE PEBBLES, PUDDING-LIKE TEXTURE	NA			HNU	α	Bγ
	63836 9-9-91 14:05	5	6	SAA, BUT LENSES OF GREEN MATERIAL APPEAR	NA			HNU	α	Bγ
22	63837 9-9-91 14:05	7	6	SAA				HNU	α	Bγ

NOTES

Drilling Contractor PENN DRILL CO.

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZEN

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

VISUAL CLASSIFICATION OF SOILS

GW 10.3.91

PROJECT NUMBER 602 25 91 3.15	PROJECT NAME FMPC RI/FS OU-1		
BORING NUMBER 1775	COORDINATES See p1	DATE 9-9-91	
ELEVATION See p1	GWL Depth / Date/Time	DATE STARTED 9-9-91	
ENGINEER/GEOLOGIST HARRIS / CASSEDAY	Depth / Date/Time	DATE COMPLETED	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 4 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63838 14:05 9-9-91	6	6	SAA	NA	NA	NA	HNU 0 / α 0 / BZ 2000
23	63839 9-9-91 14:35	SHELBY TUBE PUSHED	0	SHELBY TUBE PUSHED (NO RECOVERY)				HNU NA / α NA / BZ NA; HNU NA / α NA / BZ NA; HNU NA / α NA / BZ NA; HNU NA / α NA / BZ NA
24								
25		*	0	NR SHELBY TUBE				HNU / α / BZ; HNU / α / BZ
		*						
26	63840 14:49 9-9-91	9 7 PC 14	0	NR				HNU / α / BZ
	63841 14:49 9-9-91	8	0	NR				HNU / α / BZ
27	63842 14:49 9-9-91	8	0	NR				HNU / α / BZ
	63843 14:49 9-9-91	9	0	NR				HNU / α / BZ
28	63844 9-9-91 15:04	2	6	LOOSE, VERY SOFT (2.5Y, N3/) VERY DARK GRAY CLAYEY MATERIAL. FLOWS, VERY WET, PUDDING LIKE TEXTURE	NA			HNU 0 / α 0 / BZ 1200
	63845 9-9-91 15:04	2	6	SAA				HNU 0 / α 0 / BZ 800
29	63846 9-9-91 15:04	3	6	SAA, but contains small deposits of brown granular material.	NA			HNU 0 / α 0 / BZ 800
15L VOA	63847 9-9-91 15:04	7	6	SAA				HNU 0 / α 0 / BZ 600
32								

NOTES: * - LINER WAS ~~DUE~~ PRESENT IN BOTTOM OF SPOON (SILT, OLIVE GRAY, CLAYEY SILT, 2" RECOVERY)

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. J. STRAPPAZON

SAA - SAME AS ABOVE

NR - NO RECOVERY

NA - NOT APPLICABLE

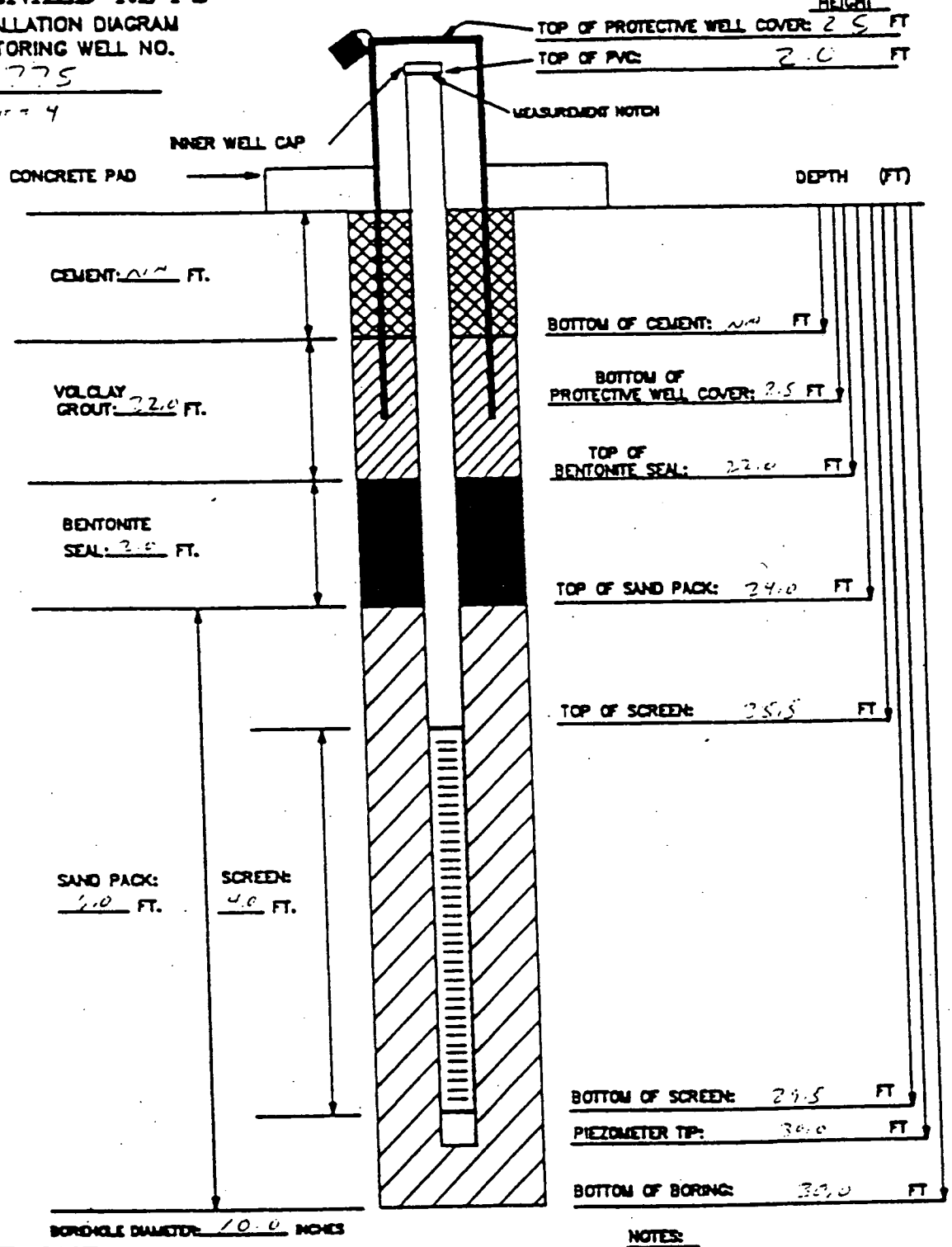
INSTALLATION DATE: [illegible]

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1775

[illegible] 4



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 1 bag
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.15

GEOLOGIST/ENGINEER: [illegible]

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. HARRIS DATE 9-10-91
PROJECT NO. 602.3.15 CHECKED BY JM DATE 10-3-91
BORING NO. 1775
PIEZOMETER NO. 1775 DATE OF INSTALLATION 9-10-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID None FROM ——— TO ———
FLUID None FROM ——— TO ———

TYPE OF BIT Auger
CASING SIZE (S) USED:
SIZE None FROM ——— TO ———
SIZE None FROM ——— TO ———

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.01 IN.
TOTAL PERFORATED AREA 4.0'

RISER PIPE MATERIAL 316 STAINLESS
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0"
LENGTH OF PIPE SECTIONS 32.0'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'
PROTECTIVE PIPE O.D. 10 3/4"

OTHER PROTECTION HINGED LOCKING COVER WITH PADLOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.8			
GROUND SURFACE	0.0		588.6	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 22.0	TOP 588.6	BOTTOM 566.6
BENTONITE	TOP 22.0	BOTTOM 24.0	TOP 566.6	BOTTOM 564.6
SAND	TOP 24.0	BOTTOM 30.0	TOP 564.6	BOTTOM 558.6
GRAVEL None used	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 25.5	BOTTOM 29.5	TOP 563.1	BOTTOM 559.1
PIEZOMETER TIP	30.0		588.6	
BOTTOM OF BOREHOLE	30.0		558.6	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS Wood Plug used in auger during well installation.

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01 TASK 3.15	PROJECT NAME: FMPC RI/FS OU-1 BURN PIT		
BORING NUMBER: 1776	COORDINATES: N481,718.7 E1,378,630.7	DATE: 7/30	
ELEVATION: 584.8	GWL: Depth NA Date/Time NA	DATE STARTED: 7/30/91	
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth NA Date/Time NA	DATE COMPLETED: 7/30/91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
1	63166 7/30 1000	21	6	DENSE (10 YR 6/6) BROWNISH YELLOW SILTY CLAY. SPARSE, MEDIUM, ANGULAR GRAVEL. GOOD COHESION. NON-PLASTICITY. VERY DRY	CL	4.0	N/A	HNU α β γ 0 0 0
	63167 7/30 1000	43	6	SAA	CL	>4.0		HNU α β γ 0 0 0
	63168 7/30 1000	28	6	SAA	CL	4.0		HNU α β γ 0 0 0
2	63169 7/30 1005	18	6	DENSE (10YR 6/8) BROWNISH YELLOW SILTY CLAY. ROUNDED QUARTZ GRAVEL. POOR COHESION AND PLASTICITY. VERY DRY.	CL	3.0		HNU α β γ 0 0 0
	63170 7/30 1006	20	6	DENSE (10 YR 3/2) VERY DRY GRAYISH BROWN SILTY CLAY. ROOTLETS PRESENT. MODERATE COHESION AND PLASTICITY. DRY TO SLIGHTLY MOIST.	CL	3.0		HNU α β γ 0 0 0
3	63172 7/30 1005	16	6	SAA	CL	3.0		HNU α β γ 0 0 0
4	63173 7/30 1010	8	6	MEDIUM DENSE (10 YR 4/6) DARK YELLOWISH BROWN SILTY CLAY. POOR COHESION. SLIGHTLY MOIST.	CL	2.0		HNU α β γ 0 0 0
	63174 7/30 1010	13	6	SAA	CL	2.0		HNU α β γ 0 0 0
	63175 7/30 1010	6	0	NR	NA	NA		HNU α β γ NA NA NA
5	63176 7/30 1020	SHELBY TUBE PUSHED	18	SHELBY TUBE COULD ONLY BE DRIVEN 1.5'. 1.5' OF RECOVERY	NA	NA		HNU α β γ NA NA NA HNU α β γ NA NA NA HNU α β γ NA NA NA
6	63147 7/30 1030	48	6	LOOSE (2.5Y 4/2) DARK GRAYISH BROWN SILTY CLAY. MODERATE COHESION AND PLASTICITY. WET.	ML	0.5		HNU α β γ 3 PPM 0 0 0
7	63148 7/30 1030	25	6	SAA	ML	0.5		HNU α β γ 3PPM 0 0 0
	63177 7/30 1030	19	0	NR	NA	NA	N/A	HNU α β γ NA NA NA

NOTES.

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. K MYERS

NR = NO RECOVERY
SAA = SAME AS ABOVE
NR = NO RECOVERY
NA = NOT APPLICABLE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01 TASK 3.15		PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)			
BORING NUMBER: 1776		COORDINATES: See PAGE 1		DATE: 7/30	
ELEVATION: See Page 1	GWL: Depth NA	Date/Time NA		DATE STARTED: 7/30/91	
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth NA	Date/Time NA		DATE COMPLETED: 7/30/91	
DRILLING METHODS: HOLLOW STEM AUGER				PAGE 2 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
8	63178 7/30 1045	21	6	LOOSE (7.5 YR N3/) VERY DARK GRAY. MEDIUM TO FINE SAND. POOR COHESION, NO PLASTICITY. WET.	SC	NA	NA	HNU α Bγ 1 PPM C 500 CPM
	63179 7/30 1045	50	6	SAA	SC	NA		HNU α Bγ 3 PPM C 700 CPM
9	63181 7/30 1045	43	6	SAA with SMALL AMOUNT OF GREY SILVER MATERIAL.	SC	NA		HNU α Bγ 1 PPM C 1000 CPM
10	63182 7/30 1135	3	6	LOOSE (10 YR 4/6) DARK YELLOWISH BROWN CLAYEY SILT. MODERATE COHESION & PLASTICITY. SLIGHTLY MOIST. MATERIAL MAY HAVE SLUFFED FROM UPPER WELL.	NA	NA		HNU α Bγ C C C
	63183 7/30 1135	38	6	DENSE (7.5 YR N2/) BLACK SILTY MATERIAL. CHARRED WOOD & CHARCOAL. SLIGHTLY MOIST.	NA	NA		HNU α Bγ C C C
	63184 7/30 1135	15	6	MEDIUM DENSE (10 YR 5/2) GRAYISH BROWN SANDY GRAVEL (ANGULAR). POOR COHESION SLIGHTLY MOIST.	SP	NA		HNU α Bγ C C C
11	63185 7/30 1140	15	6	DENSE (10 YR 4/2) DARK GRAYISH BROWN CLAY MATRIX WITH ANGULAR GRAVEL. BROKEN GLASS, BRICK. MODERATE COHESION. SLIGHTLY MOIST.	GC	2.0		HNU α Bγ C C 1800 CPM
	63186 7/30 1140	21	6	SAA	GC	2.5		HNU α Bγ C C 2000 CPM
12	63188 7/30 1140	24	6	SAA	GC	2.5		HNU α Bγ C C 3000 CPM
	63189 7/30 1405	11	6	VERY LOOSE (2.5Y 3/3) DARK OLIVE BROWN CLAY WITH SPARSE COARSE ANGULAR GRAVEL. LOW COHESION AND PLASTICITY. WET.	GC	NA		HNU α Bγ C C 400 CPM
13	63190 7/30 1405	9	6	SAA	GC	NA		HNU α Bγ C C 500 CPM
	63191 7/30 1405	6	6	SAA	GC	NA		HNU α Bγ C C 500 CPM
14	63192 7/30 1420	6	6	SAA - large piece of WOOD IN SIDE OF SPOON.	GC	NA		HNU α Bγ C C 2000
	63193 7/30 1420	20	0	NR	NA	NA		HNU α Bγ NA NA NA
	63194 7/30 1420	34	0	NR	NA	NA	NA	HNU α Bγ NA NA NA

NOTES

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST. K. MYERS

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SAA = SAME AS ABOVE
NA = NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01 TASK 3.15	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1776	COORDINATES: N481,718.7 E1,378,630.7	DATE: 7/30/91	
ELEVATION: 584.8	GWL: Depth NA Date/Time NA	DATE STARTED: 7/30/91	
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth NA Date/Time NA	DATE COMPLETED: 7/30/91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (PSI)	WELL CONSTRUCTION	REMARKS
15	63195 7/30 1450	7	6	DENSE (10 YR 3/2) VERY DARK GRAYISH BROWN COARSE SAND GRADING INTO MEDIUM ANGULAR GRAVEL. GOOD COHESION, LOW PLASTICITY. WET.	GP	NA	NA	HNU 0 / α C / Bγ 1200 CPM
	63196 7/30 1450	4	6	SAA - METALLIC & RUBBER DEBRIS	GP	NA		HNU 0 / α 0 / Bγ 1200 CPM
16	63197 7/30 1450	20	0	NR	NA	NA		HNU NA / α NA / Bγ NA
	63198 7/30 1500	13	6	LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN & ANGULAR GRAVEL IN A SILTY CLAY MATRIX. LOW COHESION & PLASTICITY. WET.	GM	NA		HNU C / α C / Bγ 100C
17	63199 7/30 1500	8	6	SAA	GM	NA		HNU 0 / α 0 / Bγ 100C
	63200 7/30 1500	5	0	NR	NA	NA		HNU NA / α NA / Bγ NA
18	63171 7/30 1510	7	6	DENSE (10 YR 3/2) VERY DARK GRAYISH BROWN COARSE SAND WITH ANGULAR GRAVEL & GLASS. LOW COHESION WET.	GP	NA		HNU 3 PPM / α C / Bγ 110C
	63209 7/30 1510	8	0	NR	NA	NA		HNU NA / α NA / Bγ NA
19	63210 7/30 1510	7	0	NR	NA	NA		HNU NA / α NA / Bγ NA
	63211 7/30 1540	12	6	VERY LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN CLAY. LARGE AMOUNT OF METAL FRAGMENTS. NO COHESION. VERY WET.	NA	NA		HNU 5 PPM / α C / Bγ 2500
20	63212 7/30 1540	8	6	SAA	NA	NA		HNU 1 PPM / α C / Bγ 2500
	63213 7/30 1540	7	0	NR	NA	NA		HNU 0 / α 0 / Bγ 2500
21	63214 7/30 1550	7	6	LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN GRAVEL IN A COARSE SAND MATRIX. ABUNDANT GLASS. SOME METAL AND WOOD. LOW COHESION. VERY WET.	NA	NA		HNU 0 / α C / Bγ 1200
	63215 7/30 1550	6	0	NR	NA	NA		HNU NA / α NA / Bγ NA
22	63216 7/30 1550	4	0	NR	NA	NA	NA	HNU NA / α NA / Bγ NA

NOTES.

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST: K. MYERS

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SAA = SAME AS ABOVE
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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01 TASK 3.15	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1776	COORDINATES: N481.718.7 E 1 378.6307	DATE: 7/30/91	
ELEVATION: 584.8	GWL: Depth NA Date/Time NA	DATE STARTED: 7/30/91	
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth NA Date/Time NA	DATE COMPLETED: 7/30/91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 4 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
LA 23	63180 7/30 1600	6	6	VERY LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN GRAVEL IN COURSE SAND. GLASS, NAILS. WET	GP	NA	NA	HNU 17 PPM; α C; BZ 2000
	63217 7/30 1600	3	0	NR	NA	NA		HNU NA; α NA; BZ NA
24	63218 7/30 1600	3	0	NR	NA	NA		HNU NA; α NA; BZ NA
	63219 7/30 1610	23	6	LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN COURSE SAND WITH SPARSE ANGULAR GRAVEL. ALSO SOME SANDY SILT WITH FINE GRAVEL. NO COHESION. VERY WET.	GP	NA		HNU 1 PPM; α 0; BZ 3000
25	63220 7/30 1610	13	6	SAA	GP	NA		HNU 0; α 0; BZ 3000
	63221 7/30 1610	21	6	SAA	GP	NA		HNU 0; α 0; BZ 3000
26	63222 7/30 1630	60	6	LOOSE (10 YR 3/2) VERY DARK GRAYISH BROWN COURSE SAND WITH SPARSE ANGULAR GRAVEL. LOW COHESION. VERY WET.	NA	NA		HNU 7 PPM; α 0; BZ 4100
	63223 7/30 1630	30	0	NR	NA	NA		HNU NA; α NA; BZ NA
27	63224 7/30 1630	14	0	NR	NA	NA		HNU NA; α NA; BZ NA
	63225 7/30 1640	2	6	LOOSE (2.5Y N5/1) GRAY SILTY MATERIAL. LARGE ROCK (PROBABLY GRAPHITE) IN SPOON SHOE. NO COHESION OR MATRIX. VERY SOUPY. VERY WET.	NA	NA		HNU 8 PPM; α 0; BZ 2300 CPM
28	63226 7/30 1640	3	0	NR	NA	NA		HNU NA; α NA; BZ NA
	63227 7/30 1640	4	0	NR	NA	NA		HNU NA; α NA; BZ NA
29	63228 7/30 1647	2	0	NR	NA	NA		HNU NA; α NA; BZ NA
	63229 7/30 1647	2	0	NR	NA	NA		HNU NA; α NA; BZ NA
30	63230 7/30 1647	2	0	NR	NA	NA	NA	HNU NA; α NA; BZ NA

NOTES:

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST: K. MYERS

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SAA = SAME AS ABOVE
NA = NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01 TASK 3.15	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1776	COORDINATES: N 481,718.7 E 1,378,630.7	DATE: 7/30/91	
ELEVATION: 584.8	GWL: Depth NA	Date/Time NA	DATE STARTED: 7/30/91
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth NA	Date/Time NA	DATE COMPLETED: 7/30/91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 5 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
30	63231 7/30 1700	2	6	LOW DENSITY (5Y 6/4) PALE OLIVE GRAY	CL	NA	NA	HNU α Bγ 10PPM 0 1500 CPM
	63232 7/30 1700	2	0	NR	NA	NA		HNU α Bγ NA NA NA
31	63233 7/30 1700	2	0	NR	NA	NA		HNU α Bγ NA NA NA
	63234 7/30 1715	2	6	LOW DENSITY (5Y 6/4) PALE OLIVE GRAY	CL	NA		HNU α Bγ 10 PPM 0 1000
32	63235 7/30 1715	5	6	SAA	CL	NA	NA	HNU α Bγ 0 0 1000
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ
								HNU α Bγ

NOTES.

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST: K. MYERS

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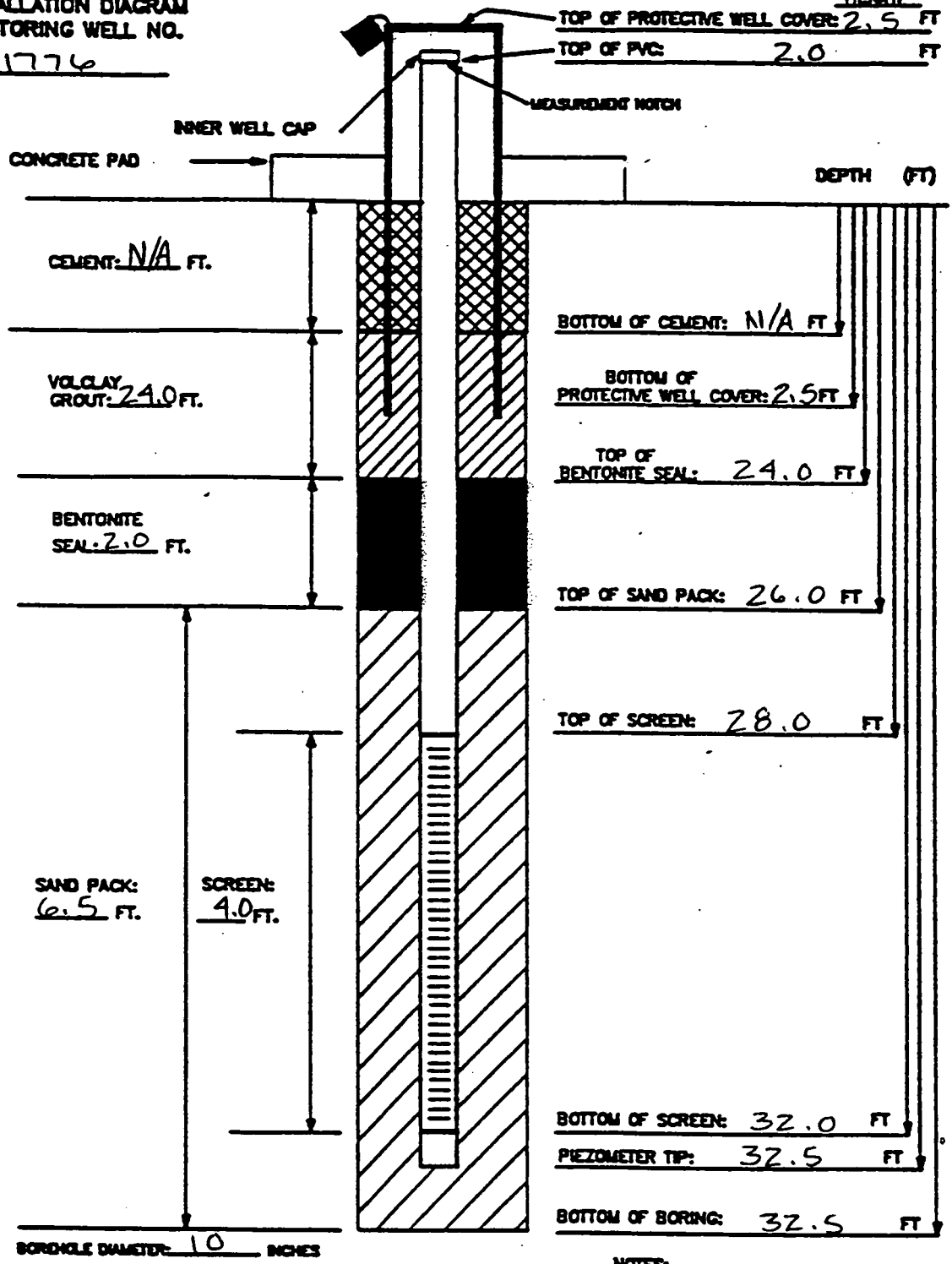
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1776

Stickups

INSTALLATION DATE: 7-30-91



MATERIALS USED:
SAND TYPE AND QUANTITY: 1½ BAGS, 10-20 SAND (80 lb bags)
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 5 - 50 lb. BAGS
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 4.0 GALLONS
OTHER: 3' x 3' CONCRETE PAD WILL BE INSTALLED

NOTES:
1) RISER PIPE IS ~~2-INCH SCHEDULE 40~~ 4" I.D. STAINLESS PVC PIPE, FLUSH-THREADED JOINTS. TC 7-30-91
2) SCREEN IS ~~2-INCH I.D. SCHEDULE 40~~ 4.0 I.D. STAINLESS PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: (OU 1) 6C2 ~~8-9-91~~ ET 8-9-91 GEOLOGIST/ENGINEER: HARRIS

3.15

:ERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 6002.25.91 3.15
BORING NO. 1776
PIEZOMETER NO. 1776
FIELD ENG./GEO. HARRIS/MULDER DATE 7-30-91
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7-31-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ____ TO ____
FLUID NONE FROM ____ TO ____

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ____ TO ____
SIZE NONE FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.01 IN.
TOTAL PERFORATED AREA 4.0 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10.0', 10.0', 5.0', 5.0', 2.5'
JOINING METHOD FLUSH JOINT THREADED

ECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 10 3/4 IN.

OTHER PROTECTION HINGED LOCKING COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		584.8	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 24.0	TOP	BOTTOM
BENTONITE	TOP 24.0	BOTTOM 26.0	TOP	BOTTOM
SAND	TOP 26.0	BOTTOM 32.5	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 28.0	BOTTOM 32.0	TOP	BOTTOM
PIEZOMETER TIP	32.5			
BOTTOM OF BOREHOLE	32.5			
GWL AFTER INSTALLATION				

E PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
EMARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1777	COORDINATES: N 481,778.1 E 1,378,652.3		DATE
ELEVATION: 585.8	GWL: Depth	Date/Time	DATE STARTED: 7/27/91
ENGINEER/GEOLOGIST HARRIS/MULDER	Depth N/A	Date/Time N/A	DATE COMPLETED: 7/29/91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63121 7/27 1230	19	6	HARD (10YR, 6/6) BROWN yellow clay LO COHESION, NO PLASTICITY VERY DRY.	CL	3.5		HNU 0; α 0; Bγ 1000
	63122 7/27 1230	32	6	SAA				HNU 0; α 0; Bγ 1000
1	63123 7/27 1230	52	6	SAA				HNU 0; α 0; Bγ 1000
	63124 7/27 1230	30	0	NR				HNU NA; α NA; Bγ NA
2	63125 7/27 1240	35	6	HARD (10 YR, 6/6) BROWN yellow clay NO COHESION, NO PLASTICITY. VERY DRY	CL	3.5		HNU 0; α 0; Bγ 100
	63126 7/27 1240	20	0	NR				HNU NA; α NA; Bγ NA
3	63127 7/27 1240	19	0	NR				HNU NA; α NA; Bγ NA
	63128 7/27 1240	11	0	NR				HNU NA; α NA; Bγ NA
4	63129 7/27 1315	15	6	HARD (10YR, 6/6) BROWN yellow clay interspersed with fine gravel. LO COHESION, LOW Plasticity, DRY	NA	NA		HNU 0; α 0; Bγ 100
F A 5	63130 7/27 1315	22	6	DENSE (5Y, 2.5/1) BLACK SILTY SAND PROBABLE FLY ASH + SLAG. LOW COHESION LOW PLASTICITY. SLIGHTLY MOIST.				HNU 0; α 0; Bγ 100
	63131 7/27 1315	22	6	SAA				HNU 0; α 0; Bγ 100
	63132 7/27 1330	23	6	DENSE (5Y, 2.5/2) BLACK SANDY SILT LOW COHESION AND PLASTICITY. DRY.				HNU 0; α 0; Bγ 1600
6	63133 7/27 1330	25	6	SAA				HNU 0; α 0; Bγ 1200
	63134 7/27 1330	18	6	SAA				HNU 0; α 0; Bγ 1500
7	63135 7/27 1400	5	6	MEDIUM DENSE (5Y, 2.5/1) BLACK SANDY SILT. LOW COHESION & PLASTICITY. LOOKS LIKE ASH. SLIGHTLY MOIST.				HNU 0; α 0; Bγ 100

NOTES

Drilling Contractor: DENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST: K. MYERS

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NA = NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.10.03.01	PROJECT NAME. FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER 1777	COORDINATES. See pg 1	DATE.	
ELEVATION: See pg 1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 7/27/91	
ENGINEER/GEOLOGIST HARRIS/MULDER	Depth Date/Time	DATE COMPLETED: 7/29/91	
DRILLING METHODS. HOLLOW STEM AUGER		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USS)	WELL CONSTRUCTION	REMARKS
	63136 7/27 1400	7	6	SAA	NA	NA		HNU 0; α 0; Bγ 160
8	63137 7/27 1400	9	6	SAA				HNU 0; α 0; Bγ 100
	63486 7/27 1415	N/A	0	SHELBY TUBE PUSHED NO RECOVERY				HNU NA; α NA; Bγ NA
9								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
10								HNU NA; α NA; Bγ NA
								HNU NA; α NA; Bγ NA
11	63138 7/27 1430	7	6	DENSE (5Y, 2.5/1) BLACK SANDY SILT WITH SPARSE FINE GRAVEL, LOW COHESION, NO PLASTICITY, MOIST.				HNU 0; α 0; Bγ 100
	63139 7/27 1430	11	6	SAA				HNU 0; α 0; Bγ 100
12	63140 7/27 1430	5	6	SAA				HNU 0; α 0; Bγ 100
	63141 7/27 1430	32	6	DENSE (10Y, 6/3) BROWNISH GRAY COURSE SANDY SILT WITH SPARSE FINE GRAVEL MODERATE COHESION & PLASTICITY.				HNU 0; α 0; Bγ 125
13	63142 7/27 1545	23	6	DENSE (10YR, 4/1) DARK, GRAY, COURSE SAND WITH GRAVEL. LOW COHESION & PLASTICITY. VERY MOIST.				HNU 0; α 0; Bγ 150
	63143 7/27 1545	27	6	DENSE (2.5Y, 4/4) OLIVE BROWN COURSE SAND WITH SPARSE COURSE GRAVEL. LOW COHESION & PLASTICITY. WET.				HNU 0; α 0; Bγ 150
14	63144 7/27 1600	3	6	SAA				HNU 0; α 0; Bγ 150
	63145 7/27 1600	5	0	NR	✓	✓		HNU NA; α NA; Bγ NA

NOTES.

Drilling Contractor PENN DRILL

Drilling Equipment SIMCO

Driller: E. GARDNER

ASST: K. MYERS

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FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1777	COORDINATES: See pg 1		DATE:
ELEVATION: See pg 1	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 7-27-91
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth	Date/Time	DATE COMPLETED: 7-29-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
15	63146 7/27 1615	15	0	A ROCK WAS JAMMED IN THE SHOE OF THE SPOON.	NA	NA		HNU α Bγ
	63147 7/27 1615	16	0	NR				HNU α Bγ
16	63148 7/27 1690	21	0	NR				HNU α Bγ
	63149 7/27 1640	15	0	NR				HNU α Bγ
17	63150 7/27 1645	3	0	NR				HNU α Bγ
	63151 7/28 0830	4	6	LOOSE (5 YR, 2.5/2) BLACK COURSE SAND WITH FINE GRAVEL. NO MEASURABLE COHESION OR PLASTICITY. VERY WET.				HNU α Bγ 0 0 4200
18	63152 7/28 0830	3	0	NR.				HNU α Bγ
	63153 7/28 0830	2	0	NR				HNU α Bγ
19	63154 7/28 0845	1	2	LOOSE - GRAVEL AND OTHER DEBRIS GLASS, CERAMIC, STYROFOAM, METAL				HNU α Bγ 0 0 4000
	63155 7/28 0845	4	0	NR				HNU α Bγ
20	63156 7/28 0845	5	0	NR				HNU α Bγ
	63157 7/28 0850	2	0	VERY LOOSE (2 YR 2.5/1) BLACK FINE GRAVEL WITH COARSE SAND. DEBRIS: GLASS, ALUMINUM, WOOD.				HNU α Bγ 0 0 3800
21	63157 63158 7/28 0850	5	0	NR				HNU α Bγ
	63158 7/28 0900	2	0	NR				HNU α Bγ
22	63159 7/28 0900	1	0	NR				HNU α Bγ

NOTES

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NA = NOT APPLICABLE

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.10.03.01	PROJECT NAME: FMPC RI/FS OU-1 (BURN PIT)		
BORING NUMBER: 1777	COORDINATES: See pg 1		DATE:
ELEVATION: See pg 1	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 7-27-91
ENGINEER/GEOLOGIST: HARRIS/MULDER	Depth	Date/Time	DATE COMPLETED: 7-29-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 4 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	63488 7/28 0915	1	0	NR	NA	NA		HNU NA; α NA; Bγ NA
23	63489 7/28 0925	2	0	NR				HNU NA; α NA; Bγ NA
	63490 7/28 0935	2	0	NR				HNU NA; α NA; Bγ NA
24	63491 7/28 0945	2	0	NR				HNU NA; α NA; Bγ NA
	63492 7/28 0955	1	0	NR				HNU NA; α NA; Bγ NA
25	63493 7/28 1000	1	0	NR				HNU NA; α NA; Bγ NA
	63494 7/28 1010	1	0	NR				HNU NA; α NA; Bγ NA
26				WELL SET AT 26 FEET				HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ
								HNU; α; Bγ

NOTES.

Drilling Contractor: PENN DRILL

Drilling Equipment: SIMCO

Driller: E. GARDNER

ASST: K. MYERS

NR = NO RECOVERY
SAA = SAME AS ABOVE
NA = NOT APPLICABLE

8-9-91

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1777

Stickups

INSTALLATION DATE: 7-28-91

5711

HEIGHT

TOP OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF PVC: 2.0 FT

MEASUREMENT NOTCH

INNER WELL CAP

CONCRETE PAD

DEPTH (FT)

CEMENT: N/A FT.

BOTTOM OF CEMENT: N/A FT

VOLCLAY GROUT: 17.0 FT.

BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT

TOP OF BENTONITE SEAL: 17.0 FT

BENTONITE SEAL: 2 FT.

TOP OF SAND PACK: 19.0 FT

TOP OF SCREEN: 20.5 FT

SAND PACK: 7 FT.

SCREEN: 5 FT.

BOTTOM OF SCREEN: 25.5 FT

PIEZOMETER TIP: 26.0 FT

BOTTOM OF BORING: 26.0 FT

BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 1.5 80 lb. bags 10/20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 0.5
BAGS OF VOLCLAY GROUT: 3 50 lb. bags
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 2.5 GALLONS
OTHER: 3'x3' CONCRETE PAD WILL BE INSTALLED

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE-40 T.C. 7-28-91 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH-ID SCHEDULE-40 4.0" I.D. STAINLESS PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK(OU-17)602.25.01 GEOLOGIST/ENGINEER: HARRIS

001873

REVIEWED BY QA MB DATE 8-28-91

FERNALD RI/FS

5711

8-8-91

PIEZOMETER INSTALLATION SHEET

ROJECT NAME EMPC RI/FS — FIELD ENG./GEO. HARRIS — DATE 7-28-91
PROJECT NO. 602.25.91/3.15 — CHECKED BY — DATE
BORING NO. 1777
PIEZOMETER NO. 1777 — DATE OF INSTALLATION 7-28-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NONE FROM ___ TO ___
FLUID NONE FROM ___ TO ___

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NONE FROM ___ TO ___
SIZE NONE FROM ___ TO ___

PIEZOMETER DESCRIPTION

TYPE MONITOR WELL
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01
TOTAL PERFORATED AREA 4.0 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 10.0', 10.0', 5.0', 1.0'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 IN

OTHER PROTECTION HINGED LOCKING COVER W/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		587.8	
GROUND SURFACE	0.0		585.8	
BOTTOM OF PROTECTIVE PIPE	2.5		583.3	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 17.0	TOP 585.8	BOTTOM 568.8
BENTONITE	TOP 17.0	BOTTOM 19.0	TOP 568.8	BOTTOM 566.8
SAND	TOP 19.0	BOTTOM 26.0	TOP 566.8	BOTTOM 559.8
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 20.5	BOTTOM 25.5	TOP 555.3	BOTTOM 560.3
PIEZOMETER TIP	26.0		559.8	
BOTTOM OF BOREHOLE	26.0		559.8	
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS WOOD PLUG USED IN AUGER BIT DURING WELL INSTALLATION.

REVIEWED BY QA [illegible] DATE 8-28-91

001874

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.37 | PROJECT NAME FMPC RI\FS

BORING NUMBER ~~1778~~ | COORDINATES N 480305.19, E 1381672.31 | DATE 02-05-91

ELEVATION 580.31 concrete floor | GWL: Depth 5.7 FT. Date/Time 2-14-91 @ 1830 | DATE STARTED: 02-04-91

ENGINEER/GEOLOGIST M. GARMAN, J. LGAR | Depth NA | Date/Time NA | DATE COMPLETED: 02-14-91

DRILLING METHODS HOLLOW STEM AUGER | PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
	NA 02-04 2200	NA	NA	0.0 TO 1.0 FT. INTERVAL IS CONCRETE	NA	NA	NA	NA
	NA 02-04 2200	NA	NA		NA	NA		
1 (FINE SAMPLE)	57445 02-05 1820	12	6	DENSE (10YR, 5/2) GRAYISH BROWN MEDIUM GRAVEL. SOME SAND. SOME SILT. MOIST.	GP	NA		HNU = 0 α = 0 BZ = 300cpm
2	57446 02-05 1820	14	6	DENSE (10YR, 5/3) BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. SLIGHTLY MOIST.	SW	NA		
(HSL SAMPLE)	57447 02-05 1820	17	4	SAA	SW	NA		
3	57448 02-05 1825	13	6	SAA	SW	NA		HNU = 0 α = 0 BZ = 280cpm
	57449 02-05 1825	15	6	SAA	SW	NA		
4 (HSL SAMPLE)	57450 02-05 1825	17	2	SAA	SW	NA		
(HSL SAMPLE)	57451 02-05 1830	14	6	MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED SAND. SOME GRAVEL. SOME SILT. SLIGHTLY MOIST.	SW	NA	4"	HNU = 0 α = 0 BZ = 250cpm
5	57452 02-05 1830	10	6	SAA	SW	NA		
	57453 02-05 1830	9	6	SAA	SW	NA		
6	57454 02-05 1830	9	6	SAA	SW	NA		
	57455 02-05 2215	4	6	SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. HIGH PLASTICITY. MOIST. ODOR RESEMBLING DIESEL FUEL - NO HNU RESPONSE)	CL	0.5		HNU = 0* α = 0 BZ = 320cpm
7	57456 02-05 2215	1	3	SAA	CL	0.5		
	57457 02-05 2215	2	0	NR	NA	NA		

NOTES.

Drilling Contractor PENDRILL CO.

Drilling Equipment CME 45

Driller: BOB HOST

ASST. M. REBOLD

001875

BACKGROUND:
HNU = 0 PPM
α = 0 cpm
BZ = 300-450 cpm

REVIEWED BY QA [signature] DATE 3-20-91

	Initial	Date
1st Review	JPB	3-21-91
2nd Review	JPB	3-22-91
Final Data Verification		

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7 | PROJECT NAME: FMPC RI\FS
BORING NUMBER: ~~1614~~ ET 1/3/91 7615 | COORDINATES: see p.1 | DATE: 02-05-91
ELEVATION: see p.1 1778 msl | GWL: Depth see p.1 Date/Time see p.1 | DATE STARTED: 02-04-91
ENGINEER/GEOLOGIST: M. GARMAK, J. LEAR | Depth NA Date/Time NA | DATE COMPLETED: 02-14-91
DRILLING METHODS: HOLLOW STEM AUGER | PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONTAMINANCY (PPM)	NA WELL CONSTRUCTION	REMARKS
8	57458 02-05 2218	2	6	SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. MOIST TO VERY MOIST.	CL	0.25	NA	HNU = 0 α = 0 βγ = 340 cpm
	57459 02-05 2218	1	0	NR	NA	NA		
	57460 02-05 2218	1	0	NR	NA	NA		
9	57461 02-05 2220	2	6	VERY SOFT (10YR, 4/1) DARK GRAY CLAY. SOME SILT. LOW PLASTICITY. WET.	CL	<0.25		HNU = 0 α = 0 βγ = 330 cpm
	57462 02-05 2220	23	6	FIRM (10YR, 4/1) DARK GRAY SILTY CLAY. TRACE GRAVEL. MOIST TO VERY MOIST.	CL	0.5		
10	57463 02-05 2220	17	0	NR	NA	NA		
	57464 02-05 2355	11	6	HARD (10YR, 5/4) YELLOWISH BROWN SILTY CLAY. TRACE GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.5		HNU = 0 α = 0 βγ = 280 cpm
11	57465 02-05 2355	12	6	SAA	CL	2.5		
	57466 02-05 2355	14	0	NR	NA	NA		
12	57467 02-06 0003	5	6	FIRM (10YR, 5/2) GRAYISH BROWN SILTY CLAY. TRACE FINE GRAVEL. MEDIUM TO HIGH PLASTICITY. SLIGHTLY MOIST.	CL	2.0		HNU = 0 α = 0 βγ = 300 cpm
	57468 02-06 0003	6	4	SAA	CL	2.0		
13	57469 02-06 0003	10	0	NR	NA	NA		
	57470 02-06 0005	5	6	FIRM (10YR, 5/1) GRAY CLAY. SOME SILT. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.5		HNU = 0 α = 0 βγ = 280 cpm
14	57471 02-06 0005	9	0	NR	NA	NA		
	57472 02-06 0005	8	0	NR	NA	NA		
15								

H_2O ZONE

NOTES.

Drilling Contractor: PENN DRILL CO.
Drilling Equipment: CME 45
Driller: BOB YOST
ASST: M. REBOLD

BACKGROUND:
HNU = 0 ppm
α = 0 cpm
βγ = 300-450 cpm

001876

REVIEWED BY QA MPR DATE 3-20-91

FERNALD
RI/FS

	Initial	Date
1st Key In		3-21-91
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7 PROJECT NAME: FMPC RI\FS

BORING NUMBER: ~~164~~ 165 COORDINATES: see p.1 DATE: 02-06-91

ELEVATION: See p.1 1778 GWL: Depth see p.1 Date/Time see p.1 DATE STARTED: 02-04-91

ENGINEER/GEOLOGIST: M. GARMAN, J. CLAIR Depth NA Date/Time NA DATE COMPLETED: 02-14-91

DRILLING METHODS: HOLLOW STEM AUGER PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	μA WELL CONSTRUCTION	REMARKS
15	57473 02-06 0045	5	6	FIRM (10YR,5/1) GRAY SILTY CLAY. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST.	CL	1.0		HNU = 0
	57474 02-06 0045	4	0	NR	NA	NA		α = 0
16	57475 02-06 0045	7	0	NR	NA	NA		Bγ = 300 cpm
	57476 02-06 0050	6	5	FIRM (10YR,5/1) GRAY SILTY CLAY. TRACE FINE GRAVEL. HIGH PLASTICITY. SLIGHTLY MOIST TO MOIST.	CL	1.0		HNU = 0
17	57477 02-06 0050	9	0	NR	NA	NA		α = 0
	57478 02-06 0050	11	0	NR	NA	NA		Bγ = 280 cpm
18	57479 02-06 0055	12	6	FIRM (10YR,5/1) GRAY SILTY CLAY. TRACE FINE SAND AND GRAVEL. MEDIUM TO HIGH PLASTICITY. MOIST.	CL	1.0		HNU = 0
	57480 02-06 0055	17	6	SAA	CL	1.0		α = 0
19	57481 02-06 0055	23	6	SAA	CL	1.5		Bγ = 300 cpm
	57482 02-06 0055	39	6	HARD (10YR,5/1) GRAY SILTY CLAY. TRACE FINE SAND AND GRAVEL. LOW TO MEDIUM PLASTICITY. SLIGHTLY MOIST.	CL	2.0		
20				DRILLING AND SAMPLING COMPLETED AT 20.0 FT. 4 IN. I.D. STAINLESS STEEL PIEZOMETER INSTALLED.				

NOTES.

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CME 45

Driller: BOB GOST

ASST: M. REBOLD

BACKGROUND:

HNU = 0 ppm

α = 0 cpm

Bγ = 300 - 450 cpm

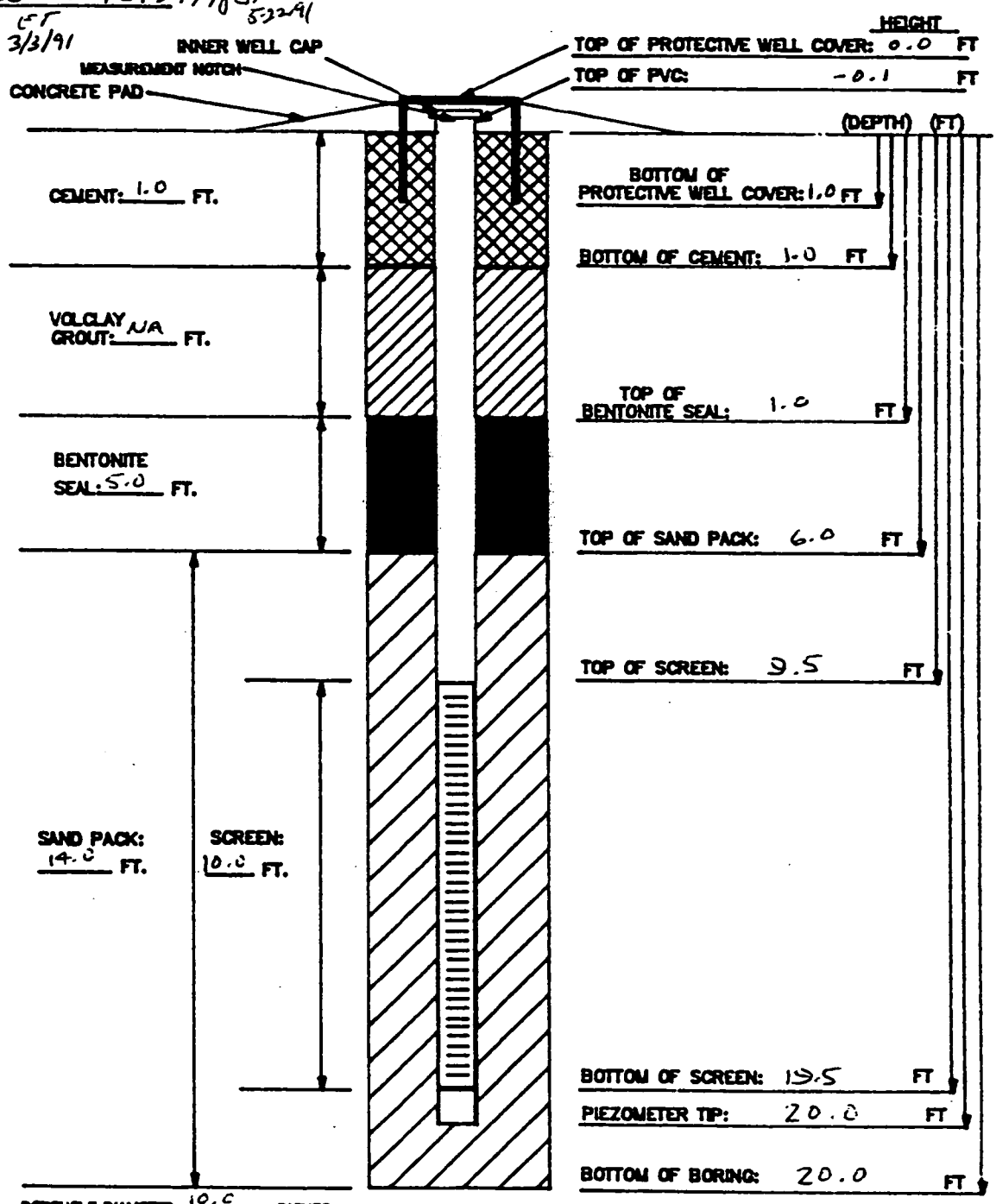
001877

REVIEWED BY: [illegible] DATE: 3-20-91

FERNALD RI/FS

INSTALLATION DATE: 02-14-91

INSTALLATION DIAGRAM
MONITORING WELL NO.
~~1614~~ ~~1615~~ 1778 JMW 5-22-91
CT 3/3/91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 5 - 80lb. BAGS 10\20
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: NONE USED
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 9 GALLONS
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS. 4-INCH 12 STAINLESS STEEL
2) SCREEN IS 2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS. 2-4-91
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 5.7 FT TOC / 2-14-91
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 3.7 GEOLOGIST/ENGINEER: [signature]

001878

REVIEWED BY QA [signature] DATE 3-20-91

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS FIELD ENG./GEO. M. GARMAN
PROJECT NO. 602.3.7 1778 JAN 5-22-91 CHECKED BY E. Trollinger DATE 3/3/91
BORING NO. ~~1614~~ ~~1615~~ ET 3/3/91
PIEZOMETER NO. ~~1614~~ ~~1615~~ 1778 JAN 5-22-91 DATE OF INSTALLATION 02-14-91

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NONE ~~FROM~~ ____ ~~TO~~ ____	SIZE NONE ~~FROM~~ ____ ~~TO~~ ____
FLUID NONE ~~FROM~~ ____ ~~TO~~ ____	SIZE NONE ~~FROM~~ ____ ~~TO~~ ____

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL	RISER PIPE MATERIAL STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0 IN. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 7/16 IN. I.D. 4.0 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 9.4 FT
AVERAGE SIZE OF PERFORATIONS 0.010 IN.	JOINING METHOD FLUSH JOINT
TOTAL PERFORATED AREA 10.0 FT	THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 1.0 FT	OTHER PROTECTION WELL CAP, BOLT-ON
PROTECTIVE PIPE O.D. 9.75 IN.	PROTECTIVE LID

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT.) E.T. 3/3/91	
TOP OF RISER PIPE	- 0.1		580.21	
GROUND SURFACE	0.0		580.31	
BOTTOM OF PROTECTIVE PIPE	1.0		579.31	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT (NG 2-12-91)	TOP 0.0	BOTTOM 1.0	TOP 580.31	BOTTOM 579.31
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP 579.31	BOTTOM 574.31
SAND	TOP 6.0	BOTTOM 20.0	TOP 574.31	BOTTOM 560.31
GRAVEL NONE USED	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.5	BOTTOM 19.5	TOP 570.81	BOTTOM 560.81
PIEZOMETER TIP	20.0		560.31	
BOTTOM OF BOREHOLE	20.0		560.31	
GWL AFTER INSTALLATION	5.7 @ TOC		VARIABLE	

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS 4.0 IN. I.D. STAINLESS STEEL PIEZOMETER AND 10 INCH AUGER MATERIALS USED AS PER WORK PLAN.

001879

REVIEWED BY ON ATS DATE 3-20-91

ERNALD
RI/FS

This is a copy verified by Ken Marion

JW 9.23.91

5711

VISUAL CLASSIFICATION OF SOILS

NUMBER: 602.3.29 ~~2795~~	PROJECT NAME: FMPC RI/FS		
RING NUMBER: 1779	COORDINATES: N 480592.55 E 1,380,059.30	DATE 8-14-91	
EVATION: 5845	GWL: Depth: 2.80 ft Date/Time 8-25-91 / 1100	DATE STARTED: 8-14-91	
GINEER/GEOLOGIST: Ken Marion	Depth: NA Date/Time NA	DATE COMPLETED: 8-15-91	
ILLING METHODS: 10" Hollow Stem Augers		PAGE 1 OF 3	

Depth (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 16 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	8-14-91 1437	6	6.25	Light gray (2.5Y, 7/2) medium dense gravel and sand, dry	GP	N/A	Hnu = .4 ppm
				Light yellowish brown (2.5Y, 6/3)	S/C	N/A	Bγ = 150 cpm
		9	3	CLAYEY SAND with gravel, dry	S/C	N/A	α = 0 cpm
		7	0	No Recovery	N/A	N/A	
5	8-14-91 1439	7	6	Light olive brown (2.5Y, 5/6) very stiff SILTY CLAY with sand and a little fine gravel, dry, non plastic	CL	2.5	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		4	6	Same As Above	CL	2.5	
		4	0	No Recovery	N/A	N/A	
	8-14-91 1445	3	6	Dark grayish brown (10YR, 4/2) very stiff CLAY with a little sand and trace gravel, damp, low plasticity	CL	2.5	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		4	3		CL	2.5	
		6	0	No Recovery	N/A	N/A	
5	8-14-91 1455	2	3	Light olive brown (2.5Y, 5/4) Soft CLAY with trace sand, damp, medium plasticity	CL	1.0	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		2	0	No Recovery	N/A	N/A	
		1	0	No Recovery	N/A	N/A	
	8-14-91 1504	2	3	Light olive brown (2.5Y, 5/6) Very loose coarse sand with a little clay, Saturated	S/C	N/A	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		2	0	No Recovery	N/A	N/A	
		2	0	No Recovery	N/A	N/A	

NOTES:
Contractor: Penn Drill
Rig CME-45
Driller: Craig Coulter
Assistant Driller: Kevin Myers
Geo Assistant: Jim Carpenter

Samples Collected Per ASTM Standard Penetration Test
Colors identified using Munsell Color Chart

Hnu S/N A01345	.4 ppm	Background Levels
Bγ S/N 4646c	150 cpm	
α S/N 75242	0 cpm	

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

NUMBER: 602.329.95 KM 8-12-91	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1779	COORDINATES: See p 1	DATE 8-14-91
ELEVATION: See p 1	GWL: Depth 7.80 ft Date/Time 8-25-91/1100	DATE STARTED: 8-14-91
ENGINEER/GEOLOGIST: Ken Marion	Depth NA Date/Time NA	DATE COMPLETED: 8-15-91
DRILLING METHODS: 10" Hollow Stem Augers		PAGE 2 OF 3

1 ft. 1	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in. 1	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	8-14-91 1510	1	0	No Recovery	N/A	N/A	The wet split spoon has background readings
		1	0	No Recovery	N/A	N/A	
		10	0	No Recovery	N/A	N/A	
.0	8-14-91 1514	1	6	Light olive brown (2.5Y, 5/6) medium dense Sand with trace clay and gravel, saturated	SP	N/A	Hnu = .4 ppm BJ = 150 cpm α = 0 cpm
		14	6		SP	N/A	
		12	3	Same As Above	SP	N/A	
	8-14-91 1516	2	6	Light olive brown (2.5Y, 5/6) medium dense saturated Sand with trace gravel	SP	N/A	Hnu = .4 ppm BJ = 150 cpm α = 0 cpm
		5	6	Same As Above	SP	N/A	
		14	6	Same As Above	SP	N/A	
	8-14-91 1521	9	6	Light olive brown (2.5Y, 5/6) medium dense SAND, saturated	SP	N/A	Hnu = .4 ppm BJ = 150 cpm α = 0 cpm
		11	6	Same As Above	SC	N/A	
.5		10	6	Same As Above	SP	N/A	
	8-14-91 1529	13	6	Light olive brown (2.5Y, 5/6) medium dense SAND, Saturated	SP	N/A	Hnu = .4 ppm BJ = 150 cpm α = 0 cpm
		11	6	Same As Above	SP	N/A	
		9	6	Same As Above Grayish brown (2.5Y, 5/2) medium dense sand, wet	SP	N/A	

TES

001881

402-11-85

ERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

O[illegible] NUMBER: 6027.95 3-29	PROJECT NAME. FMPC RI/FS		
RING NUMBER: 1779	COORDINATES: See p1.	DATE 8-14-91	
EVATION: See p1	GWL: Depth 7.8 ft. Date/Time 8-15-91 / 1100	DATE STARTED: 8-14-91	
GINEER/GEOLOGIST. Ken Marion	Depth N/A Date/Time N/A	DATE COMPLETED: 8-15-91	
ILLING METHODS: 10" Hollow Stem Augers		PAGE 3 OF 3	

1 ft	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	8-14-91 1610	2	6	Light olive brown (2.5 Y, 5/6) medium dense coarse SAND, wet	SP	N/A	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		5	6	Same As Above	SP	N/A	
		17	6	Gray (5Y, 5/1) medium dense, medium Sand, wet	SP	N/A	
5	8-14-91 1630	7	6	Gray (5Y, 5/1) medium dense, medium Sand, wet	SP	N/A	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		13	6	Same As Above	SP	N/A	
		17	6	Same As Above	SP	N/A	
10	8-14-91 1651	4	6	Light olive brown (2.5 Y, 5/6) dense coarse sand, wet	SP	N/A	Hnu = .4 ppm Bγ = 150 cpm α = 0 cpm
		9	6	Same As Above	SP	N/A	
		15	6	Same As Above	SP	N/A	
		19	6	Same As Above	SP	N/A	
				Bottom of hole			

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RNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

OJECT NAME FMPC RI/FS
CJECT NC. 602.3.29
RING NO. 1779
:ZOMETER NO. 1779

FIELD ENG./GEO. Ken Marion DATE 8-15-91
CHECKED BY JRW DATE 9.23.91
DATE OF INSTALLATION 8-15-91

REHOLE DRILLING

DRILLING METHOD 10" Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM NA TO NA
FLUID N/A FROM NA TO NA

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE N/A FROM NA TC NA
SIZE N/A FROM NA TC NA

:ZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 4.0 in. ID
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in.
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 11.6 ft.
JOINING METHOD flush-Joint threaded

TION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION Steel Well Cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft)	
OP OF RISER PIPE	2.0 (ABOVE)		582.5	
ROUND SURFACE	0.0		580.5	
OTTOM OF PROTECTIVE PIPE	N/A		NA	
OREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.0	TOP 579.5	BOTTOM 576.5
SAND	TOP 4.0	BOTTOM 20.1	TOP 576.5	BOTTOM 560.4
GRAVEL	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
ERFORATED SECTION	TOP 9.6	BOTTOM 19.6	TOP 560.4	BOTTOM 560.9
EZOMETER TIP	20.1		560.4	
OTTOM OF BOREHOLE	20.1 ft.		560.4	
WL AFTER INSTALLATION	to be taken at a later date			

'EZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
RKS

001883

5711

FERNALD RI/FS

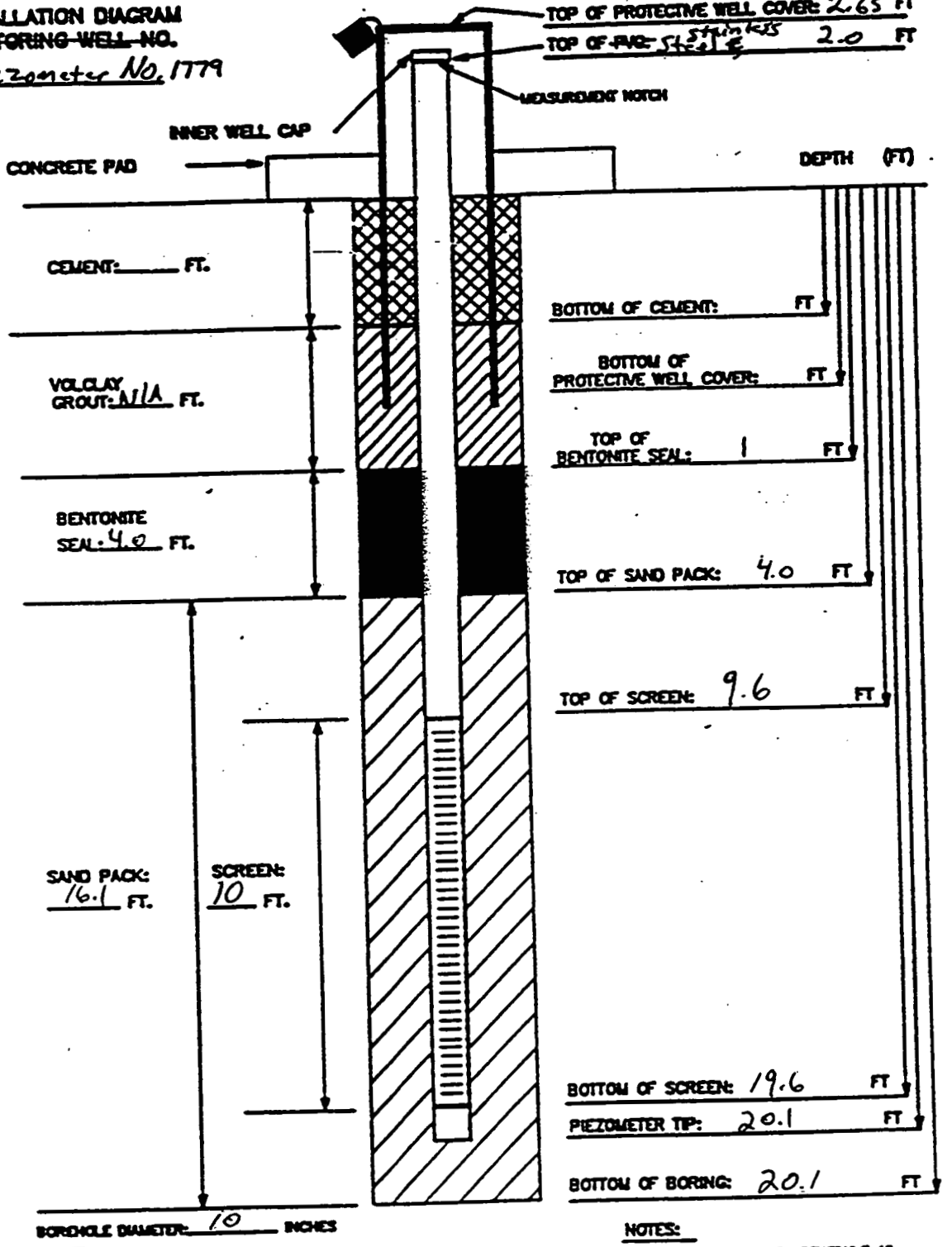
INSTALLATION DIAGRAM

~~MONITORING WELL NO.~~

Piezometer No. 1779

Stickups

INSTALLATION DATE: 8-15-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 6 bags (430 sand)

BENTONITE PELLETS (5-GALLON BUCKETS): 4 buckets

BAGS OF VOLCLAY GROUT: N/A

AMOUNT OF CEMENT:

AMOUNT OF WATER USED: 5 gallons

OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 7.80 ft. 8-25-91

TASK: 602.27.95

GEOLOGIST/ENGINEER: Ken Morris

FERNALD
RI/FS

JLW
9.23.91

This is a copy verified by Ken Marion

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1780	COORDINATES: N480594.23 E1,390311.54	DATE 9/5/91	
ELEVATION: TOW 577.07	GWL: Depth NA Date/Time NA	DATE STARTED: 9/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth NA Date/Time NA	DATE COMPLETED: 9/5/91	
DRILLING METHODS: 10" Hollow Stem Augers		PAGE 1 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	9-5-91 1638	N/A	12in.	Concrete	N/A	N/A	Core through concrete Hnu = 0 ppm
1	9-6-91 0853	5	6	Light olive brown (2.5Y, 5/4) very stiff CLAY with a little sand and gravel, trace strong brown (7.5YR, 5/6) mottling, damp, low plasticity	CL	2.5	Hnu = 0 ppm Bg = 300 cpm α = 0 cpm
		4	0	No Recovery	N/A	N/A	
		4	0	No Recovery	N/A	N/A	
2.5	9-6-91 1904	3	6	Light olive brown (2.5Y, 5/4) to olive gray (5Y, 5/2) stiff CLAY with trace sand and gravel, damp, medium plasticity	CL	1.5	Hnu = 0 ppm Bg = 100 cpm α = 0 cpm
		6	0	No Recovery	N/A	N/A	
		4	0	No Recovery	N/A	N/A	
4.0	9-6-91 0912	4	5	Light olive brown (2.5Y, 5/4) stiff SANDY CLAY, moist, high plasticity	CL	1.5	Hnu = 0 ppm Bg = 100 cpm α = 0 cpm
		4	0	No Recovery	N/A	N/A	
		2	0	No Recovery	N/A	N/A	
5.5	9-6-91 0916	3	2	Brown (10YR, 5/3) loose clayey SAND with trace black and yellowish brown (10YR, 5/6) mottling, moist	SC	N/A	Hnu = 0 ppm Bg = 100 cpm α = 0 cpm
		2	0	No Recovery	N/A	N/A	
		4	0	No Recovery	N/A	N/A	
7.0	9-6-91 0922	4	6	Light olive brown (2.5Y, 5/4) stiff CLAY with trace sand, gravel and shells, moist, high plasticity	CL	1.5	Hnu = 0 ppm Bg = 100 cpm α = 0 cpm

NOTES: Contractor: Penn Drill
Rig: CME-45
Driller: Bobby Yost
Assistant Driller: Mark Rehold
Geo Assistant: Jim Capannari

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu S/N	A01385	0 ppm	Background Levels
Bg S/N	46466	100 cpm	
α S/N	50750	0 cpm	

402-11-85

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.29		PROJECT NAME: FMPC RI/FS			
BORING NUMBER: 1780		COORDINATES: See p1		DATE 9/5/91	
ELEVATION: See p1		GWL: Depth N/A	Date/Time N/A	DATE STARTED: 9/5/91	
ENGINEER/GEOLOGIST: Ken Morgan		Depth N/A	Date/Time N/A	DATE COMPLETED: 9/5/91	
DRILLING METHODS: 10" Hollow Stem Augers				PAGE 2	OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	9-6-91 0930	4	6	SAME AS ABOVE	CL	1.5	
				2" of Coarse Sand	SC	N/A	
		3	6	Light brownish gray (10YR, 6/2) and Dark gray (10YR, 4/1) stiff CLAY, moist high plasticity	CL	1.5	
8.5	9-6-91 0940	2	6	Light olive brown (2.5Y, 5/4) loose well graded clayey sand with trace gravel saturated	SC	N/A	Hnu = 0 ppm Br = 100 cpm α = 0 cpm
		3	6	Gray (5Y, 5/1) stiff clay with trace sand and trace Yellowish brown (10YR, 5/6) mottling, wet, med. plasticity	CL	1.5	
		3	6		CL	1.5	
10	9-6-91 0950	1	6	Light olive brown (2.5Y, 5/4) medium dense clayey medium sand, saturated	SC	N/A	Hnu = 0 ppm Br = 100 cpm α = 0 cpm
		5	6	Light olive brown (2.5Y, 5/4) medium dense SILT and fine SAND with CLAY, trace brownish Yellow (10YR, 6/6) mottling, wet	ML	N/A	
		8	6	Gray (5Y, 5/1) stiff CLAY with trace SAND, moist, medium plasticity	CL	1.5	
11.5	9-6-91 1020	7	6	Gray (5Y, 5/1) clayey silt, medium dense with a few sand and high plastic clay layers, moist	ML	N/A	Hnu = 0 ppm Br = 100 cpm α = 0 cpm
		9	6	Same As Above	ML	N/A	
		9	0	No Recovery	N/A	N/A	
13	9-6-91 1030	14	6	Gray (5Y, 5/1) medium dense silty sand, wet	SM	N/A	Hnu = 0 ppm Br = 100 cpm α = 0 cpm
		15	5	Same As Above	SM	N/A	
		12	0	No Recovery	N/A	N/A	
14.5	9-6-91 1040	7	6	Gray (5Y, 5/1) medium dense clayey SANDY SILT, wet	ML	N/A	Hnu = 0 ppm Br = 100 cpm α = 0 cpm

NOTES:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1780	COORDINATES: See p 1	DATE 9/5/91	
ELEVATION: See p 1	GWL: Depth NA Date/Time NA	DATE STARTED: 9/5/91	
ENGINEER/GEOLOGIST: Ken Marion	Depth NA Date/Time NA	DATE COMPLETED: 9/6/91	
DRILLING METHODS: 10" Hollow Stem Augers		PAGE 3 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	9-6-91 1048	11	3	Same As Above	ML	N/A	
		14	0	No Recovery	N/A	N/A	
16	9-6-91 1055	8	6	olive brown (2.5Y, 4/3) medium dense Coarse Sand, Saturated	SP	N/A	Hnu = 0 ppm Bγ = 100 cpm α = 0 cpm
		12	6	Same As Above	SP	N/A	
17.5		16	6	Same As Above	SP	N/A	
	9-6-91 1102	26	6	Light olive brown (2.5Y, 5/3) very dense medium SAND with trace gravel, Saturated	SP	N/A	Hnu = 0 ppm Bγ = 100 cpm α = 0 cpm
		25	6		SP	N/A	
19		29	6	SAME As Above	SP	N/A	
	9-6-91 1110	28	6	olive brown (2.5Y, 4/3) dense coarse SAND, Saturated	SP	N/A	Hnu = 0 ppm Bγ = 100 cpm α = 0 cpm
20		32	6	Same As Above	SP	N/A	
				Bottom of Borehole			

NOTES:

001887

402-11-85

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. K.M./T.A. DATE 9-5-91
PROJECT NO. 602.3.29 CHECKED BY JRW DATE 10-8-91
BORING NO. 1780
PIEZOMETER NO. 1780 DATE OF INSTALLATION 9-5-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO NA
FLUID N/A FROM NA TO NA

TYPE OF BIT Bull dog
CASING SIZE (S) USED:
SIZE N/A FROM NA TO NA
SIZE N/A FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 4-inch
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☑
AVERAGE SIZE OF PERFORATIONS .010 inch
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 inch
LENGTH OF PIPE SECTIONS 10.8 ft.
JOINING METHOD Flush-joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION Steel well cover with lock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION ( )	
TOP OF RISER PIPE	1.5 ft.		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	3.0		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP n/A	BOTTOM n/A	TOP NA	BOTTOM NA
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP NA	BOTTOM NA
SAND	TOP 6.0	BOTTOM 18.8	TOP NA	BOTTOM NA
GRAVEL	TOP n/A	BOTTOM n/A	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.0	BOTTOM 18.0	TOP NA	BOTTOM NA
PIEZOMETER TIP	18.8			
BOTTOM OF BOREHOLE	18.8			
GWL AFTER INSTALLATION	7.5 ft. below T.O.C.			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

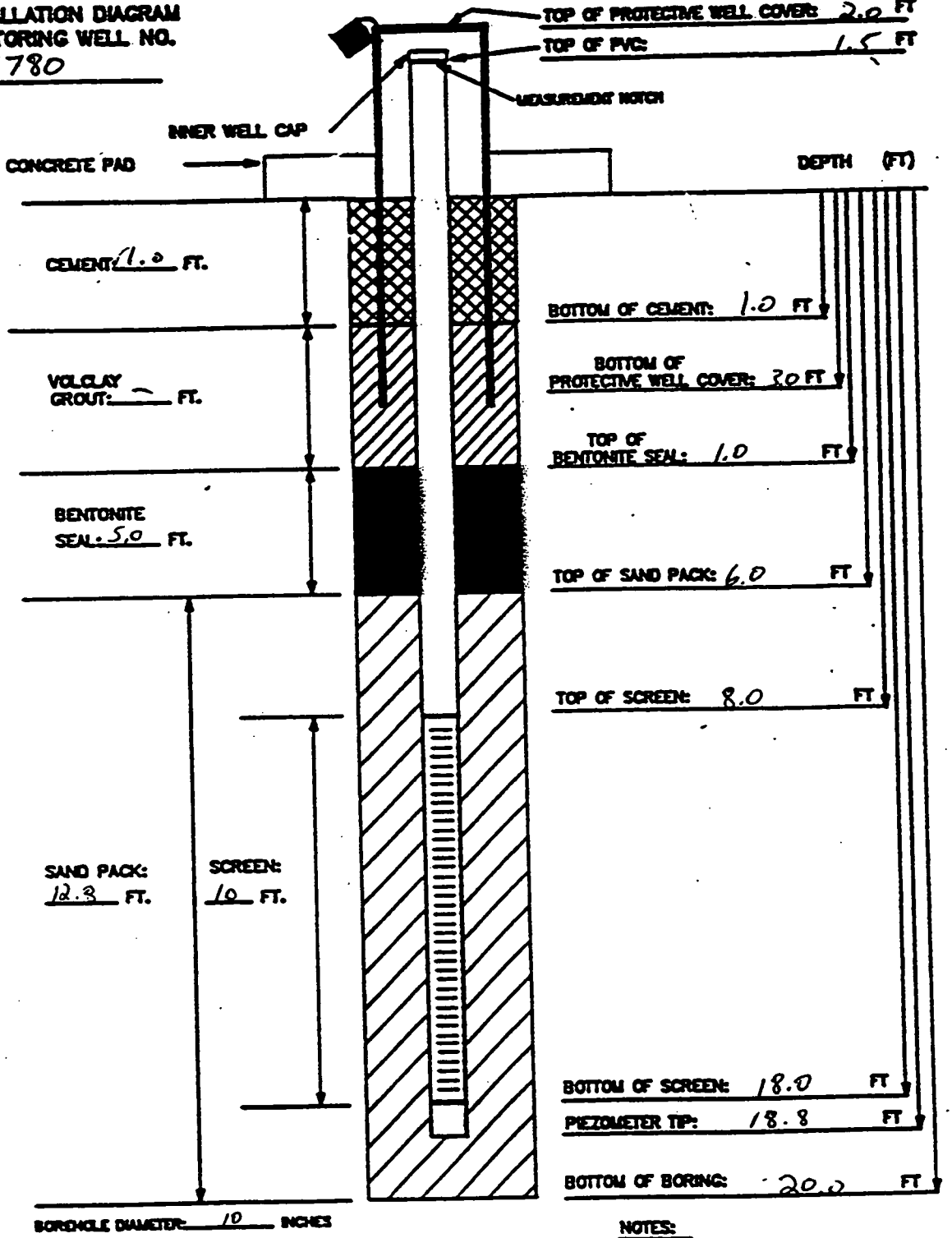
001888

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1780

Stickups

INSTALLATION DATE: 8-6-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: Silica - 6 - 80lb. bags
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT: n/a
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: none
OTHER: Riser pipe and screen are 4" Stainless steel. Screen = .010 slot

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS. T.A. 8-7-91
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.29

GEOLOGIST/ENGINEER: Tom Andersen

FERNALD
RI/FS

Date: 9-9-91
Time: 1300
Page: 1 of 1

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	FMPC RI/FS	SAMPLE LOCATION	1980
PROJECT NUMBER	602-3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	9-9-91	RFA NUMBER	N/A
TIME COLLECTED	13:00	C/C NUMBER	N/A
COLLECTED BY	LM, JH	SAMPLE TYPE	GRD/WTR

SAMPLING INFORMATION

BAROMETRIC PRESSURE	760
AIR TEMPERATURE	24.4
DO SATURATION IN AIR	9.3 PPM
WATER TEMPERATURE	23.°C
DEPTH OF SAMPLE	18.8
WATER LEVEL	7.2' TOC

FIELD READINGS

24°C

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.94	6.95	
SPEC. COND. uMHOS/cm	150MS	149MS	
D.O. MG/L	1.5	1.3	

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
19°C	4	7	19°C	0	15	0	19°C	147	1413	250 ppm Hexane	1207101	55	8.82
OK	✓	✓	OK	✓	✓	✓	OK	✓	✓	✓	✓	✓	✓

WEATHER CONDITIONS: cloudy / Raining

ADDITIONAL REMARKS:

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
71071151	ICM Water Analyzer
A 06345	HNU Meter
N/A	1 l Bailer

EQUIP.	NUMBER
BAILER	
HOSE/S	
PUMP	Teflon
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

(D.18.8) - (W.L. 7.2) = 11.6 Ht. of Water Column

11.6 Ht. of Water Column x .68 = 37.7 (3 Volumes)

11.6 Ht. of Water Column x .65 = 37.7 (5 Volumes)

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	5	91
NO.			
SHEET	1	OF	1

PROJECT NAME FMPC RI/FS PROJECT NO. 6023.29

FIELD ACTIVITY SUBJECT: Perched Water Removal Action

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

700 Meet with field crew
Go to supply trailer

800 Rust employees are working in our site. I tell them we will be bringing the rig in soon.
I meet with Lanny Marshall in the field. I show him the well locations and brief him on how to remove filled drums.

830 The drillers don't show up on site (boring 1780) until now
Apparently they had some more work left to do on the drill rig.

900 The rig is set up to core through the concrete
The Decon area and drums, etc. are in place

900 Health & Safety meeting held by Mark Turner
Mark goes over the Health & Safety plan in great detail

910 Leaving the drill site for lockers (Lunch time)
Jim Capannari and I go to Sears for supplies (i.e. speed wrench, crescent wrench, Sockets, nylon rope, utility knife, and hammer)

930 Tom Anderson is at WMCO overseeing the coring operation
I'm at the office filling out paper work and getting signatures for today's expenses.
I didn't expect to spend over $50 on items
Doug Hurmel says the vertical Boring project is missing the originals of some of my geologic logs. He also says the lab can't take any more samples for awhile
The drillers need a wrench for the hydrant in order to run water through the core bit

1038 Start BZ meter
coring begins

1038 finished coring

1030 leaving ASI

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
Lanny Marshall	None
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
Sunny and hot	None

PERSONNEL ON SITE: Jim Capannari, Tim Anderson, Joe Mulvaney, Bobby Yost, Mark Rehold

SUPERVISOR: Ken Marion 001891 DATE: 9/5/91

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	9 / 4 / 91
NO.	/ /
SHEET	1 OF 1

PROJECT NAME: Fmpc RI/FS
PROJECT NO. 602.3.29
FIELD ACTIVITY SUBJECT: Perched Water Removal Action

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 Meet Field crew at office
Weekly field meeting held by Bruce Myers – He gives out internal dosimetry cards
Tom Anderson gives me the FAOL he wrote on 8/28/91 – I was out sick that day

Bruce calls a rain day – my field crew leaves accordingly
I use the down time to get my paper work in order

000 I go to the farm house to meet with Jim Wheat. Jim's not there.
I have tried to reach him over the phone and at the other work location.
We had planned to have my 6 month review today

There's nothing else I can get done without the drillers today, I go home and take a "rain day"

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None	None
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
rain day	None

PERSONNEL ON SITE:

SUPERVISOR: Ken Marion DATE: 9/4/91

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	6	91
NO.			
SHEET	1	OF	1

PROJECT NAME: FMPC RI/FS — PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Perched Water Removal Action 1780

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 Meet with field crew at ASI
0805 Health & Safety Meeting held at boring 1780
853 Split spoon sample from 1-2.5 ft.
The Bir Frisker read 300 cpm or 200 cpm above background over the soil sample
904 Split spoon sample from 2.5-4.0 ft.
912 4.0-5.5 ft.
916 5.5-7.0 ft.
922 7.0-8.5 ft
940 8.5-10 ft. Beginning of water zone
950 10-11.5 ft.
70 11.5-13 ft
30 13-14.5 ft
18 14.5-16 ft.
55 16-17.5 ft
02 17.5-19 ft.
10 19-20 ft Bottom of bore hole
30 Leave area for Lunch
00 Arrive back at Site
00 Augering hole using 10" hollow stem augers
130 John Vandine brings the riser pipe and screen into the process area
The riser is too long. Since John's accident using the grinder he isn't supposed to cut riser pipe.
00 Mark Rebold brings well sand over to the bore hole
Mark gets a short piece of riser to attach to the pipe that John Vandine brought over. This eliminates having to cut the well using a hack saw
There's a lot of formation sand in this borehole. I expect there may be trouble with the formation sand caving into the bottom of the hole.
730 leaving office

Bir meter 40460 and Δ meter 50750 passed calibration check using a lantern mantle
Hnu S/N 401345 calibration checked w/ isobutylene/air mixture. Calibrated to 55 ppm at a span setting of 3.66

VISITORS ON SITE:
Leo Singleton

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None

WEATHER CONDITIONS:
Sunny and warm

IMPORTANT TELEPHONE CALLS:
None

PERSONNEL ON SITE: Tom Anderson, Joe Medicke, Jim Supernaw, Bobby Cost, Mark Rebold

SUPERVISOR: Ken Matson

001893

DATE: 9/6/91

FERNALD
RI/FS

Date: 9-17-91
Time: 0900
Page: 1 of 1

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WATER QUALITY FIELD COLLECTION REPORT

FADL REF#	data 9-17 to 9-19

PROJECT NAME	FEMP RI/FS	SAMPLE LOCATION	1780
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	9-17-91	RFA NUMBER	N/A
TIME COLLECTED	1000	C/C NUMBER	N/A
COLLECTED BY	TA, J.L. JM.	SAMPLE TYPE	ground water

SAMPLING INFORMATION

AROMETRIC PRESSURE	754
R TEMPERATURE	unknown
O SATURATION IN AIR	N/A
ATER TEMPERATURE	21.3 / 21.8
EPTH OF SAMPLE	10.0 ft.
ATER LEVEL	7.46 ft. TOC

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.75	N/A	6.82
SPEC. COND. uMHOS/cm	1.52mS	N/A	1.53mS
D.O. MG/L	N/A	N/A	N/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

H mpt	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low		Spec. Cond. High		HNU Stand.	HNU Lot #	HNU Reading	HNU Span
0	4	7	N/A	N/A	N/A	N/A	N/A	~~147~~ 73.8	~~1413~~ 53.4	~~1413~~ 7.3	~~1413~~ 6.07				
9:55	3.81	6.98	OK	N/A	N/A	N/A	OK	73.0	51.7	7.5	6.44				

ATHER CONDITIONS	sunny and mild mid 70's
DITIONAL REMARKS	used teflon bailers to purge and sample.

TEST EQUIPMENT LIST

UIPMENT NUMBER	EQUIPMENT NAME

EQUIP.	NUMBER
BAILER	
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

___) - (W.L. ___) = ___ Ht. of Water Column

___ Ht. of Water Column x ___ = ___ (3 Volumes)

___ Ht. of Water Column x ___ = ___ (5 Volumes)

purged well dry purged 3 gallons

001894

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	07	91
NO.			
SHEET	1	OF	

PROJECT NAME: Fernald LFS | PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Perched water removal wells #1780

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 - arrive at office; get paperwork from Ken Marion (Ken will be supervising K-65 for the rest of the week, Tom A. will be working in his place) go dress out.
0730 - arrive at site.
0745 - get supplies Ready
0800 - Tailgate Safety Meeting
0815 - Start setting well.
1030 - Had trouble with sand coming up around well pipe.
- Called Ken M. to confirm well depth.
1130 - Complete well (1780) used 6 bags of sand, 3 buckets Bentonite.
Bottom of Well 18.7 ft.; Screen 18.0 - 8.0; Sand to 6.0.
Bentonite to 1.0 ft.
1200 - Leave for Lunch
1300 - go to ASI trailer for supplies
1330 - arrive at site. drillers pick up decomned equipment; begin setting up to sample.
? - call 202 to have overhead electric shut off.
1420 - get confirmation from 202 that power has been shut off.
1430 - meet with Mark T. for H&S pre-work checklist review
1445 - sample for well #1782
1630 - finish sampling; clean up site
1715 - leave site to changeout.
1740 - Talk w/ Bruce M. at office
1800 - leave for the day.

VISITORS ON SITE: Mark Turner, 202

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
Fog in the morning, cool, then sunny and warm

IMPORTANT TELEPHONE CALLS: TJ 8-2-91
1400 - called 202 to get ~~that~~ overhead power shut off.

PERSONNEL ON SITE: Tom Anderson, Jim Capannari, Joe Mediate, Bobby Yost, Mark Lebold

SUPERVISOR: Bruce Myers

DATE: 8-07-91

This is a copy verified by Tom Anderson.
Tom Anderson
10-29-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

JW 9.23.91

5711

OJECT NUMBER: 602 3.29	PROJECT NAME: FMPC RI/FS		
RING NUMBER: 1761	COORDINATES: 40,540.39 E 41,370.[illegible]	DATE: 9-10-91	
VATION: 579.3	GWL: Depth N4 Date/Time N/A	DATE STARTED: 9-10-91	
GINEER/GEOLOGIST: T. Anderson	Depth N/A Date/Time N/A	DATE COMPLETED: 9.10.91	
LLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 3	

(FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	7	6	Very stiff, Brown (10 YR 4/4) moist. silty clay trace gravel	CL	3.5	HNU = 0 ppm; α = 0 cpm; Bγ = 160 cpm
		8	6	SAA	CL		
		8	4	SAA	CL		
		5	6	SAA	CL	3.5	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
		8	6	SAA	CL		
		7	6	SAA	CL		
		7	6	medium stiff, dark grayish brown (10 YR 3/2). silty clay trace wood and gravel.	CL	1.5	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
		7	6	SAA	CL		
		6	2	SAA	CL		
		4	0	NR	CL		HNU = Ø ppm; α = Ø cpm; Bγ = Ø cpm
		4	0	NR	CL		
		5	0	NR	CL		
		4	6	Soft, mottled gray (10 YR 3/1) and Brown (10 YR 3/2) silty clay trace wood pieces and gravel	CL	.25	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
		5	6	SAA	CL		
		4	6	SAA	CL		

TES:

ing Contractor Penn Drill

ent CME 45 Auger Drill

er: Bobby Yost

lper Mark Pehold

o Assistant Tim Capuanar.

J Serial #

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm; LEL = N/A %; O_2 = N/A %

SAA=Same As Above

NR=No Recovery

001896

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JECT NUMBER: 602 3.29	PROJECT NAME: FMPC RI/FS		
ING NUMBER: 1781	COORDINATES: See p1		DATE: 9-10-91
VATION: See p1	GWL: Depth NA	Date/Time NA	DATE STARTED: 9/10/91
INEER/GEOLOGIST:	Depth NA	Date/Time NA	DATE COMPLETED: 9/10/91
LLING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 3

SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
VA	1	6	very soft, mottled brown (10 YR 5/4), very moist sandy clay trace gravel	CL	.1	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
	2	6	SAA	CL	n/A	
	1	1	SAA	CL	n/A	
	1	6	loose, brown (10YR 5/3), wet medium sand	SP	n/A	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
	1	6	soft, gray (10YR 5/1), very moist sandy clay trace gravel	CL	n/A	
	1	6	loose, brown (10YR 5/3), wet course sand trace gravel	SP	n/A	
	6	6	SAA	SP	n/A	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
	11	6	medium dense, brown (10YR 5/3) silty fine sand	SM	n/A	
	16	5	SAA	SM	n/A	
	10	6	SAA	SM	n/A	HNU = 0 ppm; α = 0 cpm; Bγ = 140 cpm
	14	6	SAA	SM	n/A	
	19	6	SAA	SM	n/A	
	8	6	medium dense, grayish-brown (10YR 5/2) medium to course sand trace gravel	SP	n/A	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
	17	6	SAA	SP	n/A	
	14	6	medium dense to dense, brownish-gray (10YR 6/2) fine to medium sand trace angular gravel	SM	n/A	

ES:

ng Contractor Penn drill

ment CME-45 auger drill

Bobby Yost

Mark Lebolet

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.29	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1781	COORDINATES: See p1	DATE: 9-10-91	
ELEVATION: See p1	GWL: Depth NA Date/Time	DATE STARTED: 9/10/91	
ENGINEER/GEOLOGIST: T. Anderson	Depth NA Date/Time	DATE COMPLETED: 9/10/91	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 8	

(FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	13	6	SAA	SM	n/A	HNU = 0 ppm α = 0 cpm Bγ = 120 cpm
		20	6	SAA	SM	n/A	
6		19	6	dense, brown (10YR 5/4) and gray (10YR 6/1) silty sand	SM	n/A	
		10	6	SAA	SM	n/A	HNU = 0 ppm α = 0 cpm Bγ = 100 cpm
7		11	6	SAA	SM	n/A	
		9	6	SAA	SM	n/A	
		12	6	medium dense, gray (10YR 6/1) silty fine sand	SM	n/A	HNU = 0 ppm α = 0 cpm Bγ = 110 cpm
		18	6	SAA	SM	n/A	
		14	6	SAA	SM	n/A	
		14	6	SAA	SM	n/A	

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: CME-45 auger Dr. 11

Bobby Yost

Mark Rebold

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

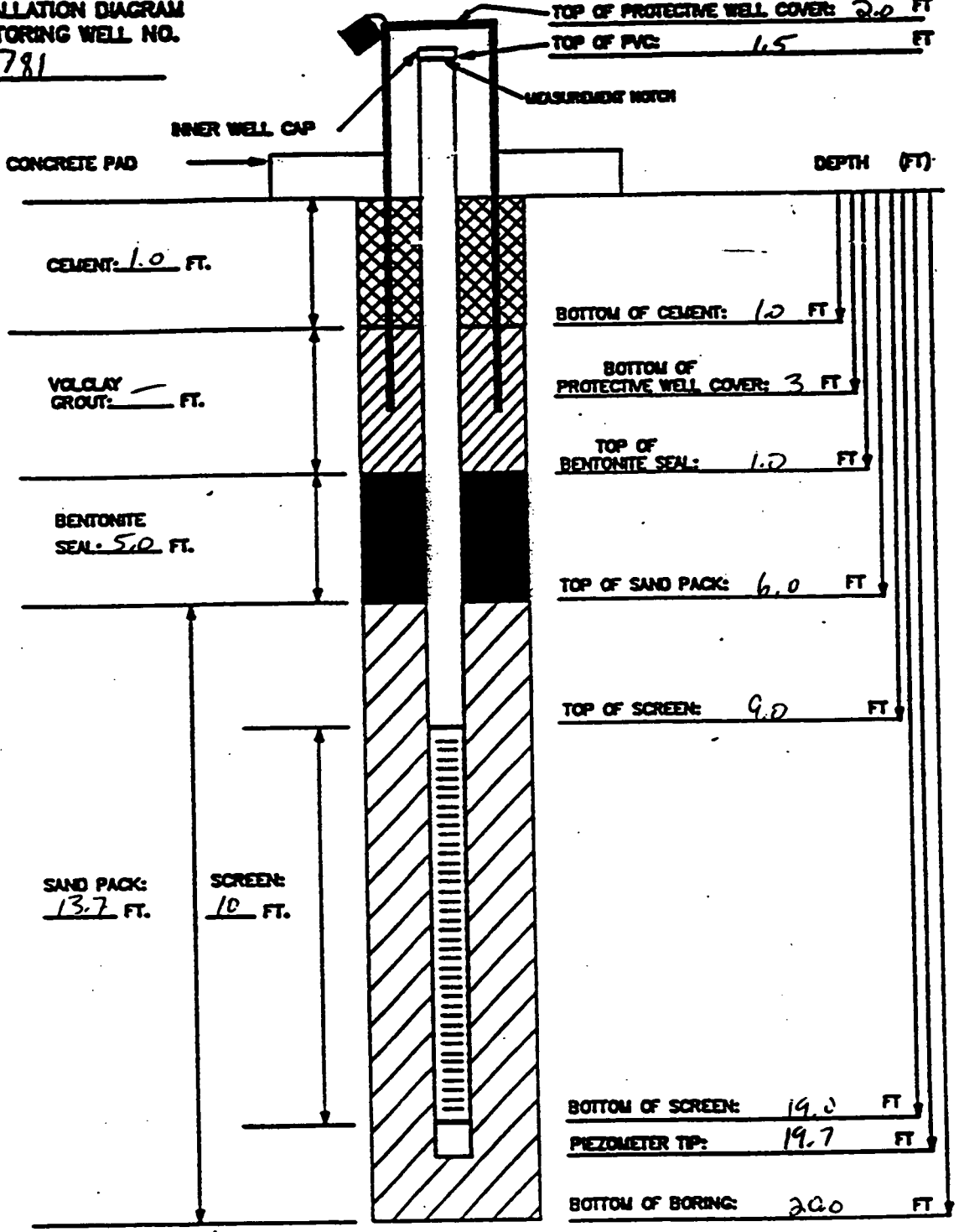
NR=No Recovery

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1781

Stickups

INSTALLATION DATE: 9-10-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY:
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: none
OTHER: Riser and screen are 4" stainless steel.

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.29

GEOLOGIST/ENGINEER: T. Anderson

001899

ERNALD
RI/FS

Date: 9-17-91
Time: 0900
Page: 1 of 1

5711

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#

ROJECT NAME	FEMP RI/FS	SAMPLE LOCATION	1781
ROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	n/A
ATE COLLECTED	9-17-91	PFA NUMBER	n/A
ME COLLECTED	0900	C/C NUMBER	n/A
OLLECTED BY	TA, J.L., J.M	SAMPLE TYPE	groundwater

SAMPLING INFORMATION

OMETRIC PRESSURE	754
TEMPERATURE	unknown
ATURATION IN AIR	n/A
ER TEMPERATURE	19.9 / 19.3
TH OF SAMPLE	9.5 ft.
ER LEVEL	6.60 ft. TOC

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.69	n/A	6.90
SPEC. COND. uMHOS/cm	.98mS	n/A	1.03mS
D.O. MG/L	n/A	n/A	n/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

pH Std	pH Std	D.O. Temp	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp	Spec. Cond. Low		Spec. Cond. High		HNU Stand.	HNU Lot #	HNU Reading	HNU Span
4	7	n/A	n/A	n/A	n/A	n/A	73.9 ~~147~~	53.4 ~~107~~	~~1418~~ 707.8	627				
3.84	6.98	OK	n/A	n/A	n/A	OK	73.0	57.7	715	644				

THER CONDITIONS: sunny and mild mid 70s

IONAL REMARKS: used teflon bailers for purging and sampling

TEST EQUIPMENT LIST

MENT NUMBER	EQUIPMENT NAME
NA	NA

EQUIP.	NUMBER
BAILER	NA
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

) - (W.L. ____) = ____ Ht. of Water Column

____ Ht. of Water Column x ____ = ____ (3 Volumes)

____ Ht. of Water Column x ____ = ____ (5 Volumes)

Purged well dry ~20 gallons

001900

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	10	91
NO.	602	3.	29
SHEET	1	OF	1

NAME Fernald RI/FS | PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Perched water well installation

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

700 - weekly field meeting
730 - gather paper work, and signatures on drum labels;
- Talk to Jon Van Dyne to tentatively arrange for drum disposal;
750 - go to plant, dress out, go to site;
800 - call 202 to have electric shut off, informed that they will get to it in a few minutes and will call;
820 - call 202, again, informed that they will get with electric and call back;
845 - 202 stops by to inform that power has been shut off;
- begin setting up to drill;
900 - Jim C. conducts tailgate safety meeting;
910 - Begin drilling 1781;
30 - finish drilling 1781, dropped well pipe into boring, when the plug was pushed out, formation sand surged into the augers around the screen. Upon measure, there was 4 feet of formation sand around the screen;
- begin pulling the augers, will get a new plug at lunch and redrill the same hole, and attempt to set the well this afternoon;
10 - all augers are out of the ground, go to dress out and go to lunch;
0-1430 - redrill 1781, drop well pipe through augers, push plug out, sand heave pushes bottom of well to 19.0 feet, no formation sand around well screen;
0 - install sand pack - 5 bags of sand
10 - finish sand pack and pulling augers, add bentonite seal 3 buckets.
30 - install protective casing, clean up site, dispose of garbage. bottom of well @
35 - call 202 to inform them that the derrick on the drill rig was down, and they can turn the electric back on; dress out and go to the office.
0 - leave for the day

VISITORS ON SITE:
Mark Turner - Health and Safety

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
Sunny and warm.

IMPORTANT TELEPHONE CALLS:
202 - shut off overhead electric.

PERSONNEL ON SITE: Tom Anderson, Jim Lapurnari, Joe Melnite, Bobby Yost, Mark Rebold

SUPERVISOR:

DATE:

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	08	16	91
NO.			
SHEET	1	OF	1

5711

PROJECT NAME: Fernald RI/FS. PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Perched water well sampling

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 - arrive at office, talk with Tom M. about what has been done previously on purging the perched water wells.

0800 - Talk to Dave Spatta about previous samples - will meet him at the sample trailer to review 1783 and 1784 samples. go to sample trailer.

0815 - arrive at sample trailer. go through previous well purging paper work.

0840 - Dave spatta arrives, 1783 samples were left in cooler ~~unlabelled~~ TA 9-16-91 unlable, 1784 samples were incomplete - missing metals filtered. Decide to resamples these wells.

0915 - Ron G. arrives at sample trailer arrange to meet at office to pick up meters, Finish going over paper work.

1000 - check out BG from Ron G., go to process area to inventory of water in drums → need 3 pallets (2 drums left off pallets), one drum left unsealed, half full of water, & also need keys to procovers. return to ASI to track down key

1035 - Doug H. said to get key at security shack at 1300

1300 - pick up keys from security

1315 - Keys from security are not the keys on the wells, need master lock.

1345 - get master lock key from Bill H., go dress out.

1425 - set up at 1783 and 1784 take water levels from TOC
- 1783 - 10.52 ft.; 1784 - 10.93 ft.

1445 - take pH, spec. cond., Temp. using water analyzer (see attached forms) ~~calc~~

1510 - purge 1784 dry - removed 10 gallons

1610 - purged 1783 dry - removed 6 gallons

1645 - clean up site; dress out.

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
Sunny, very hot (95°)

IMPORTANT TELEPHONE CALLS:

PERSONNEL ON SITE: Tom Anderson, Joe Holtgrewe, Joe Mediate

SUPERVISOR:

DATE:

RNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	17	91
NO.			
SHEET	1 OF 2		

NAME Fe[redacted] RI/FS | PROJECT NO. 602.3.29

D ACTIVITY SUBJECT: [redacted] perched water wells

CRIPTION ON DAILY ACTIVITIES AND EVENTS:

730 - Arrive at office, get paperwork from Bruce tell him what the status of the purging of perched water wells.

800 - go to sample trailer, pick up sample bottles, coolers, ice, and RFA forms. Don M. could not find C-O-C forms.

830 - go to new trailer to see if Larry M. had any at his desk, He had none.

855 - meet with Jim W. in Visitors locker room, tell him of our need for C-O-C forms. He said he will track some down.

910 - Dress out, go to site, begin setting up to purge. Place plastic around wells, check calibration of water analyzer. (see attached ~~barometric pressure~~ forms).

30 - check water levels: 1779 - 7.12 ft.; 1780 - 7.46 ft.; 1781 - 6.60 ft.; measured from Top of Casing (TOC) 1782 - 7.22 ft.

- measure Temp, Specific Conductivity, pH of 1779 - 1782. (see attached forms)

5 - begin purging 1781 - removed 20 gallons to dry

0 - decon bailer - Alconox → DI water → methanol → DI → DI.

0 - begin purging 1779 - removed 10 gallons to dry;

0 - decon bailer - Alconox → DI → methanol → DI → DI.

- clean up site

0 - leave for lunch

0 - go to sample trailer pick up C-O-C forms and sample numbers

- dress out

0 - set up on 1785, check water level - 8.60 ft TOC

5 - removed 20 gallons - water level - 9.80

ORS ON SITE:
Ken Grupski - QA
Ted Hunt - H&S

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

HER CONDITIONS:
Sunny and mild

IMPORTANT TELEPHONE CALLS:

RSONNEL ON SITE:

RVISOR:

DATE:

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	17	91
NO.			
SHEET	2	OF	

PROJECT NAME: Fernald RI/FS

PROJECT NO. 602-3.29

FIELD ACTIVITY SUBJECT: Purging perched water wells

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1515 - removed 25 more gallons of water from 1785, checked water level = 10.16
- Total of 45 gallons of water removed from 1785.
- clean up site → drill sample first thing in the morning.

355 - check water level in 1784 = 10.97 ft. below TOC

600 - check water level in 1783 = 9.83 ft. below TOC

610 - Label drums

630 - ~~purged~~ set up on 1780 and 1782

645 - purged 1780 → 25 gallons removed

715 - purged 1782 → 25 gallons removed

745 - cleanup site

830 - dress out, go back to office, and to sample trailer.

900 - leave for day

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
Ted Hunt - H&S Ken Grunski - QA	
WEATHER CONDITIONS:	**IMPORTANT TELEPHONE CALLS:**
Sunny and warm	

PERSONNEL ON SITE: Tom Anderson, Jim Capumuri, Joe Mediati, Joe Holtgreve

SUPERVISOR: DATE:

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	18	91
NO.			
SHEET	1	OF	1

NAME Fernald RI/FS PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Sampling perched water wells

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

700 - arrive at office, get a vehicle, talk to Brice M.
730 - go out to sample trailer to pick up sample bottles, numbers, coolers ice, water analyzer, and various supplies.
810 - calibrate water analyzer with Don Nelson
930 - go to ASI to pick up HW
00 - dress out and go to 1785 and set up to sample, tailgate safety meeting
045 - Take water level - 8.60 ft. TOC (1785)
- Take water analyzer reading (see attached tables)
10 - Begin sampling well 1785
10 - finish sampling well 1785; clean up site
35 - dress out for lunch
25 - go to sample trailer to see if bottles came in (not in); pick up clear tape, garbage bags, and paper towells, go to process area.
00 - set up 1783 and 1784 for sampling.
15 - take water levels 1783 - 9.85 ft.(TOC); 1784 - 10.60 ft.(TOC).
- take water analyzer readings (see attached tables)
sampled well 1783
35 - sampled well 1784
30 - Jim Wheat called to say that we should finish sampling 1784 and clean up for the day due to the rain.
0 - clean up site; go to sheltered area to get samples smeared for release from process area;
30 - Ted H. takes smears to be analyzed
15 - Smears cleared to be taken off site;
0 - take samples to the sample trailer, to check in samples, and check labels and COC/RFA
0 - leave for the day.

VISITORS ON SITE:
Ken Brunski - QA
Ted Hunt - H&S

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

OTHER CONDITIONS:
cloudy and cool before lunch; rain developing during the afternoon

IMPORTANT TELEPHONE CALLS:

PERSONNEL ON SITE: Tom A, Jim C., Joe M., Joe H.

SUPERVISOR:

DATE:

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	19	91
NO.	602	3	29
SHEET	1	OF	1

5711

NAME Fernald RI/FS | PROJECT NO. 602.3.29

ELD ACTIVITY SUBJECT: Sampling Perched water wells

ESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0 - go out to sample trailers to pick up coolers, bottles, ice, etc;
15 - go to plant, dress out;
45 - Tailgate safety meeting, begin setting up site for sampling
- calibrate water analyzer
45 - finish calibrating water analyzer begin sampling 1779 and 1781
0 - finish sampling both wells; place pH strips and chain of custody tape on bottles; all bottles placed in coolers with ice.
5 - straighten up site - secure for lunch
5 - dress out; go to lunch;
00 - dress out go to site;
20 - set up site for sampling
45 - begin sampling 1780 and 1782;
10 - finish sampling both wells; decon bailer, all samples pH and chain of custody tape, placed in coolers on ice.
- Collect rinsate sample, Ted H. starts smears to get samples out of plant
50 - clean up site; dispose of trash; paint water drums;
15 - Ted finished smears and took them to be analyzed;
- wait for smears to be released
- sample smears all o.k., get samples out of process area and out to trailers
- check in samples; put samples in Refrigerator, check seal labels and C-O-C/RFA.
30 - leave for the day.

TORS ON SITE:
Ted Hunt - H&S

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

THER CONDITIONS:
Sunny - 60°; light breeze

IMPORTANT TELEPHONE CALLS:

ERSONNEL ON SITE: T. Findlay, J. Cupanari, Joe Mediate, Joe Holsinger, Tim Cherry

ERVISOR: DATE:

by Tom Anderson.
Tom Anderson
10-29-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

JAW 9.23.91

JECT NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS		
ING NUMBER: 1787 1787-HW	COORDINATES: N 40,532.34 E 13,360.34	DATE: 9-09-91	
VATION: 579.16 10 Feb 91	GWL: Depth NA Date/Time NA	DATE STARTED: 9-09-91	
INEER/GEOLOGIST: T.A.	Depth NA Date/Time NA	DATE COMPLETED: 9-9-91	
LING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 3	

(FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		6	6	Stiff, Brown (10 YR 4/3), moist silty clay trace limestone gravel	CL	2.25	HNU = 0 ppm; α = 0 cpm; Bγ = 160 cpm
		11	6	SAA	CL	SAA	
		8	2	SAA	CL	SAA	
		5	6	SAA	CL	2.0	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
		6	6	SAA	CL	SAA	
		10	1	SAA	CL	SAA	
		7	6	SAA	CL	2.5	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
		11	6	Stiff, Brownish gray (10 YR 6/2), moist, moderate plastic, ~~silty clay~~ silty clay with limestone gravel	CL	SAA	
		11	1	Stiff, gray (10 YR 5/1), moist, plastic trace sand and gravel CLAY	CL	SAA	
		11	0	NR		NR	HNU = 0 ppm; α = 0 cpm; Bγ = 0 cpm
		8	0	NR		NR	
		7	0	NR		NR	
		3	6	Medium stiff, brown (10 YR 4/3), very moist, silty clay trace sand and gravel	CL	1.0	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
		4	6	SAA	CL	SAA	
		4	2	SAA	CL	SAA	

TES:

ling Contractor Penn Drill

ipment CME 45 auger drill

Bobby Yost

lper Mark Rebold

o Assistant Jim Cuganovich

U Serial #

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm; LEL = N/A %; O_2 = N/A %

SAA=Same As Above

NR=No Recovery

001907

VISUAL CLASSIFICATION OF SOILS

ECT NUMBER: 602 3.29	PROJECT NAME: FMPC RI/FS		
NG NUMBER: 1782	COORDINATES: See p1		DATE: 9.9.91
ATION: See p1	GWL: Depth NA	Date/Time NA	DATE STARTED: 9.9.91
NEER/GEOLOGIST: TA	Depth NA	Date/Time NA	DATE COMPLETED: 9.9.91
LING METHODS: HOLLOW STEM AUGER			PAGE 2 OF 3

SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	2	6	soft, Brown (10YR 4/3), wet, silty clay with sand and gravel	CL	.5	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
	2	6	SAA	CL	SAA	
	3	5	SAA	CL	SAA	
	1	6	loose, Brown (10 YR 5/3), wet, fine to medium sand, trace gravel and clay	SM	N/A	HNU = 0 ppm; α = 0 cpm; Bγ = 120 cpm
	2	6	SAA	SM	N/A	
	2	1	SAA	SM	N/A	
	7	6	medium dense, Brown (10 YR 5/3) medium SAND trace gravel	SP	N/A	HNU = 0 ppm; α = 0 cpm; Bγ = 100 cpm
	9	6	SAA	SP	N/A	
	12	6	SAA	SP	N/A	
	8	6	SAA	SP	N/A	HNU = 0 ppm; α = 0 cpm; Bγ = 125 cpm
	13	6	SAA	SP	N/A	
	10	6	SAA	SP	N/A	
	9	6	SAA	SP	N/A	HNU = 0 ppm; α = 0 cpm; Bγ = 150 cpm
	10	6	SAA	SP	N/A	
	10	6	SAA	SP	N/A	

ES:

g Contractor Penn Drill

g Equipment CME-45 auger drill

Bobby Yost

Mark Rebold

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER: 602 3.29	PROJECT NAME: FMPC RI/FS		
RING NUMBER: 178	COORDINATES: See p 1	DATE: 9.9.91	
VATION: See p 1	GWL: Depth Na Date/Time Na	DATE STARTED: 9.9.91	
GINEER/GEOLOGIST: TA	Depth Na Date/Time Na	DATE COMPLETED: 9.9.91	
LLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 3	

(FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
		9	6	SAA	SP	n/A	HNU = 0 ppm α = 0 cpm BY = 100 cpm
		10	6	SAA	SP	n/A	
		15	6	medium dense to dense, grayish brown, wet, medium to coarse SAND trace gravel (10YR 3/2)	SP	n/A	
		9	6	SAA	SP	n/A	HNU = 0 ppm α = 0 cpm Bγ = 100 cpm
		12	6	SAA	SP	n/A	
		17	6	SAA	SP	n/A	
		19	6	SAA	SP	n/A	HNU = 0 ppm α = 0 cpm Bγ = 100 cpm
		27	6	SAA	SP	n/A	
		23	6	SAA	SP	n/A	
		22	6	SAA	SP	n/A	

S:

) Contractor Penn drill

) Equipment CME -45 auger drill

Bobby Yost

Mark Rebold

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

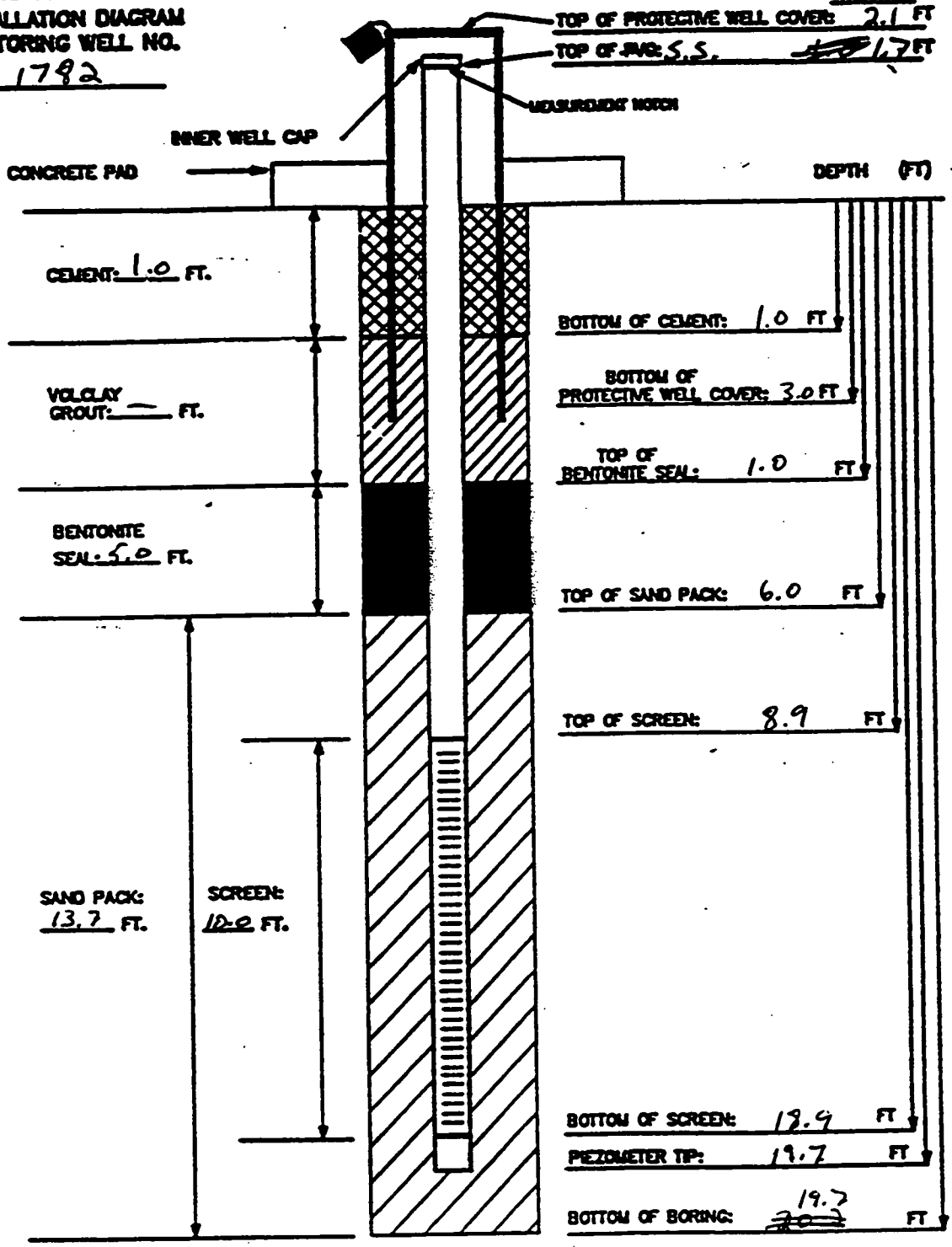
5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1782

Stickups

INSTALLATION DATE: 9-8-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 3 buckets
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 602.3.29

GEOLOGIST/ENGINEER: T. Anderson

ERNALD
RI/FS

Date: 9-17-91
Time: 0900
Page: 1 of 1

WATER QUALITY FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	FCMP RI/FS	SAMPLE LOCATION	1782
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	n/A
DATE COLLECTED	9-17-91	RFA NUMBER	n/A
TIME COLLECTED	1000	C/C NUMBER	n/A
COLLECTED BY	TA, JC, JM.	SAMPLE TYPE	ground water

SAMPLING INFORMATION

ROMETRIC PRESSURE	754
TEMPERATURE	unknown
SATURATION IN AIR	n/A
TER TEMPERATURE	19.9 / 19.4
TH OF SAMPLE	10.0 ft.
TER LEVEL	7.22 ft. TOC

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.61	n/A	7.66
SPEC. COND. uMHOS/cm	421 US	n/A	400 US
D.O. MG/L	n/A	n/A	n/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low		Spec. Cond. High		HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7	n/A	n/A	n/A	n/A	n/A	~~147~~ 73.5	58.9	~~1413~~ 705	6.67	NA	NA	NA	NA
	3.94	6.98	OK	n/A	n/A	n/A	OK	73.0	57.7	715	6.44	NA	NA	NA	NA

THER CONDITIONS: sunny and mild - mid 70's

TIONAL REMARKS: fused teflon bailers for purging and sampling

TEST EQUIPMENT LIST

PMENT NUMBER	EQUIPMENT NAME
NA	NA

EQUIP.	NUMBER
BAILER	NA
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

___) - (W.L. ___) = ___ Ht. of Water Column

___ Ht. of Water Column x ___ = ___ (3 Volumes)

___ Ht. of Water Column x ___ = ___ (5 Volumes)

→ removed 25 gallons to dry

001911

5711

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	9 / 08 / 91
NO.	602 / 3 / 29
SHEET	1 OF 1

PROJECT NAME: Fernald RI/FS

PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Ditched water well installation

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 - arrive at office; get paper work together, go dress out;
0745 - arrive at plant 2/3; informed by drillers that equipment still not out of decon;
0800 - call 202 to have overhead electric shut off prior to drilling;
0810 - 202 visited site to confirm that electric has been shut off;
0900 - got augers back from decon; set up to install well;
0940 - begin installing well 1782;
1230 - finish setting well 1782, 4 bags sand, 3 buckets bentonite,
1245 - clean up and secure site, dress out for lunch;
1345 - return to site, take equipment to decon, drum excess cuttings finish cleanup work area;
1450 - take garbage to disposal area;
- call 202 to have rest equipment and signs moved from the work area surrounding well 1781;
1520 - 202 arrives, move equipment and signs out of 1782 area;
1550 - move drill rig from 1782 and set up on 1781;
1615 - go to decon to check on equipment;
1630 - dress out
1645 - go to trailers to check on equipment; pick up gloves, boot covers, tyveks;
1730 - return to office, finish up paperwork;
1800 - leave for the day.

VISITORS ON SITE: Mark Turner (HP)
202

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
Sunny and warm

IMPORTANT TELEPHONE CALLS:
~~2-20~~ 202 to have electric shut off

PERSONNEL ON SITE: Jim Cunningham, Joe Nedinik, Tom Anderson, Bobby Yost, Mark Rybold

SUPERVISOR:

DATE: 9-08-91

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	9	09	91
NO.	602	3.	29
SHEET	1	OF	

NAME Fernald RI/FS | PROJECT NO. 602.3.29

FIELD ACTIVITY SUBJECT: Perched water wells installation

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 - meet at office; make copies of field forms; drillers are completing weekly paper work.
0730 - dress out go to site;
0800 - call control and 202 to have electric turned off;
0815 - 202 stopped by site to confirm that electric has been shut off;
- set up site for well 1781 installation.
0845 - begin ~~auging~~ sampling for 1781
115 - finish sampling 1781; secure site, dress out for lunch;
230 - return to site, augers still aren't out of decon;
1300 - go pick up drums and pallets;
1330 - check with decon, augers still not completed
1430 - augers completed, begin augering 1782;
1530 - plug fell out of the auger, had to pull the augers and try to fit another one; 45 minute delay due to rain;
1700 - drillers can't get a plug to fit. have to make a new one;
- secure site and leave site to dress out;
1735 - leave process area, go to office;
1745 - check in with Bruce M.;
1800 - leave for the day.

VISITORS ON SITE:
Mark Turner H&S.

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
mostly to party cloudy, hot, and humid.

IMPORTANT TELEPHONE CALLS:
call 202 to have electric turned off.

PERSONNEL ON SITE: Tom Cinderson Bobby Yost Jim Lapunnar, Joe Medinte, Mark Kirby

SUPERVISOR: DATE:

ERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS FIELD ENG./GEO. T. Andersen DATE 9-9-91
PROJECT NO. 602.3.29 CHECKED BY Jm DATE 9.25.9.
BORING NO. 1782
PIEZOMETER NO. 1782 DATE OF INSTALLATION 9-8-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID n/A FROM NA TO NA
FLUID n/A FROM NA TO NA

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE n/A FROM NA TO NA
SIZE n/A FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 4-inch
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☑
AVERAGE SIZE OF PERFORATIONS .010 inch
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL Stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 inch I.D. 4-inch
LENGTH OF PIPE SECTIONS 10.8 ft.
JOINING METHOD Flush-joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION steel well cover with lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	1.7			
GROUND SURFACE	0.0		579.6	
BOTTOM OF PROTECTIVE PIPE	3.0		576.6	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP n/A	BOTTOM NA	TOP NA	BOTTOM NA
BENTONITE	TOP 1.0	BOTTOM 6.0	TOP 578.6	BOTTOM 573.6
SAND	TOP 6.0	BOTTOM 19.7	TOP 573.6	BOTTOM 559.9
GRAVEL	TOP n/A	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8.9	BOTTOM 18.9	TOP 570.7	BOTTOM 560.7
PIEZOMETER TIP	19.7		559.9	
BOTTOM OF BOREHOLE	19.7		559.9	
SWL AFTER INSTALLATION	7.2 ft. TOC.			

PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS

ERNALD
RI/FS

This is a copy verified by Ken Marion
JW 9-25-91

VISUAL CLASSIFICATION OF SOILS

JOB NUMBER: 602-2795 3-29 K.M. 8-29-91	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1783	COORDINATES: N480680.772, 380507.8	DATE: 8-10-91	
ELEVATION: 579.9	GWL: Depth 8.95 Date/Time 8-25-91 / 1030	DATE STARTED: 8-10-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth NA Date/Time NA	DATE COMPLETED: 8-10-91	
DRILLING METHODS: 10" O.D. Hollow stem Auger		PAGE 1 OF 3	

(ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	8-10-91 1040	10	6	Light gray (10YR, 7/1) medium dense gravel and sand, dry	GP	N/A	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		8	5	olive gray (5Y, 5/2) stiff CLAY with gravel, dry, non plastic	CL	1.25	
5		10	0	No Recovery	N/A	N/A	
	8-10-91 1045	5	6	olive gray (5Y, 5/2) very stiff moist CLAY, medium plasticity	CL	2.75	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		5	2	Same As Above	CL	2.75	
		7	0	No Recovery	N/A	N/A	
	8-10-91 1050	4	6	olive (5Y, 5/3) hard CLAY with sand and gravel, trace wood fragments, damp, low plasticity	CL	>4.5	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		6	6	Same As Above	CL	>4.5	
5		7	1	Same As Above	CL	>4.5	
	8-10-91 1055	4	6	Light olive brown (2.5Y, 5/3) hard CLAY with trace sand and gravel, damp, low plasticity	CL	4.0	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		5	2	Same As Above	CL	4.0	
0		7	0	No Recovery	N/A	N/A	
	8-10-91 1115	5	6	A light olive brown (2.5Y, 5/3) and dark gray (2.5Y, 4/0) very stiff CLAY	CL	2.25	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		6	6	with trace sand and gravel, trace yellowish brown (10YR, 5/6) mottling	CL	2.25	
5		9	4	damp, medium plasticity	CL	2.25	

NOTES: Contractor: Penn Drill
Rig: CME-45

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color chart

Driller: Craig Coulter
Assistant Driller: John Strapazzon
Geo Assistant: Jim Capanari

Hnu S/N: A01345 — 0 ppm
Bγ S/N: 46406 — 240 cpm
α S/N: 75242 — 0 cpm
} Background levels

402-11-86

VISUAL CLASSIFICATION OF SOILS

RO[illegible] NUMBER: 602.~~27.95~~ 3.29	PROJECT NAME: FMPC RI/FS		
ORING NUMBER: 1783	COORDINATES: See p1	DATE 8-10-91	
LEVATION: See p1	GWL: Depth 10.95 Date/Time 8-25-91/1030	DATE STARTED: 8-10-91	
NGINEER/GEOLOGIST: Ken Morton	Depth NA Date/Time NA	DATE COMPLETED: 8-10-91	
RILLING METHODS: 10" O.D. Hollow Stem Auger		PAGE 2 OF 3	

DEPTH 1 ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	8-10-91 1120	3	6	Light olive brown (2.5Y, 5/3) stiff CLAY with gray (2.5Y, 5/0) and yellowish	CL	2.0	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		3	6	brown (10YR, 5/6) mottling, damp high plasticity	CL	2.0	
9.0		4	4	Same As Above	CL	2.0	
	8-10-91 1124	5	6	Light olive brown (2.5Y, 5/3) very stiff SILTY CLAY with gray (5Y, 6/1) mottling	CL	3.25	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		5	6	and trace yellowish brown (10YR, 5/6) mottling, trace sand, moist, medium	CL	3.25	
		5	3	plasticity	CL	3.25	
				Same As Above	CL	3.25	
	8-10-91 1130	4	6 10.7	Yellowish brown (10YR, 5/6) loose SAND	SC	N/A	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		6	6 11.3	and a little gravel, saturated	SC	N/A	
		9	1	Light olive brown (2.5Y, 5/3) very stiff silty clay with gray (5Y, 6/1) mottling and trace yellowish brown (10YR, 5/6) mottling, trace sand, moist, med plasticity	CL	N/A	
12	8-10-91 1140	12	6	Light olive brown (2.5Y, 5/4) medium dense CLAYEY SAND, wet	SC	N/A	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		11	4	Light olive brown (2.5Y, 5/4) very stiff clay with some grayish brown (2.5Y, 5/2) mottling, trace sand and fine gravel, moist, med plasticity	CL	2.25	
13.5		11	0	No Recovery	N/A	N/A	
	8-10-91 1400	5	6	Light olive brown (2.5Y, 5/3) SANDY CLAY with trace gravel, wet medium plasticity	CL	1.75	Hnu = 0 ppm Bγ = 240 cpm α = 0 cpm
		6	6	Gray (5Y, 5/1) very stiff SILTY CLAY with a little sand and gravel, damp,	CL	2.25	
15		8	3	medium plasticity	CL	2.25	

NOTES

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

NUMBER: 602 ~~27.45~~ 3.29	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1783	COORDINATES: See p1.	DATE 8-10-91	
ELEVATION: See p1	GWL: Depth 10.95 Date/Time 8-25-91/1030	DATE STARTED: 8-10-91	
ENGINEER/GEOLOGIST: Ken Marion	Depth N/A Date/Time N/A	DATE COMPLETED: 8-10-91	
DRILLING METHODS: 10" O.D. Hollow Stem Auger		PAGE 3 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	8-10-91 1407	5	6	Gray (5Y 5/1) Very stiff SILTY CLAY with a little sand and gravel, damp medium plasticity	CL	2.25	H_{nu} = 0 ppm $\beta\gamma$ = 240 cpm α = 0 cpm
	↓	8	5		CL	2.25	
16.5	↓	11	0	No Recovery	N/A	N/A	
				Bottom of bore hole			

NOTES:

001917

402-11-86

:RNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

:OJECT NAME FMPC RI/FS FIELD ENG./GEO. Ken Marion DATE 8-10-91
:CJECT NC: ~~602.27.95~~ 602.3.29 CHECKED BY JMW DATE 9.23.91
)R!NG NO. 1783
:ZOMETER NO. 1783 DATE OF INSTALLATION 8-10-91

)REHOLE DRILLING

DRILLING METHOD 10 in Hollow Stem Auger	TYPE OF BIT Bull Dog
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM — TO —	SIZE N/A FROM ___ TO ___
FLUID N/A FROM — TO —	SIZE N/A FROM ___ TO ___

:ZOMETER DESCRIPTION

TYPE Monitoring piezometer	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in.
SLOTS ☑ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 12.8 ft.
AVERAGE SIZE OF PERFORATIONS .010 in.	JOINING METHOD Flush-Joint Threaded
TOTAL PERFORATED AREA 5 ft.	

.. :TION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A	OTHER PROTECTION steel well cover
PROTECTIVE PIPE O.D. N/A	with lock

ITEM	DISTANCE ABOVE/(BELOW) GROUND SURFACE (ft)		ELEVATION (ft)	
:OP OF RISER PIPE	2.3 (ABOVE)		—	
:ROUND SURFACE	0.0		579.9	
:OTTOM OF PROTECTIVE PIPE	N/A		—	
:OREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 8.1	TOP 578.9	BOTTOM 571.8
SAND	TOP 8.1	BOTTOM 16.5	TOP 571.8	BOTTOM 563.4
GRAVEL	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
ERFORATED SECTION	TOP 10.5	BOTTOM 15.5	TOP 569.4	BOTTOM 564.4
IEZOMETER TIP	16.0 ft		563.4	
OTTOM OF BOREHOLE	16.5 ft.		563.4	
WL AFTER INSTALLATION	to be taken at a later date			

'IEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

ARKS

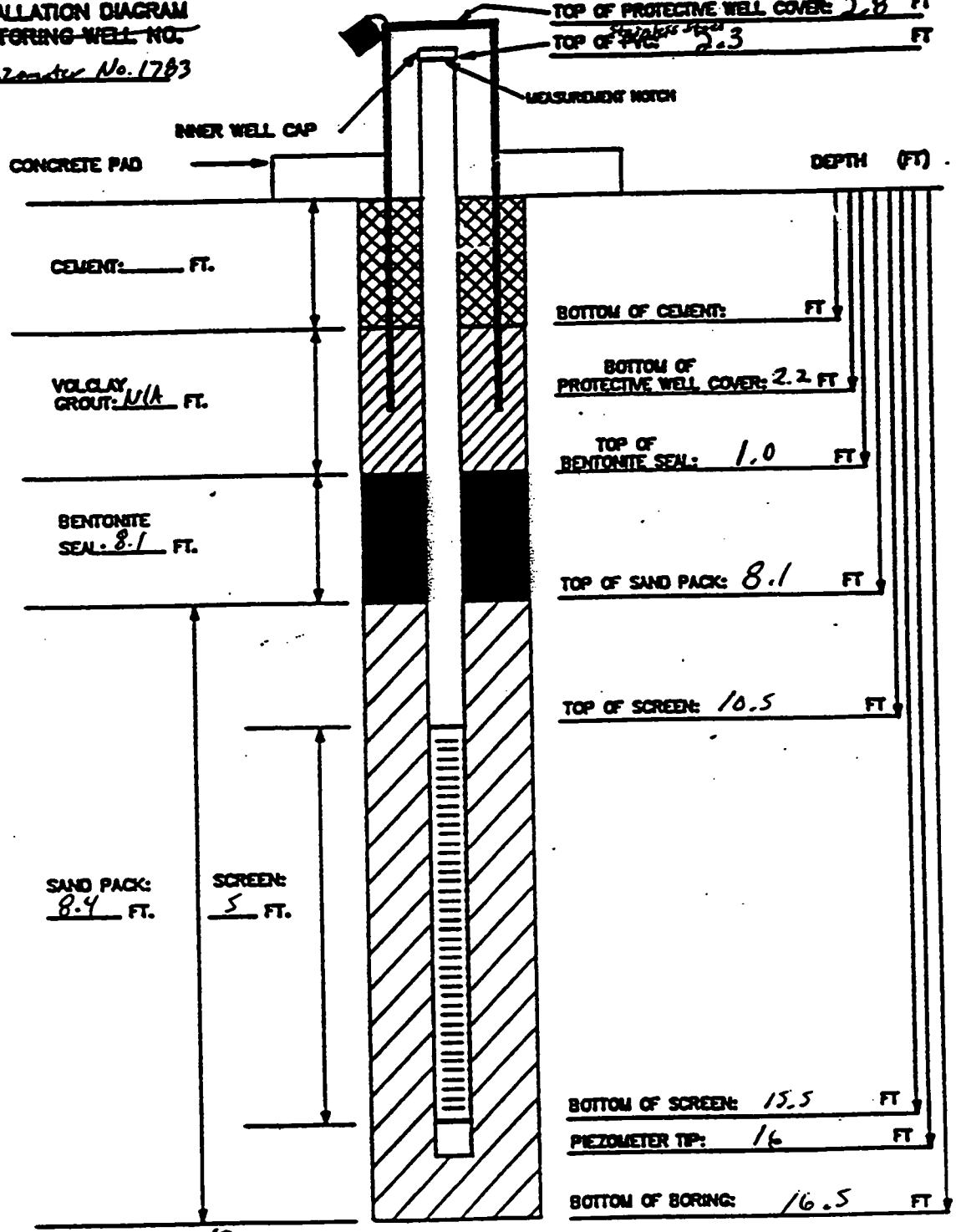
001918

FERNALD RI/FS

INSTALLATION DIAGRAM
~~MONITORING WELL NO.~~
Piezometer No. 1783

Stickups

INSTALLATION DATE: 8-10-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 43 u sand, 6 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 4 buckets
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 5 gallons
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 10.95 ft. 8-25-91

TASK: 602.27.95

GEOLOGIST/ENGINEER: Ken Marino

ERNALD
RI/FS

5711

Date: 8-29-91
Time: 0900
Page: 1 of ____

WATER QUALITY FIELD COLLECTION REPORT

FADL REF# 8-29-91

PROJECT NAME	FMPC RI/FS	SAMPLE LOCATION	1783
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	8-29-91	RFA NUMBER	N/A
TIME COLLECTED	0935	C/C NUMBER	N/A
COLLECTED BY	I.A., J.C., K.M.	SAMPLE TYPE	Ground Water

SAMPLING INFORMATION

ROMETRIC PRESSURE	Not Available
TEMPERATURE	23°C
SATURATION IN AIR	<10 µS
TER TEMPERATURE	17.6°C
TH OF SAMPLE (T.O.C)	145'
TER LEVEL (T.O.C)	11.00'

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.00	NA	NA
SPEC. COND. uMHOS/cm	1210	NA	NA
D.O. MG/L	.9	NA	NA

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	N/A	N/A	N/A

METER CALIBRATION

The humidity is too high

	pH Std	pH Std	D.O. Temp	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7	NA	NA	NA	NA	NA	147	1413				
	3.99	7.01	OK	NA	NA	NA	OK	NA	NA				

THER CONDITIONS	foggy, humid, warm
TIONAL REMARKS	muddy water

TEST EQUIPMENT LIST

IPMENT NUMBER	EQUIPMENT NAME
N/A	1 Gallon Bailer
401395	Hnu Meter
71151	ICM Water Analyzer

EQUIP.	NUMBER
BAILER	teflon
HOSE/S	—
PUMP	—
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

5) - (W.L 87) = 7.8 Ht. of Water Column
Subtracted Stick-up 2.3 ft

7.8 Ht. of Water Column x .65 = 5.07 1 Volume (~~3 Volumes~~)

____ Ht. of Water Column x ____ = ____ (5 Volumes)

5.07 X 5 = 25.35 gallon (5 volume)

FERNALD
RI/FS

Date: 8-5-91
Time: 1530
Page: 1 of 3

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	RI/FS FMPC	SAMPLE LOCATION	1783
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	8-5-91	RFA NUMBER	N/A
TIME COLLECTED	15:30	C/C NUMBER	N/A
COLLECTED BY	LM, ER, J.H.	SAMPLE TYPE	N/A

SAMPLING INFORMATION

AROMETRIC PRESSURE	754
IR TEMPERATURE	24°c
O SATURATION IN AIR	6.8 ppm
'ATER TEMPERATURE	17.7
EPTH OF SAMPLE	N/A
ATER LEVEL	10.70

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.85	NA	NA
SPEC. COND. uMHOS/cm	1,27 mS	↓	↓
D.O. MG/L	0.8	↓	↓

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
7°C	4	7	19°C	0	15	0.0	19°C	147	1413	ISO Butylene	1267901	55 ppm	8.82
✓	✓	✓	OK	✓	✓	0.1	OK	✓	✓	✓	✓	✓	✓

EATHER CONDITIONS Clear, Hot
DITIONAL REMARKS

TEST EQUIPMENT LIST

UIPMENT NUMBER	EQUIPMENT NAME
N/A	1 Gallon Bailer
701345	HNU Meter
1071151	ICM Water Analyzer

EQUIP.	NUMBER
BAILER	teflon
HOSE/S	-
PUMP	-
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

16.5 - (W.L. 10.7) = 5.8 Ht. of Water Column

5.8 Ht. of Water Column x .65 = 3.77 (3 Volumes) 7.25

5.8 Ht. of Water Column x .65 = 18.85 (5 Volumes)

001921

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG | DATE 8 12 91 | NO. | SHEET 1 OF 1

6711

PROJECT NO. 602.27.953.29

PROJECT NAME FMPC RI/FS

FIELD ACTIVITY SUBJECT: Perched Water Removal Action 1783, 1784

METER CALIBRATION

Hnu Calibration Gas 120740-1
Hnu S/N 4u345 (10.2 eV) Span 6.88 Cal. to 55 ppm
Hnu S/N (eV) Span Cal. to ppm
Hnu S/N
Meter S/N 46460 passed Cal. check using Wanco Source
Meter S/N 75342 passed Cal. check using Wanco Source

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700 Arrive at office
Meet with field crew
Complete paper work

800 Get supplies for drilling operations
obtain sample bottles for total-U
and TCLPs

Ben waits for Steve Duce to arrive, Ben looks up to date Rad Worker Training and therefore is not supposed to be working inside the process area

100 The drillers get the decomed drill rig from ~~decon~~ Ken 8-12-91 Wanco's Decon Pad. They set the rig back-up over the incomplete bore hole 1784.

30 Steve Duce is out of the office today – Doug Hurmel tells Ben to work as Health & Safety Officer (Ben will be getting his rad worker training soon)

130 Arrive at drill site
380 Rust engineers Cross our caution tape barrier – Ben calls Doug Hurmel and he sends Bruce out to investigate
Make-up trip blank
330 Collect split spoon sample 8-10 ft. from boring 1784
Jim Capowski helps me collect the drum cuttings for total-U and TCLP Analysis for boring 1783
Sample Nos. 65503 and 65503
340 Split spoon sample 10-12 ft.
Split spoon sample 12-14 ft.
100 Split-spoon sample 14-16 ft. (bottom of bore hole)
Collecting Sample Nos. 65504 and 65505. These are total-U and TCLP samples respectively.

115 Drillers take rig to decon

15 Rig is decomed. Drillers move to bore hole RA-1 on the South West side of plant 2/3
We were going to drill at plant 8 first but the well will be 6" in diameter and the augers that the drillers now have aren't wide enough to install a well of this size through. There is more sand here than at some of the other bore holes and therefore if the augers are pulled before dropping the well, the hole may collapse.

10 I tell drillers to leave.
Jim and Ben Brier help me clean-up site. Our rad waste is dumped in a dumpster near decon
Ben has smear results

08 leaving front gate of Wanco – deliver soil samples to sample trailer 1800 Arrive at office 1830 finish paper work

VISITORS ON SITE:
A.M. 8-12-91
~~None~~
John Hall

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None

WEATHER CONDITIONS:
Sunny and warm

IMPORTANT TELEPHONE CALLS:
None

PERSONNEL ON SITE: Ben Brier, Jim Capowski, Craig Coulter, Kevin Myers
DATE: 8/12/91

SUPERVISOR: Ken Marion

ERNALD
RI/FS

Date: 9-18-91
Time: 0900
Page: 1 of 1

WATER QUALITY FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	FFMP RI/FS	SAMPLE LOCATION	1783
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	9-18-91	RFA NUMBER	N/A
TIME COLLECTED	1000	C/C NUMBER	N/A
COLLECTED BY	TA, JC, JM	SAMPLE TYPE	groundwater

SAMPLING INFORMATION

BAROMETRIC PRESSURE	75.4
AIR TEMPERATURE	unknown
SATURATION IN AIR	N/A
WATER TEMPERATURE	17.9 / 17.9
DEPTH OF SAMPLE	12.0 ft.
WATER LEVEL	9.85 ft. TOC

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.92	N/A	6.97
SPEC. COND. uMHOS/cm	1.11 mS	N/A	1.14 mS
D.O. MG/L	N/A	N/A	N/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low		Spec. Cond. High		HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7	N/A	N/A	N/A	N/A	N/A	~~147~~ 73.9	~~3.44~~	~~1413~~ 71.3	~~6.67~~				
	3.84	6.94	OK	N/A	N/A	N/A	OK	73.0	51.7	71.5	6.44				

OTHER CONDITIONS: sunny in morning turning cloudy and cool

ADDITIONAL REMARKS: used teflon bailers after purging and sampling

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
NA	NA

EQUIP.	NUMBER
BAILER	NA
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

( ) - (W.L. ___) = ___ Ht. of Water Column

___ Ht. of Water Column x ___ = ___ (3 Volumes)

___ Ht. of Water Column x ___ = ___ (5 Volumes)

purged well dry - removed 6 gallons

001923

ERNALD
RI/FS

This is my ... by Ken Marion

5711

VISUAL CLASSIFICATION OF SOILS

JW 9.25.91

NUMBER: 602 ~~27.95~~ 3.29	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1784	COORDINATES: N 480679.39 E 1,380,546.32	DATE: 8-11-91
ELEVATION: 580.7	GWL: Depth 9.90 Date/Time 8-25-91/1040	DATE STARTED: 8-11-91
ENGINEER/GEOLOGIST: Ken Marion	Depth: NA Date/Time: NA	DATE COMPLETED: 8-14-91
DRILLING METHODS: 8" Hollow Stem Augers		PAGE 1 OF 3

Depth (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	8-11-91 1028	12	6	Light gray (10YR, 7/1) medium dense gravel with sand, dry	GP	N/A	Hnu = .2 Bγ = 200 cpm α = 0 cpm
1		12	4	Light yellowish brown (2.5Y, 6/4) medium dense gravel, sand, and CLAY mixture, dry	GC	>4.5	
		7	0	No Recovery	N/A	N/A	
2		12	0	No Recovery	N/A	N/A	
	8-11-91 1045	8	6	Light yellowish brown (2.5Y, 6/4) hard CLAY with sand and gravel, dry non plastic	CL	>4.5	Hnu = .2 Bγ = 200 cpm α = 0 cpm
		16	6	Same As Above	CL	>4.5	
		13	6 3.4	Same As Above	CL	>4.5	
				Very Dark gray (2.5Y, 3/0)	CL	3.0	
4		12	4	very stiff CLAY with some organic matter, dry, non plastic	CL	3.0	
	8-11-91 1050	7	6	Light olive brown (2.5Y, 5/4) hard CLAY with sand and gravel, dry, non plastic	CL	>4.5	Hnu = .2 ppm Bγ = 200 cpm α = 0 cpm
5		7	6	Gray (5Y, 5/1) very stiff CLAY with some Light olive brown (2.5Y, 5/6) mottling, damp, low plasticity	CL	2.5	
		10	0	No Recovery	N/A	N/A	
		8	0	No Recovery	N/A	N/A	
	8-11-91 1055	4	6	Olive gray (5Y, 4/2) very stiff CLAY, damp, medium plasticity	CL	2.5	Hnu = .2 Bγ = 200 cpm α = 0 cpm
7		4	4	Same As Above	CL	2.5	
		5	0	No Recovery	N/A	N/A	

NOTES:

Contractor: Penn Drill
Rig: CME-45.
Driller: Craig Coulter
Assistant Driller: Kevin Myers
Geo Assistant: Jim Capanari

Samples Collected Per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Hnu S/N: AC1345 .2 ppm
Bγ S/N: 46460 200 cpm
α S/N: 75242 0 cpm
} Background Levels

402-1-1-66

VISUAL CLASSIFICATION OF SOILS

JOB NUMBER: 602.329	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1784	COORDINATES: See p1	DATE 8-11-91	
ELEVATION: See p1	GWL: Depth 9.90 Date/Time 8-25-91/1040	DATE STARTED: 8-11-91	
ENGINEER/GEOLOGIST: Ken Marian	Depth N/A Date/Time N/A	DATE COMPLETED: 8-14-91	
DRILLING METHODS: 8" Hollow Stem Augers		PAGE 2 OF 3	

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	8-11-91 1055	9	0	No Recovery	N/A	N/A	
	8-12-91 1330	3	6	Light olive gray (5Y, 6/2) SILTY CLAY with trace yellowish brown (10YR, 5/8)	CL	2.25	Hnu = .2 ppm Bγ = 250 cpm α = 0 cpm
9		5	6	mottling, damp, medium plasticity	CL	2.25	
		3	3	Same As Above	CL	2.25	
10		4	0	No Recovery	N/A	N/A	
	8-12-91 1340	2	6	olive (5Y, 5/3) stiff clay, damp, high plasticity	CL	1.5	Hnu = .2 ppm Bγ = 250 cpm α = 0 cpm
			3	Light olive brown (2.5Y, 5/3) to	SC	N/A	
11		3	6	light olive brown (2.5Y, 5/6) CLAYEY SAND with pure sand lenses, trace fine gravel, wet, medium dense	SC	N/A	
		4	6	Same As Above	SC	N/A	
12		11	0	No Recovery	N/A	N/A	
	8-12-91 1350	2	6	olive gray (5Y, 5/2) very stiff gravely clay with a little sand, trace yellowish brown (10YR, 5/6) mottling, wet	CL	3.0	Hnu = .2 ppm Bγ = 250 cpm α = 0 cpm
13		10	6	med plasticity	CL	3.0	
		12	6	Same As Above	CL	3.0	
		13	3	olive gray (5Y, 5/2) ~~loose~~ medium loose clayey SAND, bryozoan fossil, wet	SC	N/A	
14	8-12-91 1400	6	6	olive gray (5Y, 5/2) loose CLAYEY SAND with fine gravel and trace	SC	N/A	Hnu = .2 ppm Bγ = 250 cpm α = 0 cpm
		7	6	Fossils, moist	SC	N/A	

NOTES:

8/12:

Hnu S/N: A01345	.2 ppm	Background Levels
Bγ S/N: 46460	250 cpm	
α S/N: 75242	0 cpm	

402-11-89

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1784	COORDINATES: See p1	DATE 8-12-9
ELEVATION: See p1	GWL: Depth 9.90 ft Date/Time 8-14-91 1040	DATE STARTED: 8-11-91
ENGINEER/GEOLOGIST: Ken Marion	Depth NA Date/Time NA	DATE COMPLETED: 8-14-91
DRILLING METHODS: 8" Hollow Stem Auger		PAGE 3 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	8-12-91 1400	6	4	Same As Above	SC	N/A	
		4	0	No Recovery	N/A	N/A	
16				Bottom of Borehole			

NOTES:

402-11-86

:RNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

:OJECT NAME FMPC RI/FS
:CJECT NC. 602.329
)RING NO. 1784
:ZOMETER NO. 1784

FIELD ENG./GEO. Ken Marion DATE 8-14-91
CHECKED BY JMO DATE 9-23-91
DATE OF INSTALLATION 8-14-91

)REHOLE DRILLING

DRILLING METHOD 8 in. Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID N/A FROM — TO —
FLUID N/A FROM — TO —

TYPE OF BIT Bull Dog
CASING SIZE (S) USED:
SIZE N/A FROM NA TO NA
SIZE N/A FROM NA TO NA

:ZOMETER DESCRIPTION

TYPE Monitoring Piezometer
DIAMETER OF PERFORATED SECTION 4.0 in. I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.0 in.
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 7.2 ft.
JOINING METHOD flush-Joint threaded

:TION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION Steel well cover with lock

ITEM	DISTANCE ABOVE/(BELOW) GROUND SURFACE (ft.)		ELEVATION (ft)	
:OP OF RISER PIPE	1.7 (ABOVE)		—	
ROUND SURFACE	0.0		580.7	
:OTTOM OF PROTECTIVE PIPE	N/A		—	
:OREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
BENTONITE	TOP 1.0	BOTTOM 4.0	TOP 579.7	BOTTOM 576.7
SAND	TOP 4.0	BOTTOM 16.0	TOP 576.7	BOTTOM 564.7
GRAVEL	TOP N/A	BOTTOM N/A	TOP NA	BOTTOM NA
ERFORATED SECTION	TOP 5.5	BOTTOM 15.5	TOP 575.2	BOTTOM 565.2
IEZOMETER TIP	16.0 ft.		564.7	
OTTOM OF BOREHOLE	16.0 ft.		564.7	
WL AFTER INSTALLATION	to be taken at a later date		—	

:IEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
ARKS

5711

FERNALD RI/FS

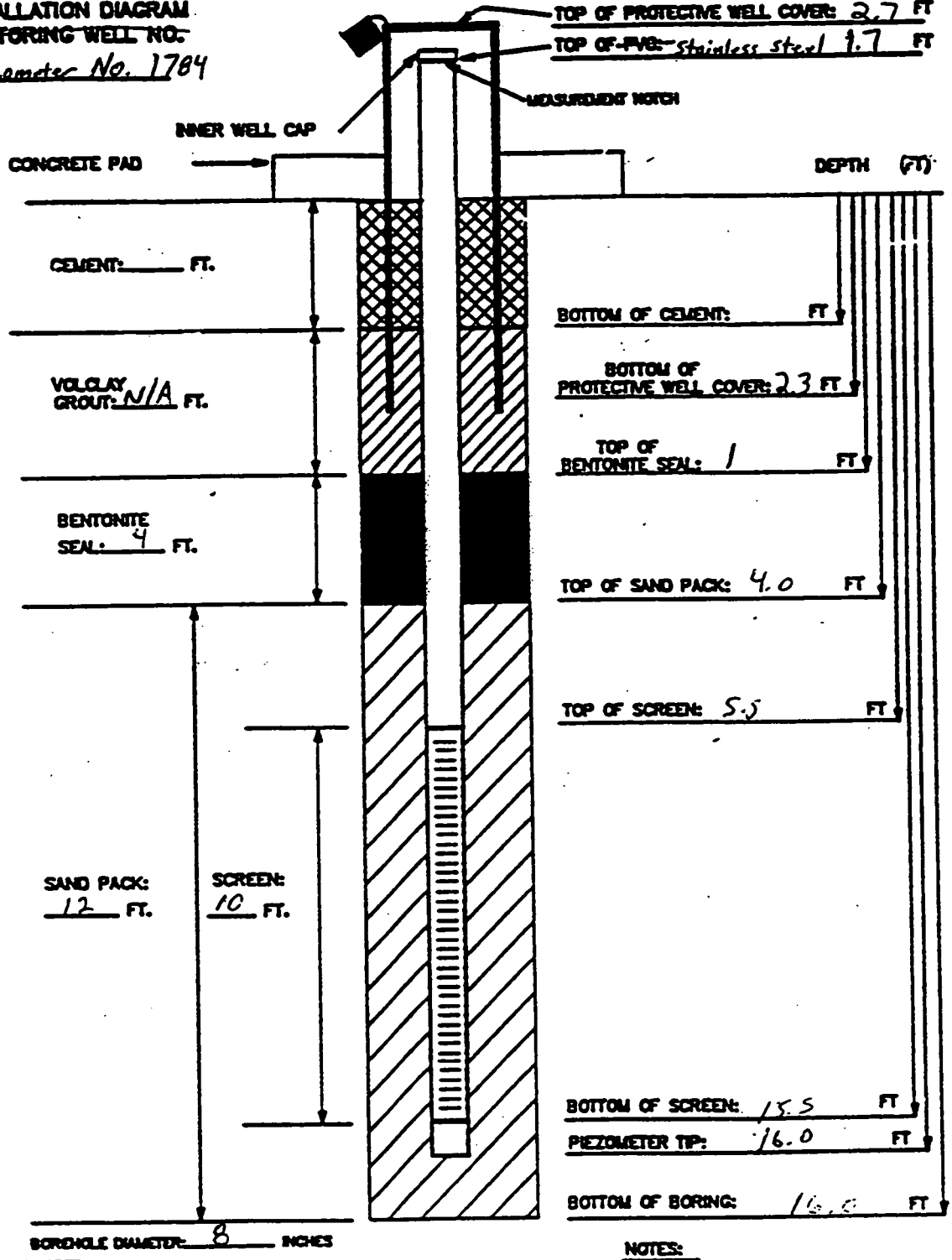
INSTALLATION DIAGRAM

~~MONITORING WELL NO.~~

Piezometer No. 1784

Stickups

INSTALLATION DATE: 8-14-91



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: 7 bags, 430 Sand

BENTONITE PELLETS (5-GALLON BUCKETS): 1 Bag

BAGS OF VOLCLAY GROUT: N/A

AMOUNT OF CEMENT:

AMOUNT OF WATER USED: 3 gallons

OTHER:

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 9.90 ft 8-25-91

TASK: [illegible]

GEOLOGIST/ENGINEER: Ken [illegible]

ERNALD
RI/FS

Date: 9-5-91
Time: 1530
Page: 2 of 3

WATER QUALITY FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	RI/FS FINPC	SAMPLE LOCATION	1784
PROJECT NUMBER	602-8.29	SAMPLE ID NUMBER	N/A.
DATE COLLECTED	9-5-91	RFA NUMBER	N/A
TIME COLLECTED	15.30	C/C NUMBER	N/A
COLLECTED BY	LM, RR, JH	SAMPLE TYPE	N/A

SAMPLING INFORMATION

AROMETRIC PRESSURE	754
R TEMPERATURE	24°C
D SATURATION IN AIR	6.8
ATER TEMPERATURE	17.2°C
EPTH OF SAMPLE	N/A
ATER LEVEL	10.49

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.77	NA	NA
SPEC. COND. uMHOS/cm	93 mS	↓	↓
D.O. MG/L	0.5 ppm	↓	↓

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calb. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
19°C	4	7	19°C	0	15	0.0	19°C	147	1413	100 Butane	1207904	55	8.82
:	✓	✓	OK	0	15	0.1	OK	✓	✓	✓	✓	✓	✓

EATHER CONDITIONS Clear, Hot

DITIONAL REMARKS

TEST EQUIPMENT LIST

UIPMENT NUMBER	EQUIPMENT NAME
N/A	1 l Gallon Bailer
A01345	HNU Hnu meter
91071151	ICM Water Analyzer

EQUIP.	NUMBER
BAILER	TEFLON
HOSE/S	NA
PUMP	↓
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

16.0 - (W.L. 9.42) = 6.5 Ht. of Water Column

6.5 Ht. of Water Column x .65 = 12.6 (3 Volumes)

6.5 Ht. of Water Column x .65 = 21.125 (5 Volumes)

ERNALD
RI/FS

Date: 8-29-91
Time: 1010
Page: 1 of ____

571 1

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF# 8-29-91

PROJECT NAME	FMPC RI/FS	SAMPLE LOCATION	1784
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	8-29-91	RFA NUMBER	N/A
TIME COLLECTED	1015	C/C NUMBER	N/A
COLLECTED BY	T.A., J.C., K.M.	SAMPLE TYPE	Ground Water

SAMPLING INFORMATION

ROMETRIC PRESSURE	Not Available
R TEMPERATURE	24°C
SATURATION IN AIR	<10µS
TER TEMPERATURE	18.0°C
PTH OF SAMPLE (T.O.C.)	12.1'
TER LEVEL (T.O.C)	11.12'

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.04	NA	NA
SPEC. COND. uMHOS/cm	731	NA	NA
D.O. MG/L	0	NA	NA

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	N/A	N/A	N/A

METER CALIBRATION

The humidity is too high

H mp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7						147	1413				
	3.99	7.01	OK				OK						

ATHER CONDITIONS humid, hot, hazy
DITIONAL REMARKS Very muddy water

TEST EQUIPMENT LIST

UIPMENT NUMBER	EQUIPMENT NAME
N/A	1/3 ? gallon Bailer
A01345	Hnu Meter
9107115I	JCM Water Analyzer

EQUIP.	NUMBER
BAILER	teflon
HOSE/S	NA
PUMP	NA
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

~~9.42~~ 6.58 Ht. of Water Column x .65 = 4.3 ~~(3 Volumes)~~ 1 Volume

(6.0) - (W.L. 9.42) = 6.58 Ht. of Water Column

____ Ht. of Water Column x ____ = ____ (5 Volumes)

Subtract Stand 12 ft

4.3 x 5 = 21.5 gallon (5 Volumes)

001930

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	8	28	91
NO.			
SHEET	1	OF	2

T NAME: FMPC RI/FS | PROJECT NO. 602 3.29

IELD ACTIVITY SUBJECT: Purging perched water wells

ESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

700 - arrive at office
745 - Ken called in sick; Bruce M. told Tom A., Jim L., and Joe M. to develope the 3.29 Task perched water wells.
815 - need to get H&S plan and kwl before working.
845 - Call Ken to locate H&S plan and kwl.
910 - Talked to H&S Ted about protective clothing for project, and set meeting at site.
945 - got approval for using Teflon bailer for purging wells from Mike Brabender - providing the bailer is properly deconned.
1030 - decon equipment - pressure washed and steam cleaned at Penn Drill
1115 - bring in equipment and protective gear
1135 - dress out
1145 - set up site for work
200 - go to lunch
- dress out go back to site
00 - Talked to H&S Ted he will meet us at the site as soon as he helps set up another crew
310 - get drums and exclusionary tape set up
345 - Ted arrives at site - helps conduct Tailgate safety meeting and radiation survey.
15 - Talk to Tom M. re. water volumes to purge
30 - calibrate water analysis equipment
00 - Take water level, pH, ~~and~~ etc.
20 - Ted came to site to shut us down due to lightning and the onset of rain.

SITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
Ted from H&S.	

ATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
Cloudy to rain	Tom M. to locate water analyzer and info on purging

PERSONNEL ON SITE: Tom Anderson, Jim ~~Conding~~ Cupanioni, Joe Mielcarek

UPERVISOR: Bruce Myers

001931

DATE:

ERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	8/28/91
NO.	
SHEET	2 OF 2

5711

NAME: FMPC RI/FS | PROJECT NO. 602 3.29

ELD ACTIVITY SUBJECT: Purge perched water wells

ESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

30 - clean area of equipment and debris.
45 - leave area - staged for tomorrow.
50 - drop off trash at disposal site.
00 - dress out.
30 - go to ASI Trailers to restock supplies - tyvets, gloves, etc.
5 - return off to ASI offices
30 - leave for the day.

ITORS ON SITE:
Ted from H&S
John Throckmorton

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None

ATHER CONDITIONS:
Cloudy to rain
n Throckmorton

IMPORTANT TELEPHONE CALLS:
Tom M. to locate water analyzer and info on purging.

PERSONNEL ON SITE: Tom Anderson, Jim Cardanna, Joe Medina

PERVISOR: Bruce Myers | DATE:

ERNALD
RI/FS

Date: 9-16-91
Time: 0800
Page: 1 of 1

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	FEMP RI/FS	SAMPLE LOCATION	1784
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	n/A
DATE COLLECTED	9-16-91	RFA NUMBER	n/A
TIME COLLECTED	1000	C/C NUMBER	n/A
COLLECTED BY	TA, JC, TM	SAMPLE TYPE	ground water

SAMPLING INFORMATION

ROMETRIC PRESSURE	754
TEMPERATURE	–
SATURATION IN AIR	–
TER TEMPERATURE	17.5° / 18.4°
TH OF SAMPLE	12.0 ft.
TER LEVEL	10.93 / 10.60

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.83	n/A	7.19
SPEC. COND. uMHOS/cm	853.5	n/A	631.5
D.O. MG/L	n/A	n/A	n/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7	n/A	n/A	n/A	n/A	n/A	~~147~~ 739 / 5860	~~1413~~ 7.32 / 6.11				
	3.84	6.98	OK	n/A	n/A	n/A	OK	732 / 51.7	7.15 / 6.44				

THER CONDITIONS: sunny in morning turning cloudy and cool
TIONAL REMARKS: used teflon bailers for purging and sampling

TEST EQUIPMENT LIST

PMENT NUMBER	EQUIPMENT NAME

EQUIP.	NUMBER
BAILER	
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

) - (W.L. ___) = ___ Ht. of Water Column

___ Ht. of Water Column x ___ = ___ (3 Volumes)

___ Ht. of Water Column x ___ = ___ (5 Volumes)

would fill the 5 gallon

ERNALD RI/FS

(6 in well)

9.25.91 JRW 5711

This is a copy verified by Ken Marion

VISUAL CLASSIFICATION OF SOILS

NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS	
ORING NUMBER: 1785	COORDINATES N 900370.45 E 1310260.96	DATE 8/20/91
EVATION: TOW 581.09	GWL: Depth 8.44 ft Date/Time 8-27-91 / 845	DATE STARTED: 8/20/91
GINEER/GEOLOGIST: Ken Marion	Depth N/A Date/Time N/A	DATE COMPLETED: 8/26/91
ILLING METHODS: 12" Hollow Stem Augers		PAGE 1 OF 3

(ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	8-20-91 1400	N/A	N/A	Cement	N/A	N/A	Cored through concrete
1.0	8-20-91 1536	5	6	olive (5Y, 5/4) stiff clay with sand and gravel, damp, low plasticity	CL	2.0	Hnu= 0 ppm Bγ = 400 cpm α = 0 cpm
		9	0	No Recovery	N/A	N/A	
		9	0	No Recovery	N/A	N/A	
2.5	8-20-91 -8	6	6	olive gray (5Y, 4/2) medium stiff clay with trace sand and gravel, and	CL	1.0	Hnu= 0 ppm Bγ = 400 cpm α = 0 cpm
		8	6	organic matter, damp, low plasticity	CL	1.0	
		10	4	Same As Above	CL	1.0	
4.0	8-20-91 1545	6	6	Light olive brown (2.5Y, 5/6) stiff damp Clay with olive gray (5Y, 5/2) mottling, med plasticity	CL	1.75	Hnu= 0 ppm Bγ = 400 cpm α = 0 cpm
		9	6	olive gray (5Y, 5/2) stiff clay with a little Dark Yellowish Brown (10YR, 4/4)	CL	1.75	
		11	2	mottling, damp, medium plasticity	CL	1.75	
5.5	8-20-91 1550	4	6	A mottled Yellowish brown (10YR, 5/6) and gray (5Y, 6/1) medium dense	ML	1.5	Hnu= 0 ppm Bγ = 400 cpm α = 0 cpm
		6	6	clayey silt with trace sand, damp	ML	1.5	
		9	5	Same As Above	ML	1.5	
7.0	8-20-91 1605	2	6	A mottled Yellowish brown (10YR, 5/6) and gray (5Y, 6/1) medium dense clayey silt with a little sand, damp	ML	2.5	Hnu= 0 ppm Bγ = 400 cpm α = 0 cpm

TES

Contractor: Penn Drill

CME-45

: Craig Coulter, Bobby Yost

Assistant Driller: Kevin Myers, Mark Rebold

Geo. Assistant: Jim [illegible]

Samples Collected per ASTM Standard Penetration Test

Colors Identified using Munsell Color Chart

Hnu S/N: A01345 — 0 ppm
Bγ S/N: 4646c — 400 cpm
α S/N: 5677 — 0 cpm

Background Levels

ERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

JOB NUMBER: 602.3.29	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1785	COORDINATES: See p1	DATE 8/20/91	
ELEVATION: See p1	GWL: Depth 8.41 ft Date/Time 8-20-91/1105	DATE STARTED: 8/20/91	
ENGINEER/GEOLOGIST: Ken Marien	Depth N/A Date/Time N/A	DATE COMPLETED: 8/26/91	
DRILLING METHODS: 12" Hollow Stem Augers		PAGE 2 OF 3	

(ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25	8-20-91 1605	5	3	Same As Above	ML	2.5	
25		11	0	No Recovery ~~Same As Above~~ K.M. 8-26-91	N/A	N/A	
	8-20-91 1615	8	6	A mottled yellowish brown (10YR, 5/6) and gray (5Y, 6/1) medium dense	SC	N/A	Hnu = 0 ppm Br = 400 cpm α = 0 cpm
		7	6	clayey fine sand, moist	SC	N/A	
		5	1	Same As Above	SC	N/A	
10.0	8-20-91 5	2	6	Light olive brown (2.5Y, 5/4) loose sand with trace clay and gravel, wet	SP	N/A	Hnu = 0 ppm Br = 400 cpm α = 0 cpm
		5	5	Same As Above	SP	N/A	
15		5	0	No Recovery	N/A	N/A	
	8-20-91 1627	7	6	Light olive brown (2.5Y, 5/4) medium dense Coarse to very coarse Sand	SP	N/A	Hnu = 0 ppm Br = 400 cpm α = 0 cpm
		7	6	with trace gravel and clay, Saturated	SP	N/A	
		8	6	Same As Above	SP	N/A	
20	8-20-91 1635	8	6	Light olive brown (2.5Y, 5/4) medium dense Coarse to very coarse SAND	SP	N/A	Hnu = 0 ppm Br = 400 cpm α = 0 cpm
		10	6	with ~~trace~~ a little gravel, Saturated K.M. 8-26-91	SP	N/A	
25		12	6	Same As Above	SP	N/A	
	8-20-91 1645	9	6	olive gray (5Y, 5/2) coarse to very Coarse ~~Sand~~ medium dense SAND K.M. 8-26-91	SP	N/A	Hnu = 0 ppm Br = 400 cpm α = 0 cpm

FES

001935

402-11-66

VISUAL CLASSIFICATION OF SOILS

NUMBER: 6023.29	PROJECT NAME: FMPC RI/FS		
ORING NUMBER: 1785	COORDINATES: See p1	DATE 8/20/91	
EVATION: See p1	GWL: Depth 8.44 ft Date/Time 8-21-91/1405	DATE STARTED: 8/20/91	
GINEER/GEOLOGIST: Ken Mattson	Depth NA Date/Time NA	DATE COMPLETED: 8/26/91	
ILLING METHODS: 12" Hollow Stem Augers		PAGE 3 OF 3	

Depth (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	8-20-91 1645	9	6	with trace gravel, saturated	SP	N/A	
		9	2	Same As Above	SP	N/A	
16.0	8-20-91 1655	11	6	Olive gray (5Y, 5/2) medium dense coarse to very coarse SAND with trace gravel, saturated	SP	N/A	Hnu = 0 ppm Bγ = 400 cpm α = 0 cpm
		8	6		SP	N/A	
		7	5	Same As Above	SP	N/A	
17.5	8-20-91 [illegible]	4	6	Olive gray (5Y, 5/2) medium dense coarse to very coarse SAND with trace gravel, saturated	SP	N/A	Hnu = 0 ppm Bγ = 400 cpm α = 0 cpm
		4	6		SP	N/A	
		11	6	Same As Above	SP	N/A	
19.0	8-20-91 1707	6	6	olive gray (5Y, 5/2) medium dense coarse to very coarse SAND with trace gravel, saturated	SP	N/A	Hnu = 0 ppm Bγ = 400 cpm α = 0 cpm
		6	6		SP	N/A	
		7	6	Same As Above	SP	N/A	
20.5		8	6	Same As Above	SP	N/A	
21.0 ft				Bottom of Hole			

TES

FERNALD
RI/FS

Date: 9-5-91
Time: 11:00
Page: 3 of 3

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#	

PROJECT NAME	EMPC RI/FS	SAMPLE LOCATION	1785
PROJECT NUMBER	6023.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	9-5-91	RFA NUMBER	N/A
TIME COLLECTED	11:00	C/C NUMBER	N/A
COLLECTED BY	LA, RR, JH	SAMPLE TYPE	N/A

SAMPLING INFORMATION

BAROMETRIC PRESSURE	754
AIR TEMPERATURE	23.2
DO SATURATION IN AIR	6.1 ppm
WATER TEMPERATURE	~~18.6°C~~ 16.1
DEPTH OF SAMPLE	18.7
WATER LEVEL	8.70

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.88		
SPEC. COND. uMHOS/cm	1.80mS		
D.O. MG/L	1.2		

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand.	HNU Lot #	HNU Reading	HNU Span
19°C	4	7	19°C	0	15	0	19°C	147	1413	150 Butane	107901	56ppm	8.82
OK	✓	✓	OK	✓	✓	0.1	OK	✓	✓	✓	✓	✓	✓

WEATHER CONDITIONS Hot, Clear
ADDITIONAL REMARKS

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
9107151	ICM Water Analyzer
A0K345	HNU Meter
N/A	1l Bailer

EQUIP.	NUMBER
BAILER	
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

(D. 18.7) - (W.L. 7.2) = 11.5 Ht. of Water Column

17.5 Ht. of Water Column x 1 = ____ (3 Volumes)
17.5 Ht. of Water Column x 1.5 = 26 (5 Volumes)

ERNALD
RI/FS

Date: 9-17-91
Time: 0900
Page: 1 of 1

5711

WATER QUALITY
FIELD COLLECTION REPORT

FADL REF#

PROJECT NAME	FEMP RI/FS	SAMPLE LOCATION	1785
PROJECT NUMBER	602.3.29	SAMPLE ID NUMBER	N/A
DATE COLLECTED	9-17-91	RFA NUMBER	N/A
TIME COLLECTED	1000	C/C NUMBER	N/A
COLLECTED BY	TA, JC, JM	SAMPLE TYPE	groundwater

SAMPLING INFORMATION

ROMETRIC PRESSURE	754
TEMPERATURE	unknown
SATURATION IN AIR	N/A
TER TEMPERATURE	18.1 / 19.1
TH OF SAMPLE	
TER LEVEL	8.60 ft. TOC

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.90	N/A	7.09
SPEC. COND. uMHOS/cm	1.50mS	N/A	1.04mS
D.O. MG/L	N/A	N/A	N/A

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0	0	0

METER CALIBRATION

	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low		Spec. Cond. High		HNU Stand.	HNU Lot #	HNU Reading	HNU Span
	4	7	N/A	N/A	N/A	N/A	N/A	~~1.47~~ 73.5	~~1.41~~ 68.64	~~1.41~~ 71.75	~~1.41~~ 6.47	NA	NA	NA	NA
85	3.84	6.98	OK	N/A	N/A	N/A	OK	73.0	51.7	71.5	6.44	NA	NA	NA	NA

THER CONDITIONS: SUNNY and mild mid 70's

TIONAL REMARKS: used teflon bailers for purging and sampling

TEST EQUIPMENT LIST

PMENT NUMBER	EQUIPMENT NAME
NA	NA

EQUIP.	NUMBER
BAILER	NA
HOSE/S	
PUMP	
FILTER KIT	

NOTE: ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BY LISTED

) - (W.L. ___) = ___ Ht. of Water Column

___ Ht. of Water Column x ___ = ___ (3 Volumes)

___ Ht. of Water Column x ___ = ___ (5 Volumes)

* purged a total of 45 gallons of water prior to sampling.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

3.29 ET 8-8-91

JW 9.23.91

PROJECT NUMBER: 602 ~~3.7 27.95~~	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1786	COORDINATES: N480838.532 E381481.73	DATE: 08-06-91
ELEVATION: NA	GWL: Depth NA Date/Time NA	DATE STARTED: 08-06-91
ENGINEER/GEOLOGIST: C. Grube	Depth NA Date/Time NA	DATE COMPLETED: 08-07-91
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	NA	NA	6	Cement	NA	NA	HNU = 1.5 ppm α = 0 cpm Bβ = Background
	NA		6	Cement	NA	NA	
1	0820 8-07	1	6	Very stiff (10YR5/4) Yellowish Brown silty clay, trace of medium gravel, low plasticity, moist	CL	3.0	
2	0830 8-07	3	6	Stiff (10YR5/4) Yellowish Brown silty Clay, low plasticity, very moist	CL	1.75	HNU = 2.0 ppm α = 0 cpm Bβ = 260-280 cpm
	0830 8-07	5	4	Hard (10YR5/6) yellowish Brown, silty clay low plasticity, moist	CL	4.5	
3	0830 8-07	8	0	No Recovery	NA	NA	
	0840 8-07	10	6	Hard (10YR 5/4) yellowish Brown silty clay trace of sand & fine gravel, low plasticity, moist	CL	4.0	HNU = 1.5 ppm α = 0 cpm Bβ = 300-350 cpm
4	0840 8-07	11	6	SAA	CL	4.0	
	0840 8-07	11	0	No Recovery	NA	NA	
5	0850 8-07	15	6	Dense (10YR5/4) yellowish Brown well graded gravelly sand, trace of silt, wet	SW	NA	HNU = 1.5 ppm α = 0 cpm Bβ = 320-340 cpm
	0850 8-07	15	6	Very stiff (10YR5/4) yellowish Brown silty clay trace of sand and fine gravel, low plasticity, moist	CL	3.75	
6	0850 8-07	16	2	Very stiff (10YR5/4) grayish brown silty Clay trace of sand + fine gravel low plasticity, moist	CL	3.5	
	1015 8-07	5	6	Very stiff (2.5Y5/4) light olive Brown silty clay trace of sand + fine gravel, low plasticity, moist	CL	2.25	HNU = 1.5 ppm α = 0 cpm Bβ = 320-340 cpm
7	1015 8-07	5	6	Very stiff (5Y4/2) olive gray, silty clay, trace of sand and fine to medium gravel, low plasticity, moist	CL	3.75	
	1015 8-07	11	0	No Recovery	NA	NA	

NOTES: CONTRACTOR: PENN DRILL
RIG: CME-45
DRILLER: Dave Newman
ASSISTANT: Bob Johnson
H&S OFFICER: B. Brewer

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 1.5 PPM
α = 0 CPM
Bβ = 320 CPM
LEL = 20.0 PPM
O_2 = 21 %

SAA = Same As Above
NA = Not Applicable

Alpha	Beta/Gamma	HNU
#7	#7	

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1786	COORDINATES: See p 1	DATE: 08-07-91
ELEVATION:	GWL: Depth NA Date/Time NA	DATE STARTED: 08-07-91
ENGINEER/GEOLOGIST: C. Grube	Depth NA Date/Time NA	DATE COMPLETED: 08-07-91
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 4

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	1020 8-07	8	6	Very stiff (5Y4/2) olive gray silty clay trace of sand & fine to medium gravel low plasticity moist	CL	3.75	HNU = 0-1.5 ppm α = 0 cpm BG = 320-340 cpm
	1020 8-07	10	6	Hard, SAA	CL	4.5	
9	1020 8-07	15	6	Very stiff, (5Y4/1) dark gray silty clay, trace of sand and fine to medium gravel, low plasticity moist	CL	3.25	
	1030 8-07	16	6	Very stiff (5Y4/1) dark gray silty clay trace of sand and fine to medium gravel, low plasticity, moist	CL	3.75	HNU = 1.5 ppm α = 0 cpm BG = 300-320 cpm
10	1030 8-07	21	6	SAA	CL	3.5	
	1030 8-07	20	6	SAA	CL	2.5	
11	1330 8-07	1	0	No Recovery	NA	NA	HNU = NA α = NA BG = NA
	1330 8-07	1	0	No Recovery	NA	NA	
12	1330 8-07	2	0	No Recovery	NA	NA	
13	1340 8-07	9	6	Very stiff (5Y4/1) dark gray silty clay, trace of sand and fine to medium gravel, low plasticity moist	CL	2.75	HNU = 2.5 ppm α = 0 cpm BG = 280-300 cpm
	1340 8-07	11	6	SAA	CL	2.0	
	1340 8-07	13	0	No Recovery	NA	NA	* Low recovery due to cobble lodged in tip of split spoon
14	1350 8-07	[illegible]	6	Very stiff (5Y4/1) dark gray silty clay trace of sand and cobble size gravel low plasticity moist	CL	3.0	HNU = 1.5 ppm α = 0 cpm BG = 280-300 cpm
	1350 8-07	9	0	No Recovery	NA	NA	* Low Recovery due to cobble lodged in tip of split spoon
	1350 8-07	11	0	No Recovery	NA	NA	

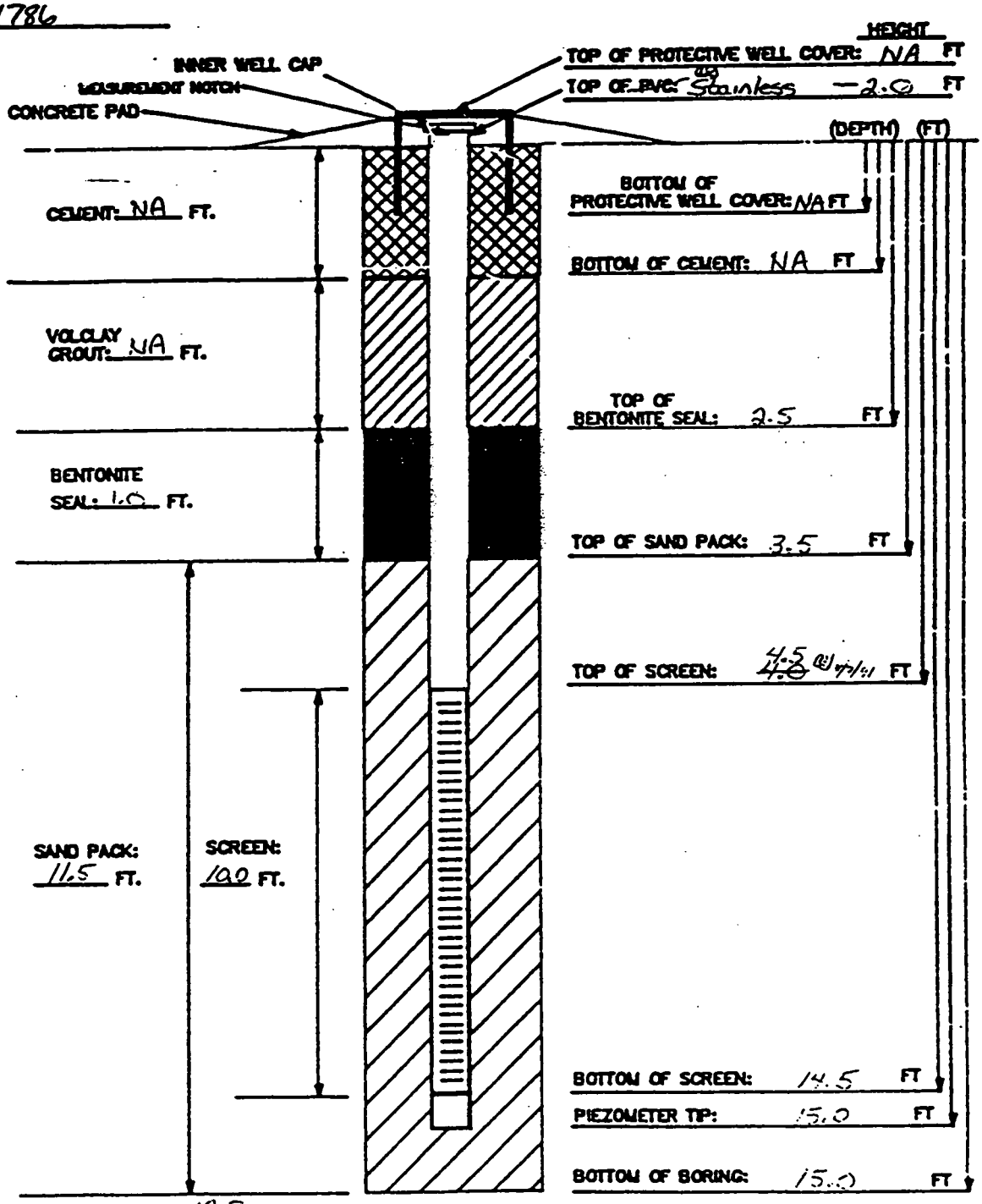
NOTES:

SAA = Same As Above
NA = Not Applicable

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1786

INSTALLATION DATE: 08-07-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 3 (50 lb bags of 10/20 sand)
BENTONITE PELLETS (5-GALLON BUCKETS): 3 5-gal
BAGS OF VOLCLAY GROUT: NA
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 5 gal
OTHER:

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE-40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE-40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: N/A
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: U.C. 2-22-95 GEOLOGIST/ENGINEER: C. Grube

3.29
ET 8/9/91

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602.2785 3.29
BORING NO. 1786 ET 8-17-91
PIEZOMETER NO. 1786

FIELD ENG./GEO. Cate Grube DATE 08-07-91
CHECKED BY GMW DATE 9.29.91
DATE OF INSTALLATION 08-07-91

BOREHOLE DRILLING

DRILLING METHOD 10 in Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT 10 in. Hollow Auger
CASING SIZE (S) USED:
SIZE NA FROM — TO —
SIZE NA FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring piezometer
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 10.0 FT [11.0 FT with sump]

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in.
LENGTH OF PIPE SECTIONS 2.0 FT
JOINING METHOD Flush-joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION Wimco installed cover w/ pump assembly

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY/CEMENT	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
BENTONITE	TOP 2.5	BOTTOM 3.5	TOP	BOTTOM
SAND	TOP 3.5	BOTTOM 15.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 4.5	BOTTOM 14.5	TOP	BOTTOM
PIEZOMETER TIP	15.0		NA	
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	To be taken at a later date			

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
IS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

COMMENTS Top of water bearing zone at 4.5 FT
Bottom of water bearing zone at 5.0 FT

409-11-86

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	08	05	91
NO.	NA		
SHEET	1	OF	1

PROJECT NAME FMPC RI/FS | PROJECT NO. 602 ~~2-7-20-27.95~~ 3.29

FIELD ACTIVITY SUBJECT: Preliminary work in preparation to drill B-1786

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700 - Arrive at ASI office, pick up keys to truck
0730 - Briefing on Site-Specific H&S Plan
0800 - Briefing on work plan - went to site to activate badges for P. Coulter + J. Strapazzon
0830 - Head to trailers to round-up supplies
1200 - Lunch
1300 - Called Leo Singleton to arrange to pick up penetration permit
1330 - met w/ L. Singleton + J. Hall to pick up permit and discuss well construction
1400 - went to B-1786 w/ L. Singleton - B. Boyer getting RWP for well
1415 - Reviewing situation - Rust Eng. Has removed cement slab (3 ft x 4 ft) where well will be
1430 - Waiting for Rig to be checked by WMCO Fire + Safety
1530 - Waiting for Rust Engineering to clear out soil excavated from below cement that is on plastic around the well - Also Rust Placing metal sheet over part of opening so drillers have some where to stand - Drillers looking for 10 in auger head
1600 - Positioning rig on site at 1786
1700 - Leave site, change out
1720 - Leave for day

VISITORS ON SITE:
L. Singleton
J. Hall
Rust Engineering Personnel

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None

WEATHER CONDITIONS:
Partly Cloudy

IMPORTANT TELEPHONE CALLS:
None

PERSONNEL ON SITE: [illegible]

SUPERVISOR: [illegible] DATE: [illegible]

001943

5711

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG		
DATE	08	06 91
NO.	NA	
SHEET	1 OF 1	

PROJECT NAME FMPC RI/FS | PROJECT NO. 602 ~~3.7.20~~ 3.19

FIELD ACTIVITY SUBJECT: Drilling & Installing Well 1786 (SE corner plant 9)

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0655 - Arrive at ACI office
0710 - Attended scheduled field up date meeting
0730 - Gathering equipment
0745 - Calibrating HNU meter
0800 - Enter plant, changeout
0820 - Arrive at site, 1786, meet w/ L. Singleton & J. Hall + Misc. Rust personnel
0830 - Waiting on rain
0930 - Still waiting on rain
1125 - Left site, changeout
1200 - Lunch
1300 - Meeting - company wide contract update at office
1400 - Talked to B. Hertel - he is calling S. Shirley to tell him that we are calling it a day due to rain
1430 - Have word that work day is called, notified HA Drilling
1500 - Leave for day

VISITORS ON SITE:

WMCO - Leo Singleton
WMCO - John Hall
Rust Eng. Personnel

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

We are working on a "rain day", and will be at standby hoping to work part of the date - As per J Wheat

WEATHER CONDITIONS:

Rainy, Temp 65°F

IMPORTANT TELEPHONE CALLS:

None

PERSONNEL ON SITE: Cate Grube, Ben Brier, Dave Newman, Bob Johnson

SUPERVISOR: Cate Grube DATE: 8/6/91

001944

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	08 / 07 / 91
NO.	NA
SHEET	1 OF 1

PROJECT NAME: FMPC RI/FS | PROJECT NO. 602 ~~2.75~~ ~~3.17~~ 3.29

FIELD ACTIVITY SUBJECT: Drilling and installing well #1786

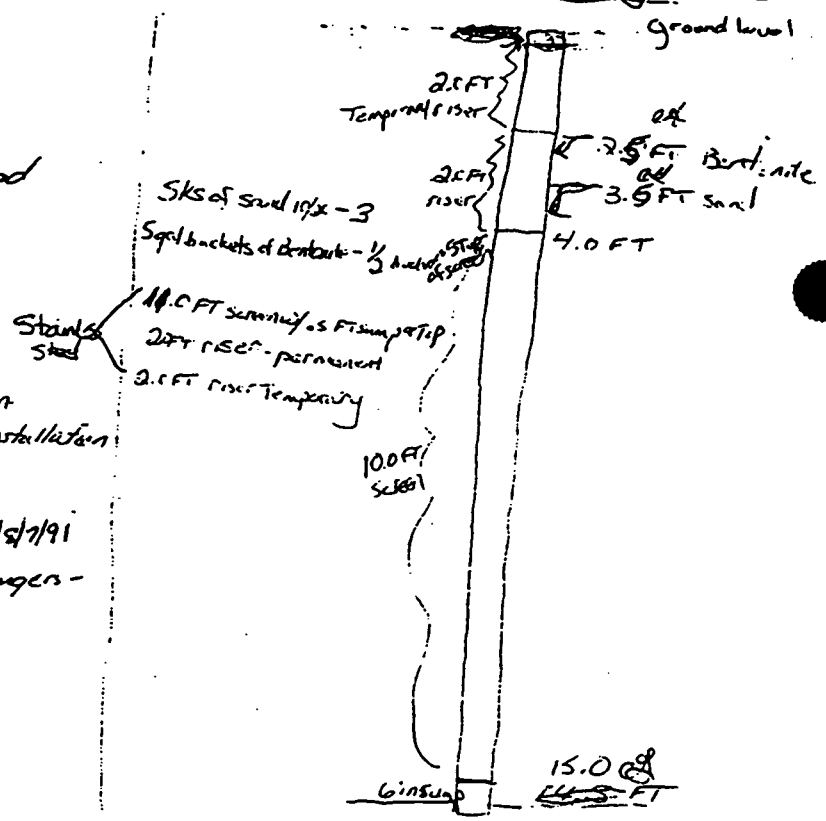
DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0700 - Arrive at office to check in w/ B. Hertel & Pick up truck & calibrate instruments

Response checked of and BX meters with fresh plate
HNU = 71.083
11.7 ppm Liquid Carbonic
10 ppm Isobutylene
Lot # 020790-1
Reading 69 ppm
Span setting - 10.3

0730 - Enter plant Change out
0750 - Arrive on site, setting up sampling & decon pad - the drillers preparing to drill
0800 - Tailgate Safety Meeting
0815 - Preparing site
0830 - Sampling from 1.0 to 3.0 FT (1 FT of cement removed prior to drilling by Rust Engineering
0900 - Drilling to 6.0 FT
1000 - Having difficulty drilling down to 6.0 FT - Augers not staying in line
1015 - Sampling from 6.0 to 7.5 FT
1045 - Drilling from 6.0 to 10.5 FT
1120 - Leave site, change out
1150 - Lunch
1230 - Enter Plant, Change out
1300 - Arrive back on site - set up sampling pad
1330 - Sampling from 10.5 FT to 12.0 FT
1410 - Augering to 15.0 FT
0 - Shovelling out around augers
1.05 - Break in Plant 5 due to Heat
1500 - Cleaning out inside augers w/ 3 in split spoon
1545 - Preparing stainless screen & risers for well installation
1600 - Installing stainless casing
1630 - Starting to install sand pack
1640 - small Break
~~1700 - Took Temp and total U: drum sample~~ CB 8/7/91
1700 - Drillers installing sand pack inside of 10 in augers - they are slowly pulling out augers
1730 - Fueling rig
1745 - Installing sand Pack
1820 - Installing Bentonite pellet seal
1830 - All augers out of hole Completing seal
1845 - Shovelling soil from removed augers into drum
1900 - Sealing drum; cleaning up site
1905 - Leave site, change out
1912 - Leave for day

Boring #1786



VISITORS ON SITE:
ASI QA - Mike + Ken
WMCO - Lea Singleton
" - John Hall
ASI - John Throckmorton

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
None.

WEATHER CONDITIONS:
Clear, sunny, temp 75 - 85°F

IMPORTANT TELEPHONE CALLS:
None.

PERSONNEL ON SITE: Dave Neiman, Bob Johnson, Ben Brier, Cate Grubbs, Bill [illegible]

SUPERVISOR: Cate Grubbs

001945

DATE: 8/7/91

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG			
DATE	08	08	91
NO.			
SHEET	1 OF 1		

571-1

SUBJECT NAME: FMPC RI/FS | PROJECT NO. 602 27.95

FIELD ACTIVITY SUBJECT: TCLP Drum sampling and securing of drum for B#1786

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0800 - Arrive at office to pick up truck
0815 - Met with D. Spatta to get sample numbers for TCLP & Total U. Drum Cuttings of B#1786
0835 - Enter Plant, change out
0900 - Met RCRA Contact to verify marking on drum, and paperwork.
0930 - Sampling drum for B-1786 (TCLP & Total U)
1030 - Leave site, change out
1100 - Arrive at ASI sample trailer to drop off samples to D. Spatta
1200 - Lunch
1300 - Arrive at ASI office to work on paperwork for well #1786
1500 - J. Throckmorton came to talk to me about problem with well #1786 noticed during a site tour.
1515 - Leave for day

VISITORS ON SITE: None

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS: None

WEATHER CONDITIONS: Overcast, - Temp 85°

IMPORTANT TELEPHONE CALLS: None

PERSONNEL ON SITE:

SUPERVISOR: DATE:

001946

LOCATION MAP

ERM—MIDWEST WELL LOG

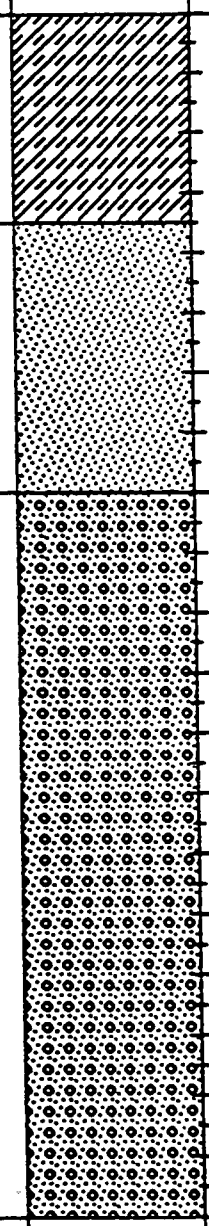
BORE NUMBER ▶ MW-38S	LOCATION ▶ PRRS Site; Fernald, Ohio
DATE ▶ 04/17/91	WEATHER ▶ Sunny, 75F
LOGGED BY ▶ JDK	DRILLED BY ▶ Bowser Morner
DRILLING METHOD ▶ 4 1/4 IN. Hollow Stem Auger	SAMPLING METHOD ▶ 300 lb. Hammer 3IN. Split Spoon
ELEVATION ▶ Ground 526.32 FT. Top of Casing 528.36 FT.	GRAVEL PACK ▶ #7 Sand 20-8 FT. / SEAL ▶ Bentonite 8.0-6.0 FT.

CASING ▶ TYPE S.S. 306 DIAMETER 2 IN. LENGTH 10 FT. | WATER LEVEL INITIAL ▼ 13.20 FT. ■ B.G.S. □ B.M.P. | HOLE DIA. 8 IN.

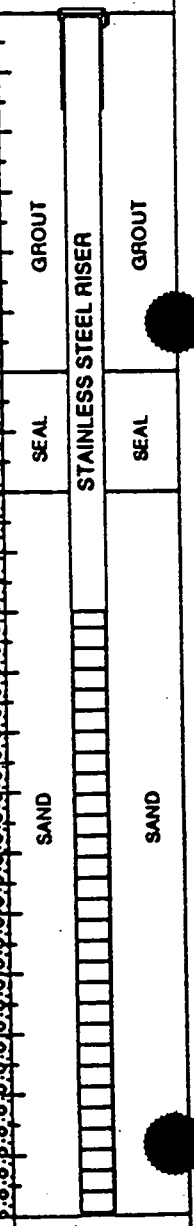
SCREEN ▶ TYPE S.S. 306 SLOT 0.01 IN. DIAMETER 2 IN. LENGTH 10 FT. | WATER LEVEL AT COMPLETION ▽19.20 FT. T.O.C. | TOTAL DEPTH 20 FT.

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
Dry		Soft	Slight	1	0.0	0–1	0.6'	2, 2, 3, 4	Medium brown to dark brown SILTY CLAY with some roots.
Dry		Soft	Slight	2	0.0	2–3	1.6'	3, 3, 5	Orange-brown SILTY CLAY.
Damp to Moist	Well to Poor	Soft	Slight	3	0.0	4–5	1.6'	2, 5, 5, 3, 7	Light brown/buff color clayey fine SAND, very moist. same but with zones of coarse SAND at 4.5-4.6 FT. and 5.9-6.0 FT., sand is dry.
Damp	Well	Soft	Slight	4	0.0	6–7	0.6'	5, 12, 17, 11	same brown-buff colored clayey silt/fine SAND, some coarse SAND at top and minor gravels at bottom.
Damp	Poor	Stiff	Non	5	0.2	8–9	1.2'	16, 16, 12, 13	Orange-brown SAND and GRAVELS, fine to coarse grained with gravels of varying sizes, some fairly well rounded, rock fragments at bottom.
Dry	Poor	Stiff	Non	6	0.0	10–11	1.7'	12, 12, 14, 11	Same, SAND and GRAVEL but more buff colored. Gravels are angular to fairly well rounded.
Wet	Poor	Stiff	Non	7	0.0	12–13	0.1'	12, 16, 23, 23	Wet SAND and GRAVEL, fine to coarse gravels, well rounded.
Wet	Poor	Soft	Non	8	0.4	14–15	1.3'	13, 9, 14, 12	Brown-rust colored SAND and GRAVEL, fine to coarse, gravels well rounded.
Wet	Poor	Soft	Non	9	0.0	16–17	1.8'	6, 10, 11, 10	Same, but not as many gravels.
Wet	Poor	Soft	Non	10	0.0	18–19	2.0'	5, 11, 14, 14	Same as above.
						20			End of Boring 20.0 FT.

GRAPHIC LOG



WELL COMPLETION



52788

LOCATION MAP

ERM–MIDWEST WELL LOG

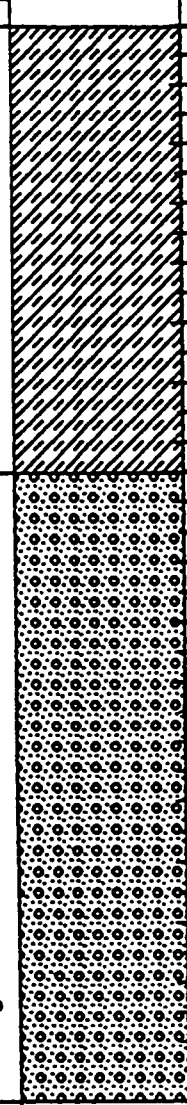
BORE NUMBER ▸ MW-39S	LOCATION ▸ PRRS, Fernald, Ohio
DATE ▸ 04/22/91	WEATHER ▸ Hot, Clear
LOGGED BY ▸ RAF	DRILLED BY ▸ Bowser Morner
DRILLING METHOD ▸ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▸ 300 lb. Hammer 3 IN. Split Spoon
ELEVATION ▸ Ground 524.71 FT. Top of Casing 527.64 FT.	GRAVEL PACK ▸ #7 Sand 17-5 FT. / SEAL ▸ Bentonite 5-3 FT.

CASING ▸ TYPE S.S. 306 DIAMETER 2 IN. LENGTH 10 FT. WATER LEVEL INITIAL 9.0 FT. ■ B.G.S. □ B.M.P. HOLE DIA. 8 IN.

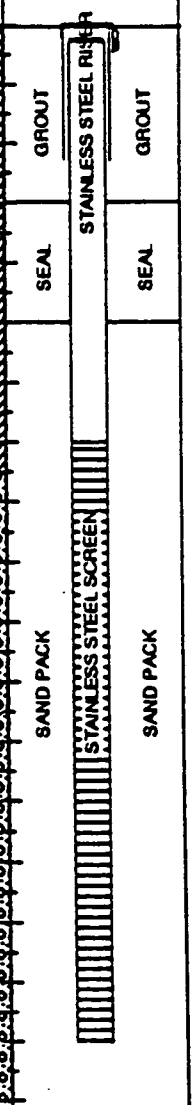
SCREEN ▸ TYPE S.S. 306 SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 10 FT. WATER LEVEL AT COMPLETION 9.0 FT. H.M.P. TOTAL DEPTH 18 FT.

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
						0		2	Brown SILTY CLAY, roots, vertical holes.
Dry	Poor	Soft	Slight	1	0	1	1.2'	2	
								5	
						2		5	
								4	Chocolate brown SILTY CLAY, trace silt, light brown mottles.
Damp	Poor	Soft	Slight	2	0	3	1.25'	6	
								7	
						4		6	Brown SILTY CLAY with fine sand/clayey fine sand.
								3	
Damp	Poor	Soft	Slight	3	0	5	2.0'	3	
								6	
						6		6	Brown SILTY CLAY trace sand, gravel.
					25			2	
Damp	Poor	Soft	Slight	4		7	1.7'	5	
					3			5	
						8		4	Angular GRAVEL and brown silty clay.
								5	
Wet	Poor	Stiff	Non	5	12	9	1.25'	10 ▼	Angular GRAVEL and coarse SAND, no visual contamination.
								10	
						10		11	
								6	
Wet	Poor	Stiff	Non	6	0	11	1.0'	8	Same as above. No visual contamination.
								9	
						12		8	
								6	Same, large 3 IN. cobbles, angular flint, no visual contamination.
Wet	Poor	Stiff	Non	7	0	13	1.5'	15	
								12	
						14		9	
								7	Same with 6 IN. of brown medium to coarse SAND, no visual contamination.
Wet	Poor	Stiff	Non	8	0	15	1.0'	5	
								5	
						16		4	
								5	Same, all coarse SAND, some GRAVEL, no visual contamination.
Wet	Poor	Stiff	Non	9	0	17	2.0'	9	
								11	
						18		15	
									Total Depth 18.0 FT.
						19			
						20			

GRAPHIC LOG



WELL COMPLETION



PROJECT\339-12-06\MW-39S.DRW 9105010900

2789

LOCATION MAP

ERM–MIDWEST WELL LOG

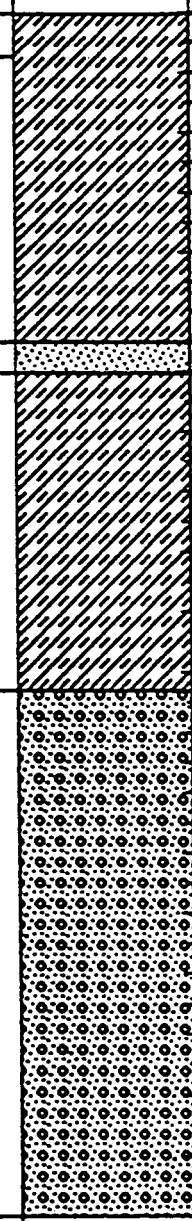
BORE NUMBER ▸ MW-40S	LOCATION ▸ PRRS, Fernald, Ohio
DATE ▸ 04/22/91	WEATHER ▸ Clear, Cool
LOGGED BY ▸ RAF/SGB	DRILLED BY ▸ Bowser Morner
DRILLING METHOD ▸ 4 1/4" Hollow Stem Auger	SAMPLING METHOD ▸ 3 IN. Split Spoon/ 300 lb Hammer
ELEVATION ▸ Ground 525.79 FT. Top of Casing 527.94 FT.	GRAVEL PACK ▸ #7 Sand 19-7 FT. / SEAL ▸ Bentonite 7-5 FT.

CASING ▸ TYPE S.S. 306 DIAMETER 2 IN. LENGTH 12 FT. WATER LEVEL INITIAL 11.0 FT. ■ B.G.S. □ B.M.P. HOLE DIA. 8 IN.

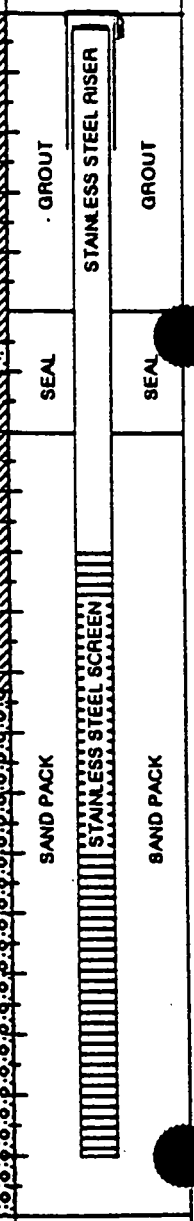
SCREEN ▸ TYPE S.S. 306 SLOT 0.010 IN. DIAMETER 2 IN. LENGTH 10 FT. WATER LEVEL AT COMPLETION 11.0 FT. H.M.P. TOTAL DEPTH 19 FT.

MOISTURE CONTENT	SORTING	DENSITY	PLASTICITY	SAMPLE NO.	OVA (ppm)	DEPTH	SAMPLE RECOVERY	PENETRATION RESISTANCE	LITHOLOGY / REMARKS
						0		1	Gray SILTY CLAY roots.
Damp	Poor	Soft	Slight	1	0	1	1.8'	1	Grades Brown.
					25			2	
						2		2	
Damp	Well	Soft	Slight	2	0	3	1.8'	3	Same, trace roots, trace fine sand.
					1.5			4	
						4		3	Same as above.
Dry	Poor	Soft	Non	3	10	5	1.3'	3	
								6	
						6		6	Brown medium grain SAND.
					25			3	Brown SILTY CLAY.
Dry	Poor	Hard	Non	4		7	1.9'	5	Clayey fine sand, damp.
					4			5	4 IN. medium grain sand, damp
						8		7	2 IN. brown SILTY CLAY, trace sand.
Dry	Poor	Hard	Non	5	8	9	1.6'	9	
								11	Gray cobbles, intermixed with brown and gray SILTY CLAY.
						10		12	
								12	Same as above.
Wet	Poor	Hard	Non	6	>1000	11	1.9'	12	
								19 ▼	
								21	Angular SAND and GRAVEL, sweet odor.
						12		25	
Wet	Poor	Hard	Non	7	430	13	1.2'	11	Same 4 IN. of brown silty clay with GRAVEL, sweet odor, flint GRAVEL.
								14	
								11	
						14		11	Brown coarse SAND and GRAVEL, oily sheen on water, sweet odor, flint GRAVEL.
Wet	Poor	Hard	Non	8	>1000	15	1.9'	16	
								8	
								18	
						16		19	
Wet	Well	Hard	Non	9	200	17	1.8'	10	Black coarse SAND and GRAVEL.
								17	
								15	
						18		15	
Wet	Well	Hard	Non	10	-	19	1.9'	6	Same as above.
								9	
								12	
						20		10	
									Total Depth 20.0 FT.

GRAPHIC LOG



WELL COMPLETION



PROJECT\539-12-05\MW-40S.DRW 9105010945

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

ET 8-19-91

PROJECT NUMBER: 602.26.91.3.16	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1791	COORDINATES: N.477812.99, E.1378971.18	DATE: 6-25-91	
ELEVATION: 571.1 GROUND	GWL: Depth NA	Date/Time NA	DATE STARTED: 6-25-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA	Date/Time NA	DATE COMPLETED: 6-26-91
DRILLING METHODS: Auger Mobile 53			PAGE 2 OF 4

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				Cross-reference Boring No. 1709 for classification of Soils up to 27.0'			
2							
3				All Remarks/Background for Spoons are within: 50-100cpm Bß, 0 cpm Alpha and 0 ppm Hnu upto 27.0'			
4							
5							
6				Composite Samples are taken from 0.0' - 30.0'			
7							
8				67123 - SRLP			
9				67124 - TCLP 67125 - Ig. Tox.cor. Rec. 67126 - Archive			
10				67127 - Field Blank			
11				67128 - TCLP D.C. 67142 - Treatability			
12							
13							
14							
15							

REVIEWED BY QA MR DATE 9-20-91

NOTES:

Drilling Contractor Penn Drilling

Drilling Equipment Auger Mobile 53

Driller: Bob Yost

Bill Anderson, Bob Johnson

All samples classified according to Munsell color chart

Background

Hnu - 0 ppm

Bß - 50-100 cpm

α - 0 cpm

2438-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: CO2.26-91-3.16 (ET 8-1791)	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1791	COORDINATES: See p.1	DATE: 6-25-91
ELEVATION: See p.1	GWL: Depth NA Date/Time NA	DATE STARTED: 6-25-91
ENGINEER/GEOLOGIST: J. Lear	Depth NA Date/Time NA	DATE COMPLETED: 6-26-91
DRILLING METHODS: Auger mobile 53		PAGE 1 OF 4

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Cross Reference Boring Log #1709 for Soil classification up to 27.0'			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28	67121 1400 6-25-91	8 16 19	18	Stiff, dark grayish brown, 2.5Y, 4/2 clayey silt, V. moist.	ML	1.5	Hnu - 0 ppm; Bγ - 150-200cpm; α - 0 cpm
29 30	67122 1410 6-25-91	13 12 17	18	S.A.A.	ML	1.5	Hnu - 0 ppm; Bγ - 50-100cpm; α - 0 cpm

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Auger CME 53

Driller: Bob Yost, Bill Anderson

Background
Hnu - 0 ppm
Bγ - 50-100cpm
α - 0 cpm

001551

2438-3-86

REVIEWED BY QA: [illegible] DATE: 6-20-91

4/4

FERNALD RI/FS

Date		
Initial		
1st Key In	2nd Key In	Hard Copy Verification

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 6-26-91
PROJECT NO. 602.26.91 3.16 ET 8-19-91 CHECKED BY E. Trollinger DATE 8-19-91
BORING NO. 1791
PIEZOMETER NO. NA DATE OF INSTALLATION 6-26-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 10 in Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft.)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		571.1	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0	TOP 571.1	BOTTOM 570.1
cement GROUT/SLURRY	TOP 1.0	BOTTOM 30.0	TOP 570.1	BOTTOM 541.1
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	30.0		541.1	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS

001952

REVIEWED BY QA [signature] DATE 9-20-91

3/4

FERNALD RI/FS

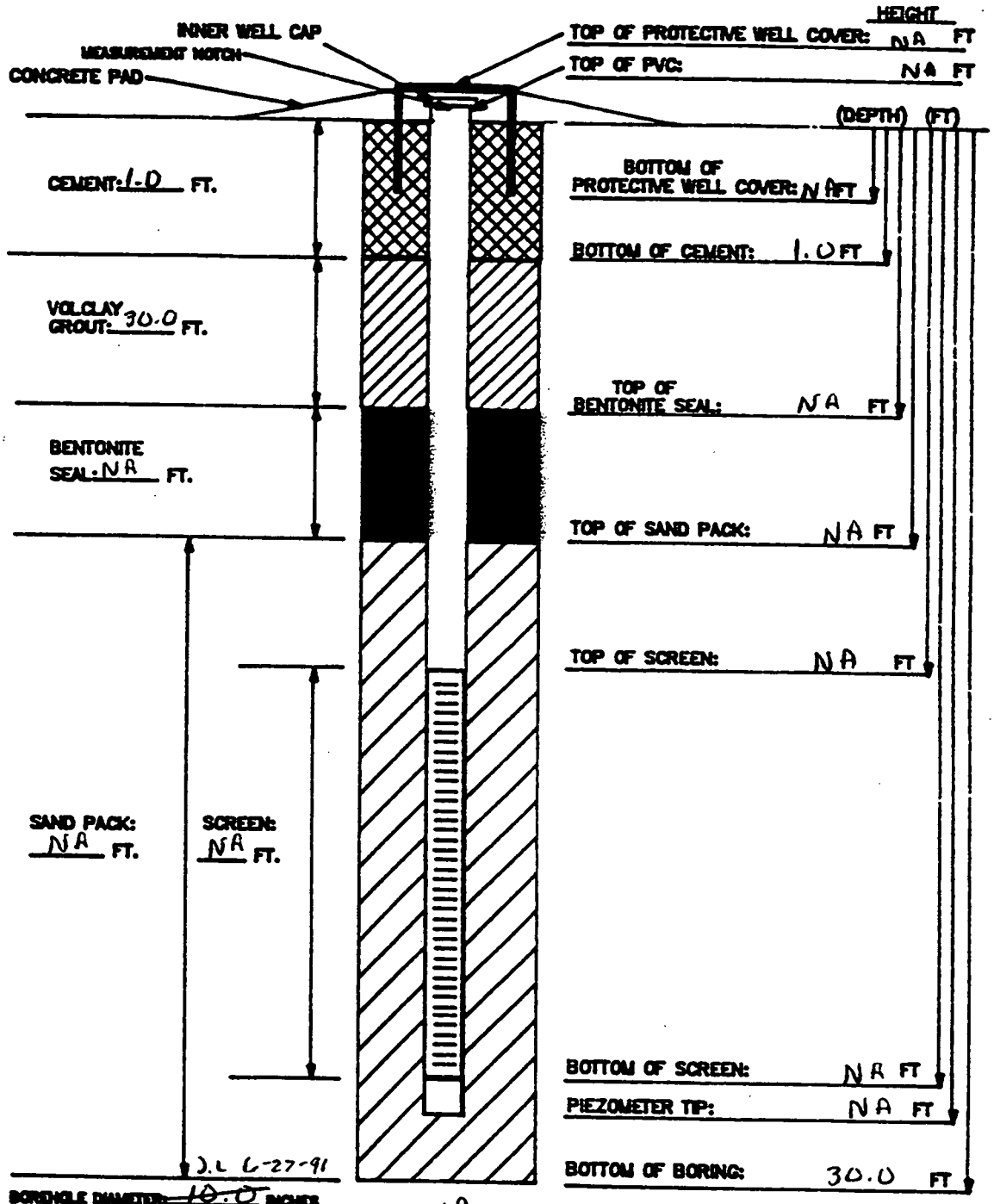
INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Plugged Boring 1791

J.L. 6-27-91

~~INSTALLATION~~ Plugging DATE: 6-26-91

J.L 6-27-91



BOREHOLE DIAMETER: ~~10.0~~ 3.0 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 1 50lb bag

AMOUNT OF CEMENT: ½ 80lb bag

AMOUNT OF WATER USED: 15 gals

OTHER:

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: ~~1.02.26.91~~ 3.16 ET 8-19-91

GEOLOGIST/ENGINEER: J. Lear

001353

REVIEWED BY QA [illegible] DATE 9-20-91

FERNALD RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.16(21.91)	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1792	COORDINATES: N477280.15 E1379372.29	DATE 8-21-91
ELEVATION: 566.1	GWL: Depth Date/Time	DATE STARTED: 8-21-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-22-91
DRILLING METHODS: 53 Mobile Auger		PAGE 1 OF 5

SAA - Same As Above

N.R. No Recovery

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67342 1315 8-21-91	4 11 21	14	Hard, dark yellowish brown (10yr. 3/4) silty clay, trace gravel. Low plastic. moist. ^ Some organics	CL	2.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
2 3	67343 1320 8-21-91	22 23 27	17	V. hard, brown (10yr. 5/3) silty clay some large gravel. low plast., moist.	CL	>4.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
4	67344 1325 8-21-91	24 25 27	17	V. hard yellowish brown, (10yr. 5/4) silty clay. Some large gravel, low plast., sl moist.	CL	>4.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
5	67345 1330 8-21-91	25 42 27	16	S.A.A.	CL	>4.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
7	67346 1500 8-21-91	37 43 39	13	S.A.A.	CL	4.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
8 9	67347 1505 8-21-91	21 24 29	13	V. hard, V. dark grayish brown (10yr. 3/2) silty clay, some large gravel, low plast. sl. moist.	CL	>4.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
10	67348 1510 8-21-91	21 24 19	12	Dense, yellowish brown (10yr. 5/4) clayey silt, some gravel, moist. 10.0 Hard, olive gravel (5y. 3/2) silty clay, some gravel med plast. moist.	ML CL	NA 2.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
11 12	67349 1515 8-21-91	9 6 7	4	Firm, Olive (5y. 4/4) clay, some gravel med plast. moist.	CL	0.5	Hnu - 0 ppm Bg - 60 cpm α - 0 cpm
13	67350 1530 8-21-91	8 6 7	18	Firm, Olive (2.5y. 4/3) silty clay, some gravel, med plasticity. moist.	CL	0.5	Hnu - 5-12 ppm Bg - 60 cpm α - 0 cpm
14 15	67352 1535 8-21-91	8 9 7	18	S.A.A.	CL	0.5	Hnu - 1-2 ppm Bg - 60 cpm α - 0 cpm

NOTES: Drilling Contractor - Penn Drilling
Drilling Equipment - 53 Mobile Auger
Driller - Bob Yost
Asst. - Mark Rebold

Back ground
Bg - 60 cpm
Hnu - 0 ppm
α - 0 cpm

402-11-88

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

CT NUMBER: 602.3.116 (26.91)	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1792	COORDINATES: See p 1		DATE: 8-22-91
ELEVATION: See p 1	GWL: Depth	Date/Time	DATE STARTED: 8-21-91
ENGINEER/GEOLOGIST: J. Lear	Depth	Date/Time	DATE COMPLETED: 8-22-91
DRILLING METHODS: 53 Mobile Auger			PAGE 2 OF 5

S.A.A. - Same as above
N.R. No Recovery

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	67352 0830 8-22-91	4 5 8	18	S.A.A.	CL	0.5	Hnu - 0 ppm; BD - 60 cpm; α - 0 cpm
17	67353 0835 8-22-91	8 9 11	18	S.A.A. Add trace wood chips	CL	0.5	Hnu - 2 ppm; BD - 80 cpm; α - 0 cpm
18	67354 0840 8-22-91	100/5	4	Firm, Olive (5Y, 5/4) silty clay, some gravel med plast. moist	CL	2.0	Hnu - 0 ppm; BD - 80 cpm; α - 0 cpm
19			17	impenetrable struck, Auger to 20.0'			
20	67355 1400 8-22-91	8 11 12	12	Firm, Olive (5Y, 5/4) silty clay, some gravel, med plasticity, moist.	CL	.75	Hnu - 0 ppm; BD - 80 cpm; α - 0 cpm
22	67356 1405 8-22-91	17 19 21	18	Firm, Olive gray (5Y, 4/2) clay, trace gravel, low to med plast. moist.	CL	1.25	Hnu - 0 ppm; BD - 80 cpm; α - 0 cpm
23							
24	67357 1410 8-22-91	27 29 33	12	S.A.A.	CL	1.25	Hnu - 2 ppm; BD - 80 cpm; α - 0 cpm
25	67358 1415 8-22-91	36 42 39 22	0	N.R.	NA	NA	Hnu - ; BD - ; α - } NA
26							
27	67359 1420 8-22-91	18 18 22	6	Firm, light olive brown (2.5Y/5/4) silty clay, some gravel, trace sand, moist.	CL	1.25	Hnu - 0 ppm; BD - 80 cpm; α - 0 cpm
28	67362 67363 1535 8-21-91	16 17 17	18	S.A.A.	CL	1.2.5	Hnu - 0 ppm; BD - 80 cpm; α - 0 cpm
				dense (10YR 4/3) brown clayey silt, moist	ML	NA	

NOTES: see page 1

cont. Next page

001955

402-11-88

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.16 (26.91)	PROJECT NAME: FMPC RI/FS OU-2	
BORING NUMBER: 1792	COORDINATES: See p 1	DATE 8-22-91
ELEVATION: See p 1	GWL: Depth Date/Time	DATE STARTED: 8-21-91
ENGINEER/GEOLOGIST: J. Lear	Depth Date/Time	DATE COMPLETED: 8-22-91
DRILLING METHODS: 53 Mobile Auger		PAGE 3 OF 5

S.A.A. Same as above

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	67364	17	18	S.A.A.	ML	NA	Hnu - 0 ppm
	1435	19					Bd - 80 cpm
31	8-22-91	21					α - 0 cpm
	67365	36	18	S.A.A.	ML	NA	Hnu - 0 ppm
32	1615	35					Bd - 80 cpm
	8-22-91	50					α - 0 cpm
33	67366	49	18	Firm dark yellowish brown (10yr, 4/6) silty clay low plasticity	CL	3.5	Hnu - 0 cpm
	1620	37					Bd - 80 cpm
34	8-22-91	32					α - 0 cpm
				Drilling & Sampling ends at 34.0' All samples taken According to OU-2 work Plan Southfield Addendum			

NOTES: See page 1

001956

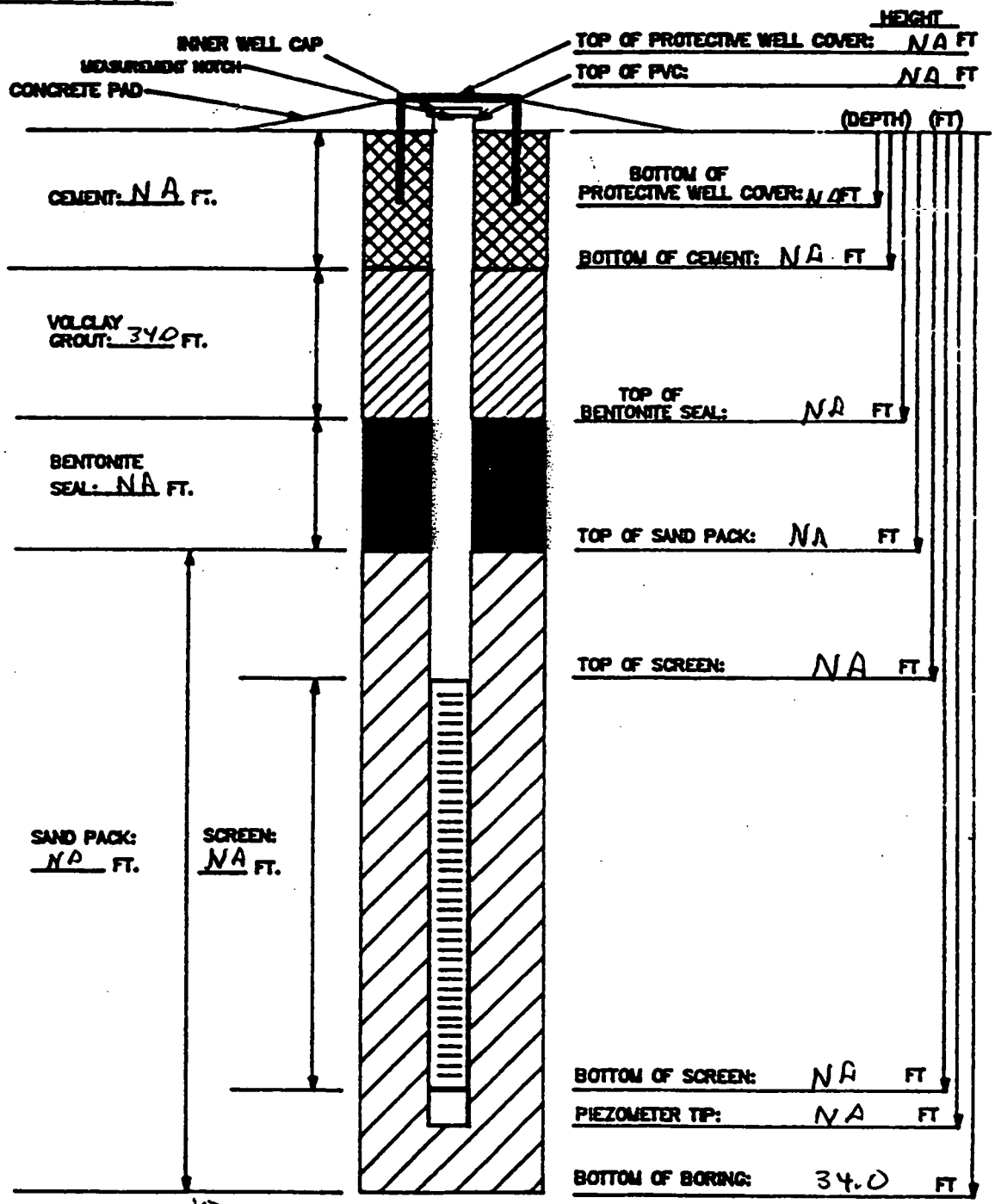
402-11-66

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ Boring NO. 1792

INSTALLATION DATE: 8-22-91



BOREHOLE DIAMETER: 10 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4-50lb bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 110 gals
OTHER: NA

NOTES: NA

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.16 GEOLOGIST/ENGINEER: J. Lear

FERNALD
RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS OU-2 FIELD ENG./GEO. J. Lear DATE 8-22-91
PROJECT NO. 602.316 (26.91) CHECKED BY JMW DATE 9-5-91
BORING NO. 1792
PIEZOMETER NO. NA DATE OF INSTALLATION 8-22-91

BOREHOLE DRILLING

DRILLING METHOD 10in Hollow Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ ~~TO~~
FLUID NA ~~FROM~~ ~~TO~~

TYPE OF BIT 10" Hollow Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ ~~TO~~
SIZE NA ~~FROM~~ ~~TO~~

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		566.1	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 34.0	TOP 566.1	BOTTOM 532.1
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	34.0		532.1	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS

001958

Field Form
Page 1 of 2

Du-2 BODINI 1792
Des 9/6/91

Subsurface Soil Sample Collection Log

Computer Entry	Date	Int.
1st Key		
2nd Key		
ManVer		

Field Check by JMW Date 9.5.91

Unique Sample Number	Well / Boring ID No.	Collectors Initials	Collection Date MM	DD	YY	Collection Time HH	MM	Sample Depth Interval	Preservative	Sequence	Blank	Spike	Duplicate	Duplicate of Sample Number	Split	General Comments
67342	1792	JL AC	8	21	91	13	15	0.0-1.5'	N	1	N	N	N	N/A	N	ARCHIVE
67343	1792	JL AC	8	21	91	13	20	1.5-3.0	Y	2	N	N	N	N/A	N	EXT HSL
67344	1792	JL AC	8	21	91	13	25	3.0-4.5	N	3	N	N	N	N/A	N	ARCHIVE
67345	1792	JL AC	8	21	91	13	30	4.5-6.0'	N	4	N	N	N	N/A	N	ARCHIVE
67346	1792	JL AC	8	21	91	15	00	6.0-7.5	Y	5	N	N	N	N/A	N	EXT HSL
67347	1792	JL AC	8	21	91	15	05	7.5'-9.0'	N	6	N	N	N	N/A	N	ARCHIVE
67348	1792	JL AC	8	21	91	15	10	9.0-10.5	N	7	N	N	N	N/A	N	ARCHIVE
67349	1792	JL AC	8	21	91	15	15	10.5-12.0'	N	8	N	N	N	N/A	N	ARCHIVE
67350	1792	JL AC	8	21	91	15	30	12.0-13.5	Y	9	N	N	N	N/A	N	EXT HSL
67351	1792	JL AC	8	21	91	15	35	13.5'-15.0'	N	10	N	N	N	N/A	N	ARCHIVE
67352	1792	JL AC	8	22	91	08	30	15.0'-16.5'	N	11	N	N	N	N/A	N	ARCHIVE
67353	1792	JL AC	8	22	91	08	35	16.5'-18.0'	N	12	N	N	N	N/A	N	EXT HSL
67354	1792	JL AC	8	22	91	08	40	18.0'-19.5'	N	13	N	N	N	N/A	N	ARCHIVE
67355	1792	JL AC	8	22	91	14	00	20.0-21.5'	N	14	N	N	N	N/A	N	ARCHIVE
67356	1792	JL AC	8	22	91	14	05	21.5'-23.0	Y	15	N	N	N	N/A	N	EXT HSL

001959

Field Form
Page 2 of 2

Qu2 BORING 1792
DCS 9/9/91

Subsurface Soil Sample Collection Log

Computer Entry	Date	Int.
1st Key		
2nd Key		
ManVer		

Field Check by JMW Date 9.5.91

Unique Sample Number	Well / Boring ID No.	Collectors Initials	Collection Date MM	DD	YY	Collection Time HH	MM	Sample Depth Interval	Preservative	Sequence	Blank	Spike	Duplicate	Duplicate of Sample Number	Split	General Comments
67357	1792	JL AC	8	22	91	14	10	23.0'-24.5'	N	16	N	N	N	N/A	N	ARCHIVE
67358	1792	JL AC	8	22	91	14	15	24.5'-26.0'	N	N	N	N	N	N/A	N	NO RECOVERY.
67359	1792	JL AC	8	22	91	14	20	26.0'-28.0'	N	17	N	N	N	N/A	N	ARCHIVE
67360	1792	JL AC	8	22	91	14	30	DRUMMED CUTTINGS	Y	18	N	N	N	N/A	N	TCLP
67361	1792	JL AC	8	22	91											BORING 1793 (TCLP)
67362	1792	JL AC	8	22	91	14	30	28.0'-29.5'	Y	19	N	N	N	N/A	N	TCLP
67363	1792	JL AC	8	22	91	14	30	28.0'-29.5'	N	20	N	N	N	N/A	N	ARCHIVE
67364	1792	JL AC	8	22	91	14	35	29.5'-31.0'	N	21	N	N	N	N/A	N	ARCHIVE
67365	1792	JL AC	8	22	91	16	15	31.0'-32.5'	N	22	N	N	N	N/A	N	ARCHIVE
67366	1792	JL AC	8	22	91	16	20	32.5'-34.0	N	23	N	N	N	N/A	N	ARCHIVE

001960

5211

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.26.91 (602.3.16)	PROJECT NAME: FMPC RI/FS OU-2		
BORING NUMBER: 1793	COORDINATES: N 477464.98 E 1379446.76	DATE: 8-15-91	
ELEVATION: 572.2	GWL: Depth / Date/Time	DATE STARTED: 8-15-91	
ENGINEER/GEOLOGIST: J. Lear	Depth / Date/Time	DATE COMPLETED:	
DRILLING METHODS: 53 Mobile Auger		PAGE 1 OF 3	

S.A.A - Same As Above

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	67331 1015 8-15-91	4 11 25	16	Dense, brown, (10yr, 4/3) clayey silt. Some gravel, Some organics, sl moist	ML	NA	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
2 3	67332 1020 8-15-91	17 25 27	18	v. hard, gray to yellowish brown (10yr, 5/1 to 10yr 4/6) silty clay, trace gravel, trace organics, Low plasticity, sl. moist	CL	>4.5	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
4	67333 1025 8-15-91	27 27 42	12	v. hard, brown (10yr, 5/3) silty clay Some gravel trace organics, Low plast. dry	CL	>4.5	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
5 6	67334 1030 8-15-91	40 37 28	16	v. hard, v. dark grayish brown (10yr, 3/2) silty clay Some gravel, Trace organics low plasticity, sl. moist.	CL	>4.5	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
7	67335 1030 8-20-91	30 33 26	17	v. hard. brown to dark gray (10yr, 5/3 to 10yr 4/1) silty clay, some gravel, trace organics Low plast., dry to sl. moist	CL	>4.5	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
8 9	67336 1035 8-20-91	26 20 23	18	hard, yellowish brown, (10yr, 5/6) mottled silty clay, Trace sand, Low plast., moist	CL	3.75	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
10	67337 1040 8-20-91	21 19 14	18	S.A.A. add trace gravel	CL	3.75	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
11 12	67338 1045 8-20-91	14 19 21	12	S.A.A. dense, brown, (10yr, 5/3) silt, some clay, moist.	CL / ML	3.0 / NA	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
13	67339 1315 8-20-91	20 20 22	17	S.A.A. Hard, brown (10yr, 5/3) clayey silt, moist.	ML / ML	NA / NA	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm
14	67340 1320 8-20-91	18 21 32	18	S.A.A. Hard, brown (10yr, 5/3) silty clay, trace gravel, low plasticity, moist	ML / CL	NA / 3.0	Hnu - 0 ppm Bd - 80 cpm α - 0 cpm

Drilling Contractor - Penn Drilling
ller - Bob Yost
- Bill Anderson

Backgrounds
Hnu - 0 ppm
Bd - 80 cpm
α - 0 cpm

Sampling Ends at 15.0'

Field Blank

All samples taken According to the OU-2 Southfield Addendum work plan. Land fill ends at 7.5'

ext HSL

CLP 3 f.11 mts

VENTS

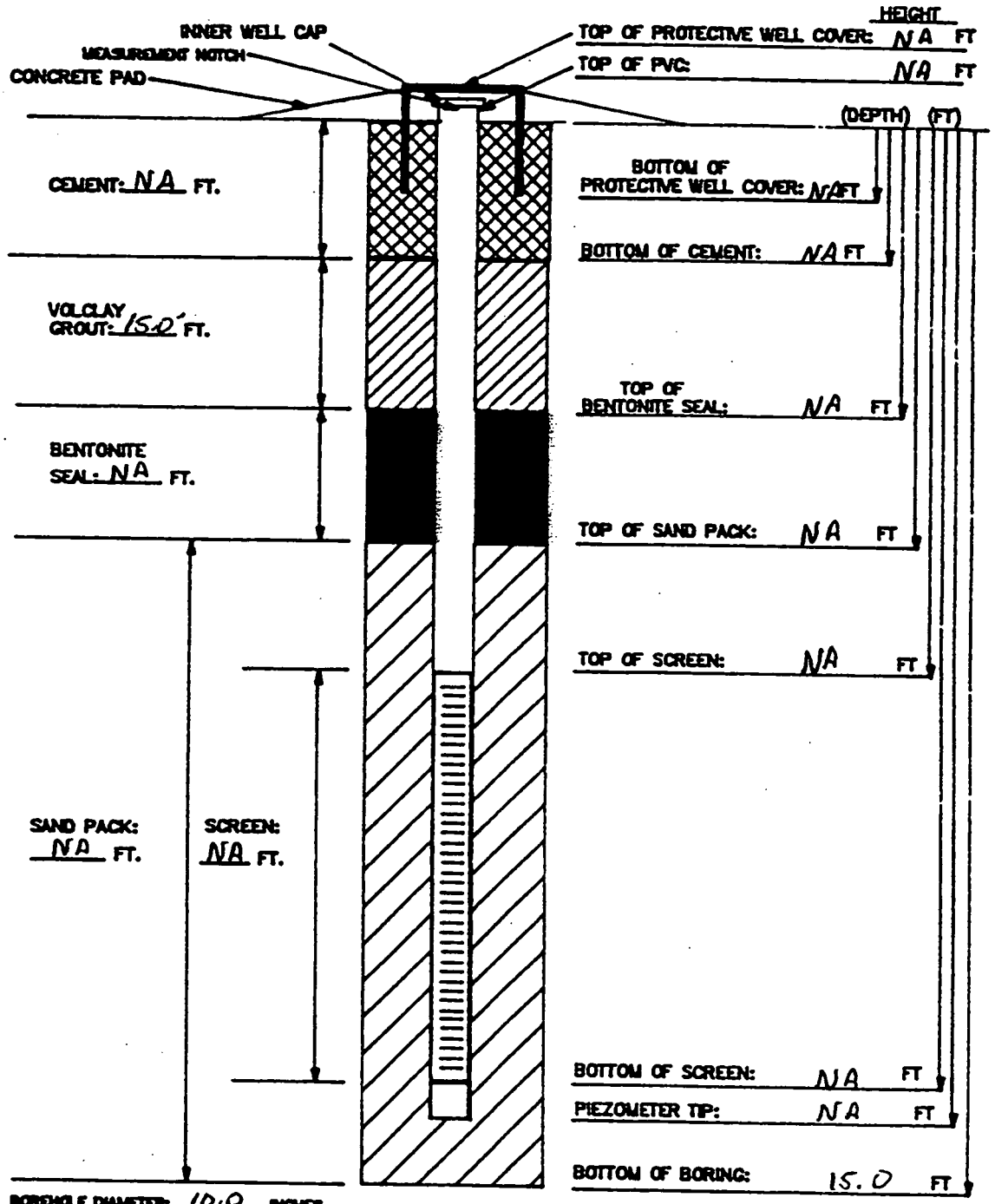
001961 REVIEWED BY QA [signature] DATE 9-9-91

402-11-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1793

INSTALLATION DATE: 8-20-91



BOREHOLE DIAMETER: 10.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 50lb bags
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 55 gal
OTHER: NA

NOTES: NA
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:
5) TOP OF PVC IS SECURED WITH EXPANDABLE RUBBER PLUG AND PADLOCK.
6) PARENTHESES INDICATE DEPTH BELOW GROUND LEVEL.

TASK: 602.3.16 GEOLOGIST/ENGINEER: J. Lear

REVIEWED BY QA MB DATE 9-9-91

FERNALD RI/FS

	1st Key In	2nd Key In	Field Copy Verification
Date	8/20	8/21	
Initial			

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. J. Lear DATE 8-20-91
PROJECT NO. 602.316 CHECKED BY _____ DATE _____
BORING NO. 1793
PIEZOMETER NO. NA DATE OF INSTALLATION 8-20-91

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED: NA
FLUID NA ~~FROM~~ _____ ~~TO~~ _____
FLUID NA ~~FROM~~ _____ ~~TO~~ _____

TYPE OF BIT 10in Hollow Auger
CASING SIZE (S) USED: NA
SIZE NA ~~FROM~~ _____ ~~TO~~ _____
SIZE NA ~~FROM~~ _____ ~~TO~~ _____

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION (~~ft~~)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		572.2	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 15.0	TOP 522.2	BOTTOM 557.2
BENTONITE	TOP N.A	BOTTOM NA	TOP NA	BOTTOM N.A
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0'		557.2	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS _____

001963

APPROVED BY QA MB DATE 9-9-91

5711

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG | DATE 8 / 13 / 91
NO. WA1 → 1
SHEET 1 OF 2

JMW 9.5.91

PROJECT NAME FMPC RI/FS PROJECT NO. 602.26.91(3.16)

FIELD ACTIVITY SUBJECT: B# 1794 Removing Rig from Plant

DESCRIPTION ON DAILY ACTIVITIES AND EVENTS:

0615 - Arrive at ASI office make boring stakes for southfield
0700 - weekly field meeting
0740 - To Southfield, stake borings
0800 - Call Ian Goodall to procure Respirators
0820 - Get Respirators at H&S
0900 - Begin Hand Auger Boring 1794 Total Depth 2.5 ft. * see pg 2.
1130 - Lunch
1230 - At office Get call from Bill Hertel; told him total Depth of 5.0' was improble to get. said we got all Samples Necessary. Get Pere permit and ERA from Jay Herskowitz VIA Bruce Meyers
1300 - To trailers, turn in Samples
1320 - Call Rad Techs Say Rig must be smeared before exit from plant Rig finally Deconned around 1300
1500 - head into plant with T. Hunt to ~~Decon~~ smear Rig and trailer Rig can not be removed
1730 - Exit site

METER CALIBRATION

Hnu Calibration Gas
Hnu S/N (eV) Span Cal. to ppm
Hnu S/N (eV) Span Cal. to ppm

Meter S/N passed Cal. check using
Meter S/N passed Cal. check using

REVIEWED BY QA MB DATE 9-20-91

VISITORS ON SITE: T Hunt

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS: NA

WEATHER CONDITIONS: Warm Sunny

IMPORTANT TELEPHONE CALLS: NA

PERSONNEL ON SITE: J. Lear A. Cleeter B. Yost M. Retold

SUPERVISOR: J. Lear DATE: 8-13-91

FERNALD
RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG | DATE 9/13/91 | NO. NA | SHEET 2 OF 2

JMW 9/13/91

PROJECT NAME FMPC RI/FS | PROJECT NO. CDZ.3.16 (26-91)

FIELD ACTIVITY SUBJECT: B#1794

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

METER CALIBRATION

Hnu Calibration Gas
Hnu S/N (eV) Span Cal. to ppm
Hnu S/N (eV) Span Cal. to ppm

β/γ Meter S/N passed Cal. check using
α Meter S/N passed Cal. check using

Boring # 1794, OU-2

67324 - 0.0 - 1.0'
Grout, sand, silt
Hnu - 10ppm
Bγ - 50-100cpm
α - 0cpm
EXT HSL 0930

67325 1.0-1.5
silt sand clay mix gravel waste
Hnu - 0ppm - 1.0 ppm
Bγ - 50-100cpm
α - 0cpm
Archive 0950

67326 1.5-2.0
silty clay, sand gravel waste
Hnu - 0ppm -
Bγ - 50-100cpm
α - 0cpm
TCLP 1095 67329 0.0-2.0 Archive

67327 1.5-2.0
clay, silt, sand gravel waste
Hnu - 0ppm
Bγ - 50-100cpm
α - 0cpm
Archive 1040

67328 2.0-2.5
clay, silt, sand, gravel waste
Hnu - 0ppm
Bγ - 50-100cpm
α - 0cpm
Ext HSL 1100

REVIEWED BY QA [signature] DATE 9-20-91

VISITORS ON SITE:
TED HUNT

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS:
NA

WEATHER CONDITIONS:
Warm Sunny

IMPORTANT TELEPHONE CALLS:
NA

PERSONNEL ON SITE: A. Clester, J. Lea

SUPERVISOR: J. Lea DATE: 9-13-91

5711

FERNALD RI/FS

FIELD ACTIVITY DAILY LOG

DAILY LOG	
DATE	8/23/91
NO.	NA
SHEET	1 OF 2

PROJECT NAME: FMPC RI/FS | PROJECT NO. 602.3.16

FIELD ACTIVITY SUBJECT: B#1795 OU-2 Hand auger

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 - Arrive at office, Daily meeting w/ Doug Harmel

0730 - to site, to trailers gather supplies

0800 - At site 1795 set up for Drilling

0845 - Sampling & Drilling begins

METER CALIBRATION

Hnu Calibration Gas Isobutelene
Hnu S/N 324 (10.2eV) Span 4.30 Cal. to 55 ppm
Hnu S/N (eV) Span Cal. to ppm

β/γ Meter S/N 18 passed Cal. check using Th 230
α Meter S/N 14 passed Cal. check using

67367 0.0 - 1.0'
dark brown silty clay, some organics, moist.
Hnu - 10 ppm
Bγ - 80 cpm
α - 0 cpm
EXT HSL

67368 1.0 - 2.0
brown silty clay concrete gravel, dry
Hnu - 1.0-2.0 ppm
Bγ - 80-cpm
α - 0cpm
Archive

67369 2.0 - 3.0'
brown silty clay concrete gravel, dry
Hnu - 1.0-2.0 ppm
Bγ - 80 cpm
α - 0cpm
TCLP

67370 3.0 - 4.0
brown silty clay, concrete gravel, dry
Hnu - <1.0
Bγ - 80 cpm
α - 0cpm
EXT HSL

1000 - Sampling ceases
1015 - clean up loose ends
1145 - Exit site

REVIEWED BY QA MB DATE 9-9-91

VISITORS ON SITE: None

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS: N.A

WEATHER CONDITIONS: Warm Sunny

IMPORTANT TELEPHONE CALLS: NA.

PERSONNEL ON SITE: J. Lear A. Chester Bo Yost M. Rebold

SUPERVISOR: J. Lear DATE: 8-23-91

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1796	COORDINATES:		DATE 9-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-22-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 9-23-91
DRILLING METHODS: HSA - CME 45			PAGE 1 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	*39000 9-21-91 1500	17	6	Very stiff, olive brown (2.5Y, 5/4) silty clay some sand, gravel and cobbles, low plasticity, moist	CL	3.5	HNU = 0 ppm α = 0 cpm βγ = 150 cpm
1.0	nA	13	6				
1.5	39003 9-21-91 1600	25	6				
2.0	nA	23	6	Stiff, olive gray (5Y, 4/2) trace brown silty clay trace gravel and wood	CL	2.25	HNU = 0 ppm α = 0 cpm βγ = 125 cpm
	39004 9-22-91 1000	9	0				
3.0	nA	7	0				
	39005 9-22-91 1005	11	6	Stiff, light olive gray (5Y, 6/2) silty clay trace gravel, low to medium plasticity, moist	CL	3.0	HNU = 0 ppm α = 0 cpm βγ = 80 cpm
4.0	nA	12	6				
4.5	39006 9-22-91 1009	8	6	Stiff olive gray (5Y 4/2) very silty clay trace organics, low plasticity, moist	CL	2.75	
5.0	nA	8	6	medium stiff, mottled olive brown (2.5Y, 4/3) and gray silty clay trace gravel, low plasticity, moist	CL	1.5	HNU = 0 ppm α = 0 cpm βγ = 150 cpm
6.0	39009 9-22-91 1020	nA	nA	pushed Shelby Tube	nA	nA	nA
7.0	39009 9-22-91 1020	nA	nA	Pushed Shelby Tube	nA	nA	nA
7.5	nA	11	6	Stiff, mottled brownish yellow (10YR, 6/6) and gray (10YR, 6/1) silty clay low plasticity, moist	CL	2.5	HNU = 0 ppm α = 0 cpm βγ = 100 cpm

NOTES:
* 39000 - TCLP
39001 - MSL
39002 - Total Rad } 0-.5

Penn Drill
Driller - Bobby Yost
Helper - Kevin Myers
Background:
HNU = 0 ppm βγ = 100 cpm
α = 0 cpm

402-11-06

FERNALD
RI/FS

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1796	COORDINATES:	DATE: 9-22-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-22-91
ENGINEER/GEOLOGIST: T Anderson	Depth Date/Time	DATE COMPLETED: 9-22-91
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	nA	11	6	stiff, mottled brownish yellow (10YR 6/6) trace gray (10YR 6/1) silty clay trace organics	CL	2.25	HNU = 0 ppm α = 0 cpm Bγ = Background cpm
8	39007 9-22-91 1040	9	6	SAA	CL ~~SAA~~ CMZ 12-92	2.25 ~~SAA~~	
	nA	11	6	SAA	CL ~~SAA~~ CMZ-12-92	2.25 ~~SAA~~	
9	39010 9-22-91 1050	nA	nA	Pushed Shelby Tube	nA	n/A	HNU = n/A ppm α = cpm Bγ = cpm
10							
	39010 9-22-91 1050	nA	nA	Pushed Shelby Tube	nA	n/A	HNU = 0 ppm α = 0 cpm Bγ = Background cpm
11	nA	7	6	loose, ~~light~~ yellowish brown (10YR 6/4) trace iron oxide stained silty fine sand trace thin clay lenses	SM	n/A	
	nA	9	6	SAA			
12	39008 9-22-91 1610	11	6	SAA			HNU = 0 ppm α = 0 cpm Bγ = Background cpm
	nA	11	5	SAA	SM	n/A	
13	39011 9-22-91 1620	nA	nA	Pushed Shelby Tube	nA	n/A	
14							HNU = nA ppm α = nA cpm Bγ = nA cpm
	39011 9-22-91 1620	nA	nA	Pushed Shelby Tube	nA	n/A	

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: CME 45 auger drill

Driller: Bobby Yost
Kevin Myers

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001968

243B-3-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1796	COORDINATES:		DATE: 9-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-22-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 9-22-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF 35

CJ 3/12/92

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	nA	11	6	medium dense, olive gray (5Y 5/2) silt very moist silt trace clay, trace layering	ML	nA	HNU = 0 ppm α = 0 cpm Bγ = Background cpm
	nA	17	6	medium dense, light olive brown (2.5Y 5/3) silty fine sand trace layering, very moist	SM	nA	
16				Bottom of Boring at ~~22.0~~ 16.0 ft.			
17							HNU = nA ppm α = nA cpm Bγ = nA cpm
8							
19							HNU = nA ppm α = nA cpm Bγ = nA cpm
20							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: CME 45 auger drill

ler: Bobby Yost

Kevin Myers

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001369

4042

5711

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1796

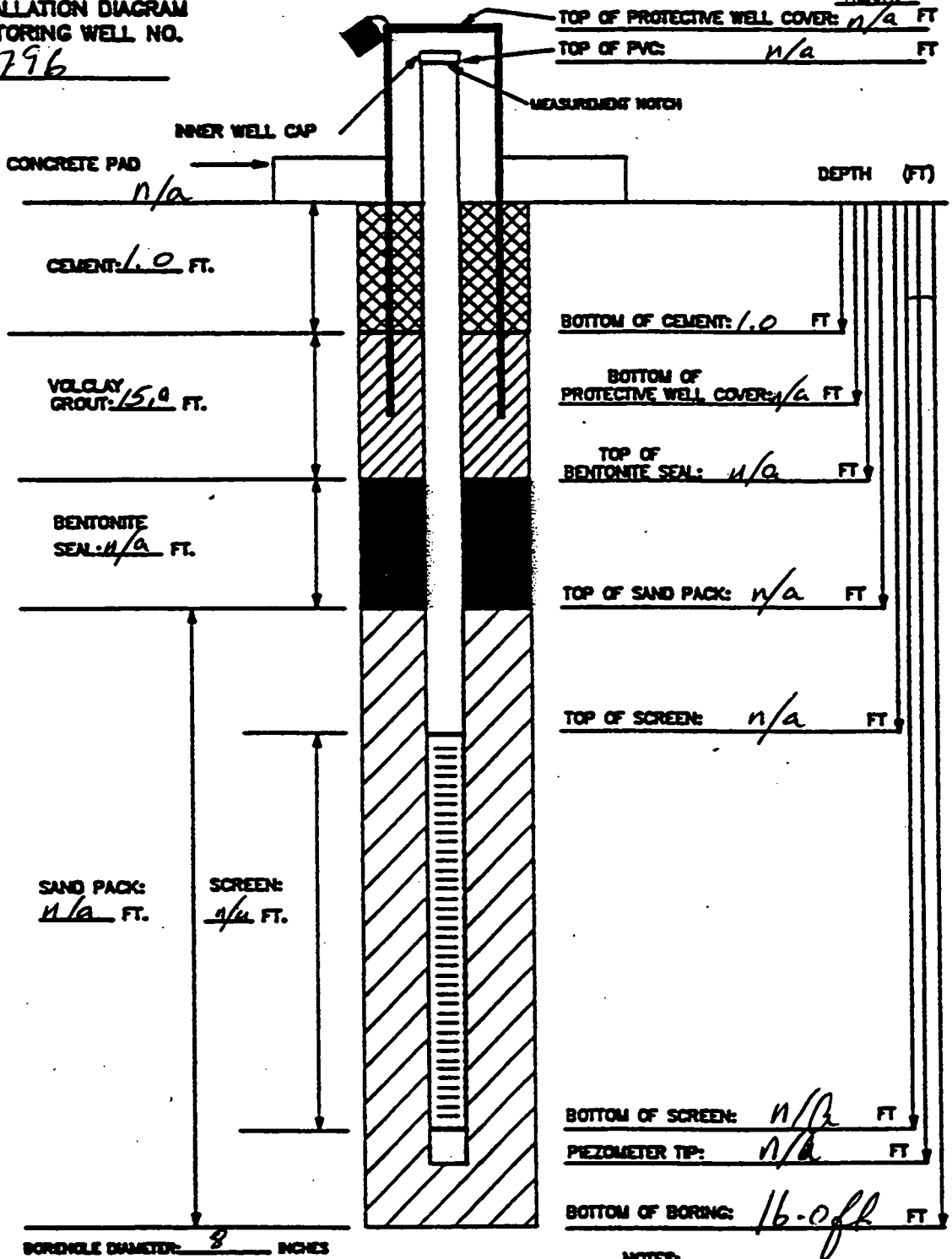
Stickups

INSTALLATION DATE: 9-21-91 to 9-22-91 TA3-3-92

HEIGHT

TOP OF PROTECTIVE WELL COVER: n/a FT

TOP OF PVC: n/a FT



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: n/a
BENTONITE PELLETS (5-GALLON BUCKETS): n/a
BAGS OF VOLCLAY GROUT: ~~n/a~~ TA3-3-92 1 bag
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 35 gallons
OTHER:
n/a

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.35

GEOLOGIST/ENGINEER: Tom Pinderson

001970

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 602-3-35
BORING NO. 1746
PIEZOMETER NO. n/A

FIELD ENG./GEO. T. Anderson DATE 2-26-92
CHECKED BY CGuire DATE ~~[illegible]~~ 03/09/92
DATE OF INSTALLATION 9-21-91 to 9-22-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED: n/A
FLUID n/A FROM n/A TO n/A
FLUID n/A FROM n/A TO n/A

TYPE OF BIT Hollow Auger - 8.0 in ID
CASING SIZE (S) USED:
SIZE n/A FROM n/A TO n/A
SIZE n/A FROM n/A TO n/A

PIEZOMETER DESCRIPTION

TYPE n/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE: n/A
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS n/A
TOTAL PERFORATED AREA n/A

RISER PIPE MATERIAL n/A
RISER PIPE DIAMETERS: n/A
O.D. ____ I.D. ____
LENGTH OF PIPE SECTIONS n/A
JOINING METHOD n/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH n/A
PROTECTIVE PIPE O.D. n/A

OTHER PROTECTION n/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	n/A		n/A	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	n/A		n/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 16.0	TOP	BOTTOM
BENTONITE	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
SAND	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
GRAVEL	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PERFORATED SECTION	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PIEZOMETER TIP	n/A		n/A	
BOTTOM OF BOREHOLE	16.0 ft.			
GWL AFTER INSTALLATION	n/A		n/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? n/A YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? n/A YES ☐ NO ☒

REMARKS No well installed in this boring.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 602.3.35	PROJECT NAME. FEMP RI/FS		
BORING NUMBER: 1797	COORDINATES:		DATE 10-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-22-91
ENGINEER/GEOLOGIST. T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: HSA - CME 45			PAGE 1 OF 35

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
*	39082 10-22-91 0100	2	6	Medium stiff, dark brown (10YR, 3/3) silty clay trace gravel, low to moderate plasticity, moist.	CL	1.25	HNU = 0 ppm α = 0 cpm βγ = Background
1.0	NA	3	6				
1.5	NR	1	0	No Recovery	NA	NA	NA
2.0	NR	1	0	no recovery	NA	NA	NA
	39095 10-22-91 0115	3	6	medium stiff, brown (10YR, 5/3) trace gray silty clay trace sand and gravel, low to moderate plasticity, moist	CL	1.5	HNU = 0 ppm α = 0 cpm βγ = Background
3.0	NA	3	6				
	39096 10-22-91 0120	2	6	soft, yellowish brown (10YR 5/4) sandy silty clay trace gravel, low plasticity, moist	CL	.75	HNU = 0 ppm α = 0 cpm βγ = Background
4.0	NA	3	6				
4.5	39097 10-22-91 0125	7	6	very stiff, mottled light gray (10YR 6/1) and ~~brownish yellow~~ (10YR 6/6) silty clay, low to moderate plasticity, moist	CL	2.5	HNU = 0 ppm α = 0 cpm βγ = Background
5.0	NA	10	6		CL ~~SAA~~ CB 2-12-92	2.5 ~~SAA~~	
6.0	39088 10-23-91 0127	NA	NA	pushed Shelby Tube	NA	NA	NA
7.0	39089 10-23-91 0127	NA	NA	Pushed Shelby Tube	NA	NA	NA
	N/A	N/A	N/A	No Sample collected	NA	NA	NA

NOTES: 12" concrete:

TCLP 39079, HSL 39080, Full Rad 39081 } Samples from concrete

* 39082 TCLP, 39083 HSL, 39084 Full Rad } Samples from 0-.5

Penn Drill CME-45
Driller - Bobby Yost
Helper - Kevin Myers

Background: HNU = 0 ppm
α = 0 cpm
βγ = 150 cpm

NA = No Applicable
NR = No Recovery
SAA = Same As Above

Samples collected per ASTM Standard penetration test

Colors identified using Munsell Color Chart

rewrite

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1797	COORDINATES:		DATE 10-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-22-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 5

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 inch	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	n/A	2	6	Soft, mottled light gray (10 YR 7/1) and brownish yellow (10 YR 6/8) Sandy silty Clay, highly plastic, moist.	CL	.5	Hnu = 0 ppm α = 0 cpm βγ = Background
	39093 10-23-91 0130	3	6				
9	n/A	9	6	very stiff, mottled light gray (10 YR 7/1) and yellowish brown (10 YR 5/8) silty clay	CL	3.75	
	39089 10-23-91 0135	n/A	n/A	Shelby Tube	n/a	n/a	n/A
10							
11	39089 10-23-91 0135	n/A	n/A	Shelby Tube	n/A	n/A	
12	n/A ~~3TH~~	3	6	loose, brown (10 YR 5/3), wet, clayey fine sand	SC	n/A	Hnu = 0 ppm α = 0 cpm βγ = Background
	39094 10-23-91 ~~TH3~~ 0140	13	6	Dense, yellowish brown (10 YR 5/6) to gray (2.5 Y N5/0) Silt trace Clay seams, moist. Silt was not plastic, clay was highly plastic	ML	n/A	Hnu = 0 ppm α = 0 cpm βγ = Background
13	n/A ~~TH8~~	18	6				
14	39090 10-23-91 0145	n/A	n/A	Shelby Tube	n/A	n/A	n/A
15'	39090 10-23-91	n/A	n/A	Shelby Tube	n/A	n/A	

NOTES:

Drilling Contractor: Penn Drill
Drilling Equipment: CME 45
Driller: Bobby Yost
Helper: Kevin Meyers

See page 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FCMI RI/FS		
BORING NUMBER: 1797	COORDINATES:		DATE 10-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-22-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: Hollow Stem Auger			PAGE 3 OF 5

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (9/8/92)
	39090 10-23-91 0145	N/A	N/A	Shelby Tube - continued	N/A	N/A	N/A
16	N/A	10	6	Stiff, gray (2.5 Y N 6/0) to brown (10 YR 5/3) very silty Clay, moist, little plasticity, trace fine Sand seams	CL	2.0	HNU = 0 ppm α = 0 cpm βγ = Background
	39095 10-23-91 0150	10	6				
17	N/A	10	6				
18	39091 10-23-91 0210	N/A	N/A	Shelby Tube	N/A	N/A	N/A
19	39091 10-23-91 0210	N/A	N/A	Shelby Tube	N/A	N/A	
20				Bottom of Boring at 20.0 feet			

NOTES:
Drilling contractor: Penn Drill
Drilling Equipment: CME 45
Driller: Bobby Yost
Helper: Kevin Meyers

See page 1

FERNALD RI/FS

Field Copy

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.35	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1797	COORDINATES:	DATE: 10-22-91
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10-22-91
ENGINEER/GEOLOGIST: T Anderson	Depth Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 35

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	nA	2	6	Soft, mottled light gray (10YR 7/1) and brownish yellow (10YR 6/8)	CL	.5	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
8	39093 10-23-91 0130	3	6	sandy silty clay, highly plastic, moist.	SAA	.5	→ Disregard this line
130	nA	9	6	very stiff, mottled light gray (10YR 7/1) and yellowish brown (10YR 5/8) silty clay	CL	3.75	
9	39089 10-23-91 0135	n/A	n/A	Shelby Tube	n/A	n/A	HNU = ppm; α = n/A cpm; Bγ = cpm
135 10							
11	39089 10-23-91 0135	n/A	n/A	Shelby Tube	n/A	n/A	HNU = ppm; α = n/A cpm; Bγ = cpm
	nA	3	6	loose, Brown (10YR 5/3), wet Clayey fine sand	SC	n/A	
12 140	39094 10-23-91 0140	13	6	dense, yellowish brown (10YR 5/6) to gray (2.5Y N5/0) silt trace		n/A	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
	nA	18	6	clay seams, moist, silt had up plasticity, clay was highly plastic		~~n/a~~	→ Disregard this line.
13	39090 10-23-91 0145	n/A	n/A	Shelby Tube	n/A	n/A	
14 145							HNU = n/A ppm; α = n/A cpm; Bγ = n/A cpm
15'	39090 10-23-91 0145	n/A	n/A	Shelby Tube	n/A	n/A	

NOTES:

Drilling Contractor Penn Drill

Drilling Equipment CME 45

Driller: Bobby Yost

Kevin Myers

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

NR=No Recovery

001975

243B-3-86

FERNALD RI/FS

Field Copy

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.35	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1797	COORDINATES:		DATE: 10-22-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-22-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-22-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 3 OF ~~3~~ 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY Ftt.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	39090 10-23-91 0145	N/A	N/A	Shelby Tube	N/A	N/A	HNU = ppm; α = N/A cpm; Bγ = cpm
	NA	10	6	Stiff gray (2.5Y N 6/0) to brown (10YR 5/3) very silty clay ~~trace~~ TA 10-22-91	CL	2.0	
16	39095 10-23-91 0150 ~~0155~~ TA 10-22-91		6	~~Sandy silty clay~~ moist, little plasticity, trace fine sand seams	CL	SAA	Disregard this line.
	NA	10	6	SAA	SAA	SAA	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
17	39091 10-23-91 0210	N/A	N/A	Shelby Tube	NA	N/A	
19							HNU = ppm; α = NA cpm; Bγ = cpm
20	39091 10-23-91 0210	N/A	N/A	Shelby Tube	NA	N/A	
				Bottom of Boring at 20 feet			

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: CME 45

Driller: Bobby Yost

Kevin Myers

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA=Same As Above

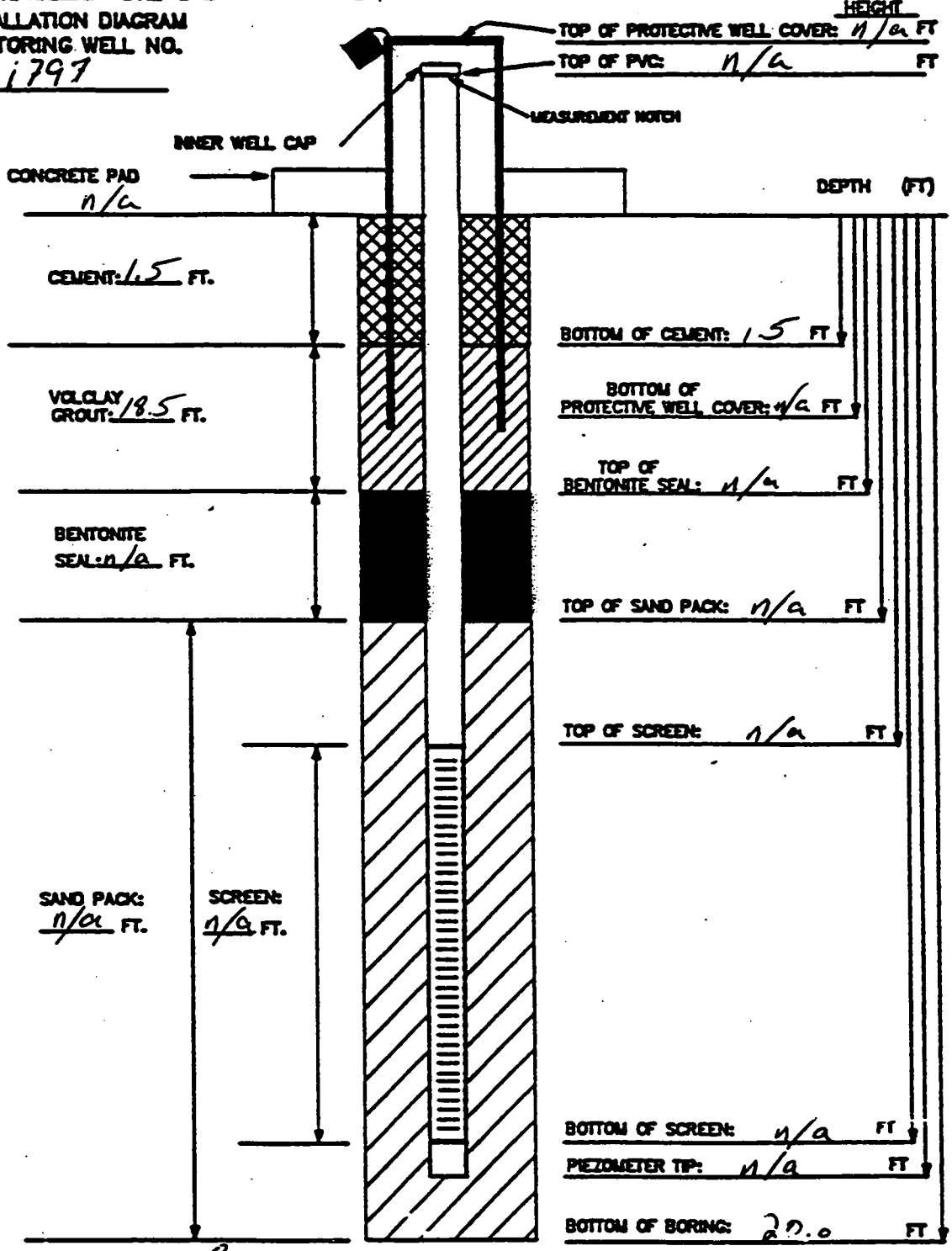
NR=No Recovery

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1797

Stickups

INSTALLATION DATE: 10-22-91 to 10-23-91 TA 3-3-9



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:

SAND TYPE AND QUANTITY: n/a
BENTONITE PELLETS (5-GALLON BUCKETS): n/a
BAGS OF VOLCLAY GROUT: 3 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 8.5 gallons
OTHER:
n/a

NOTES:

1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.35

GEOLOGIST/ENGINEER: Tom Anderson

FERNALD RI/FS

5711

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 602.3.35
BORING NO. 1797
PIEZOMETER NO. n/A

FIELD ENG./GEO. Tom Anderson DATE 2-26-92
CHECKED BY C. Shultz DATE 3/9/92
DATE OF INSTALLATION 10-22-91 to 10-23-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID n/A FROM n/A TO n/A
FLUID n/A FROM n/A TO n/A

TYPE OF BIT ~~Hollow~~ Hollow Auger - 8 in ID
CASING SIZE (S) USED:
SIZE n/A FROM n/A TO n/A
SIZE n/A FROM n/A TO n/A

PIEZOMETER DESCRIPTION

TYPE n/A
DIAMETER OF PERFORATED SECTION n/A
PERFORATION TYPE: n/A
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS n/A
TOTAL PERFORATED AREA n/A

RISER PIPE MATERIAL n/A
RISER PIPE DIAMETERS:
O.D. n/A I.D. n/A
LENGTH OF PIPE SECTIONS n/A
JOINING METHOD n/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH n/A
PROTECTIVE PIPE O.D. n/A

OTHER PROTECTION n/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	n/A		n/A	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	n/A		n/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 20.0	TOP 0	BOTTOM
BENTONITE	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
SAND	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
GRAVEL	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PERFORATED SECTION	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PIEZOMETER TIP	n/A		n/A	
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	n/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? n/A YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? n/A YES ☐ NO ☒

REMARKS No well installed in this boring.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1798	COORDINATES:		DATE 10-17-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-17-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-17-91
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	39075 39076 10-17-91 0120	5	6	Stiff, dark grayish brown (10 YR 4/3), moist, silty Clay trace gravel, moderately plastic	CL	2.5	Hnu = 0 ppm α = 0 cpm βγ = Background
	NA	6	6				
1.0	39077 10-17-91 0135	5	6	medium stiff, dark yellowish brown (10 YR 4/4), moist, silty Clay trace gravel, slightly plastic	CL	1.5	Hnu = 0 ppm α = 0 cpm βγ = Background
	NA	4	6				
2.0	39078 10-17-91 0150	4	6	Same as above	~~SAA~~ CL 8/12/92	1.5	Hnu = 0 ppm α = 0 cpm βγ = Background
	NA	4	6				
3.0				Bottom of Boring @ 3.0 ft			

NOTES
Drilling Contractor: Penn Drill
Drilling Equipment: CME 45
Driller: Bobby Yost
Helper: Kevin Meyers
Geologists: Jim Capanari
Joe Mediate

Background readings: Hnu = 0 ppm
α = 0 cpm
βγ = 150 cpm

SAA = same as above
NR = no recovery
NA = Not Applicable

Samples collected per ASTM Standard Penetration Test
Colors Identified using Munsell Color Chart

Concrete = 13"
39073 - TCLP
39074 - Full Da

001929

FERNALD RI/FS

Field Copy

571

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602, 3.35	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1798	COORDINATES:		DATE: 10-17-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-17-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-17-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF 13

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	39075 10-17-91 0120	5	6	Stiff, dark grayish brown (10YR 4/3), moist, silty clay trace gravel, moderately plastic	CL	2.5	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
	NA	6	6		CL		
1	39077 10-17-91 0135	5	6	medium stiff, dark yellowish brown (10YR 4/4), moist silty clay trace gravel, slightly plastic	CL	1.5	1.0
	NA	4	6		SAA		HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
2	39078 10-17-91 0150	4	6	SAA	SAA	1.5	2.0
	NA	4	6	SAA	SAA		HNU = 0; α = 0; Bγ = Background
3				Bottom of Boring at 3.0			3.0 HNU = NA ppm; α = NA cpm; Bγ = NA cpm
4							
5				Concrete - 13" 39073 - TCLP 39074 - Full Rad; * 0-.5 soil 39075 - TCLP 39076 - FULL RAD			HNU = NA ppm; α = NA cpm; Bγ = NA cpm
6							HNU = NA ppm; α = NA cpm; Bγ = NA cpm
7							

NOTES:

Drilling Contractor: Pierson Drill

Drilling Equipment: CME 45

Driller: Bobby Yost

Helper: Kevin Myers

Geo Assistant: Jim C., Joe M.

HNU Serial #

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 150 cpm; LEL = NA %; O_2 = NA %

SAA=Same As Above

NR=No Recovery

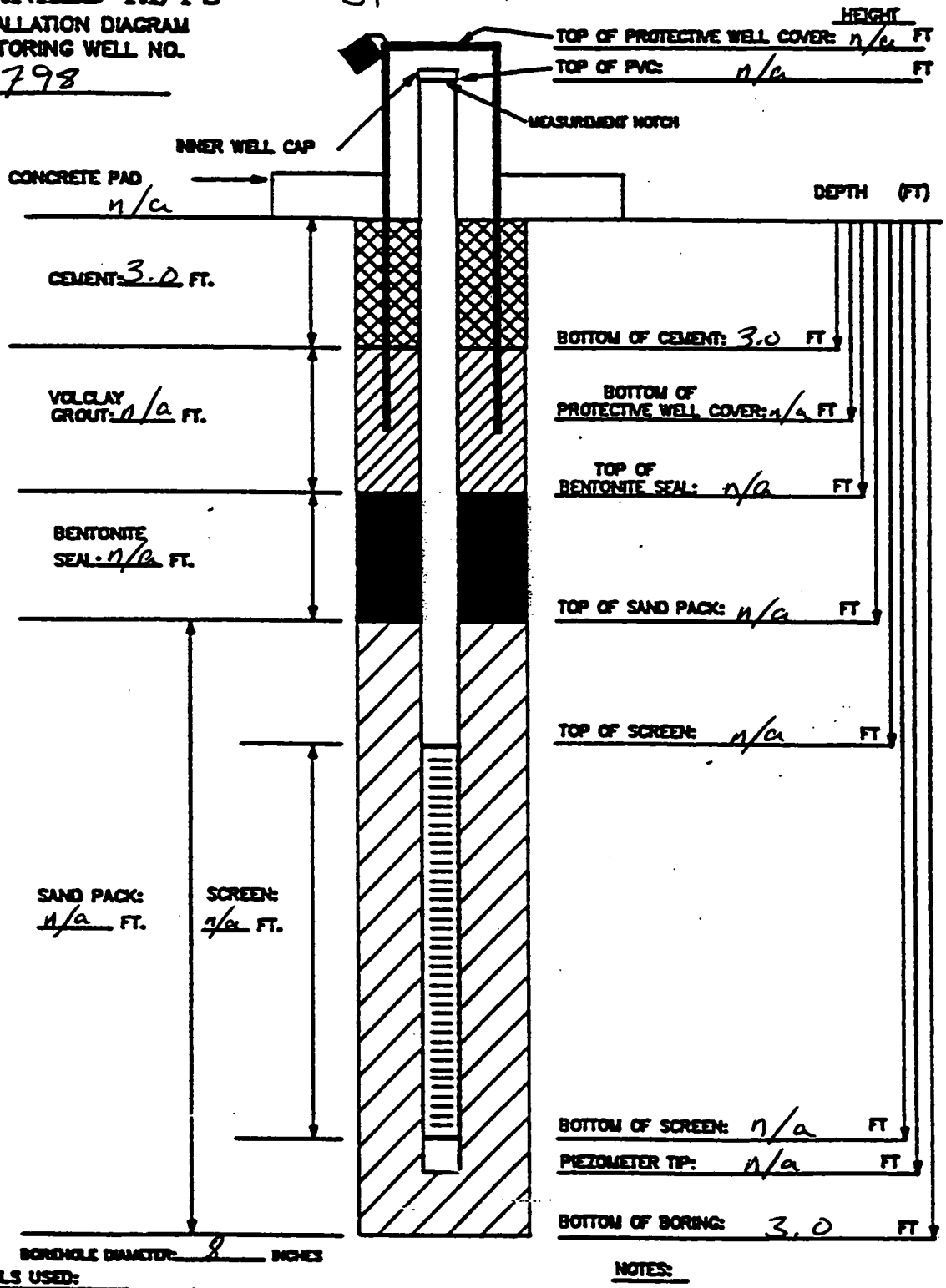
243B-3

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1798

Stickups

INSTALLATION DATE: 10-17-91 TO 3-3-92



MATERIALS USED:
SAND TYPE AND QUANTITY: n/a
BENTONITE PELLETS (5-GALLON BUCKETS): n/a
BAGS OF VOLCLAY GROUT: n/a
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 3 gallons
OTHER: n/a

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.35

GEOLOGIST/ENGINEER: Tom Anderson

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
PROJECT NO. 602-3-35
BORING NO. 1798
PIEZOMETER NO. n/A

FIELD ENG./GEO. Tom Anderson DATE 2-26-92
CHECKED BY C. Grube DATE 3/9/92
DATE OF INSTALLATION 10-17-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID n/A FROM n/A TO n/A
FLUID n/A FROM n/A TO n/A

TYPE OF BIT Auger - 8.0 in. ID
CASING SIZE (S) USED:
SIZE n/A FROM n/A TO n/A
SIZE n/A FROM n/A TO n/A

PIEZOMETER DESCRIPTION

TYPE n/A
DIAMETER OF PERFORATED SECTION n/A
PERFORATION TYPE: n/A
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS n/A
TOTAL PERFORATED AREA n/A

RISER PIPE MATERIAL n/A
RISER PIPE DIAMETERS:
O.D. n/A I.D. n/A
LENGTH OF PIPE SECTIONS n/A
JOINING METHOD n/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH n/A
PROTECTIVE PIPE O.D. n/A

OTHER PROTECTION n/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	n/A		n/A	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	n/A		n/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 3.0	TOP 0	BOTTOM
BENTONITE	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
SAND	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
GRAVEL	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PERFORATED SECTION	TOP n/A	BOTTOM n/A	TOP n/A	BOTTOM n/A
PIEZOMETER TIP	n/A		n/A	
BOTTOM OF BOREHOLE	3.0 ft.			
GWL AFTER INSTALLATION	n/A		n/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? n/A YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? n/A YES ☐ NO ☒

REMARKS No well installed in this boring.

FERNALD
RI/FS

rewrite

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FEMP RI/FS		
BORING NUMBER: 1799	COORDINATES:		DATE 10-24-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-24-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-24-91
DRILLING METHODS: Hollow Stem Augers			PAGE 1 OF 3

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	39098 10-24-91 0045 a/sq: sample 39099	4	6	Stiff, Brown (7.5YR 5/3), trace gray Silty Clay trace sand and gravel, moist, little plasticity	CL	1.5	Hnu = 0 ppm α = 0 cpm βγ = Background
1.0	n/A	6	6				
1.5	39100 10-24-91 0100	5	6	SAA	CL	~~SAA~~ 1.5 (M 01/02/92)	Hnu = 0 ppm α = 0 cpm. βγ = Background
2.0	n/A	2	6	Soft, Brown (7.5YR 5/3), Silty CLAY some sand and gravel, very moist, moderately plastic	CL	.75	Hnu = 0ppm α = 0 cpm βγ = Background
	39101 10-24-91 0115	2	6	SAA	CL	.5	Hnu = 0 ppm α = 0 cpm βγ = Background
3.0	n/A	11	6	Stiff, Olive Brown (2.5 Y 4/3) Silty Clay, trace gravel, moist, little plasticity	CL	2.0	Hnu = 0 ppm α = 0 cpm βγ = Background

Bottom of Boring at 3.0ft.

NOTES:
Drilling Contractor: Penn Drill
Drilling Equipment: CME 45
Driller: Bobby Yost
Helper: Kevin Meyers
Geologist assistants: J. Capannari, J. Mediate

Background: Hnu = 0ppm, α = 0ppm, βγ = 150 cpm

SAA = Same As Above
N/A = Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

note: Concrete = 12" thick
Samples: 39096 - TCLP
39097 - Full Pad

Encountered what appears to be concrete at 3.0 ft., white dust on split spoon, could not drive past 3.0ft.

FERNALD RI/FS

Field Copy

5711

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.35	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 129.9	COORDINATES:		DATE: 10-24-91
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 10-24-91
ENGINEER/GEOLOGIST: T. Anderson	Depth	Date/Time	DATE COMPLETED: 10-24-91
DRILLING METHODS: HOLLOW STEM AUGER			PAGE 1 OF +3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY in.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (BY 2/12/93)
1	#39098 10-24-91 0045	4	6	Stiff. Brown (7.5YR 5/3), trace gray silty clay trace sand and gravel, moist, little plasticity	CL	1.5	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
	NA	6	6	SAA	SAA	SAA	
	39100 10-24-91 0100	5	6	SAA	SAA	SAA	
2	NA	2	6	Soft, Brown (7.5 YR 5/3), silty clay some sand and gravel, very moist, moderately plastic.	SAA	.75	HNU = 0 ppm; α = 0 cpm; Bγ = Background cpm
	39101 10-24-91 0115	2	6	SAA	SAA	.5	HNU = 0; α = 0; Bγ = Background
	NA	11	6	Stiff, olivebrown (2.5Y 4/3) silty clay trace gravel, moist, little plasticity	SAA	2.0	
3				Bottom of Boring @ 3.0 ft.			HNU = ppm; α = N/A cpm; Bγ = cpm
				note: encountered what appears to be concrete at 3.0 ft., white dust on split spoon, could not drill past 3.0 ft.			
4							
5				note: concrete 12" - samples: 39096 - TCLP; 39097 - Full Rad			HNU = ppm; α = N/A cpm; Bγ = cpm
				soil 0-.5: 39098 - TCLP; 39099 - Full Rad			
6							HNU = ppm; α = N/A cpm; Bγ = cpm
7							

NOTES:

Drilling Contractor: Penn Drill

Drilling Equipment: CME 45

Driller: Bobby Yost

Helper: Kevin Myers

Geo Assistant: J. Capunnari, J. Mediate

HNU Serial #:

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Levels: HNU = 0 ppm; α = 0 cpm; Bγ = 150 cpm; LEL = nA %; O_2 = nA %

SAA=Same As Above

NR=No Recovery

001984

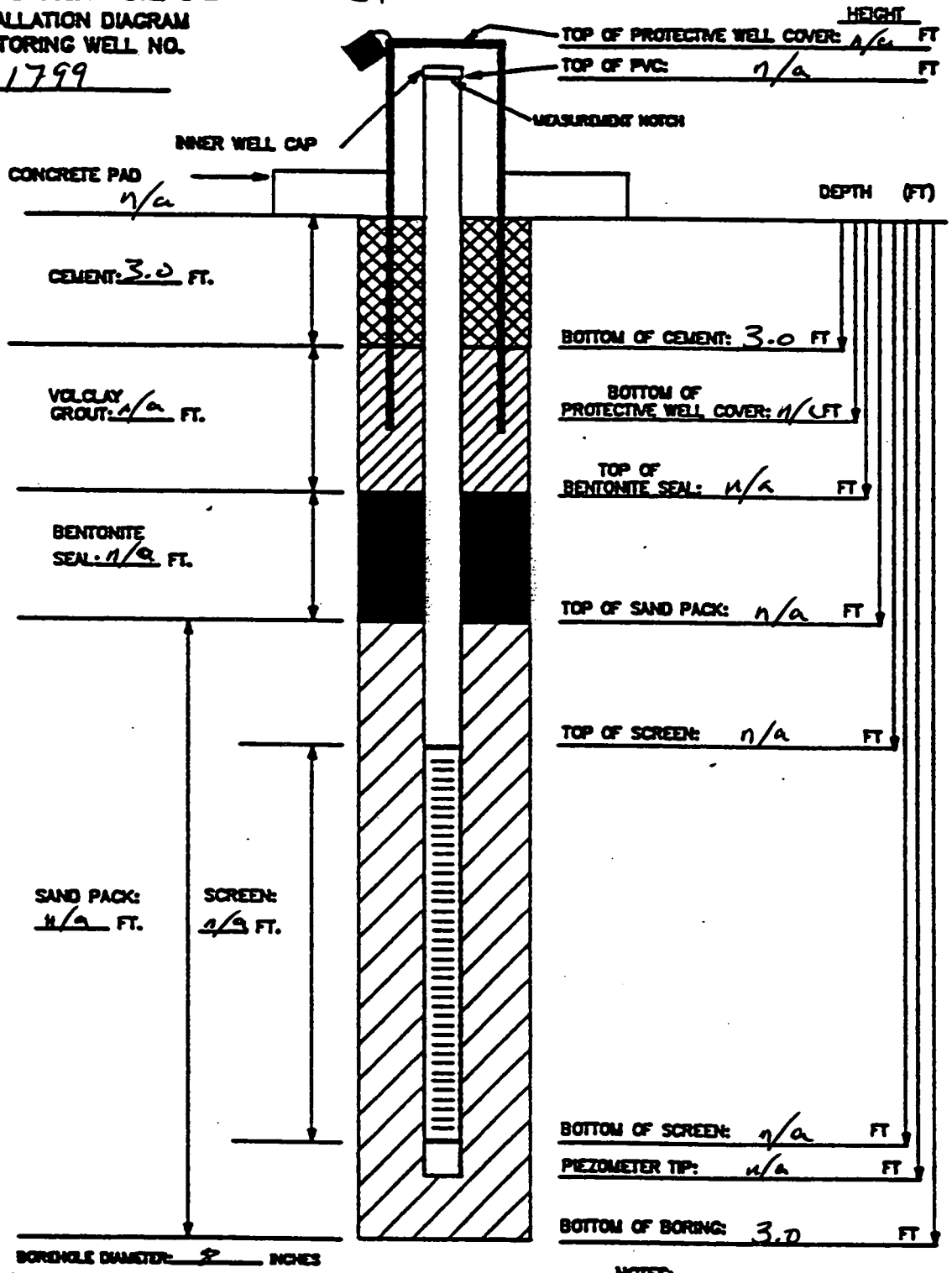
243B-3-86

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1799

Stickups

INSTALLATION DATE: 10-24-91



BOREHOLE DIAMETER: 8 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: n/a
BENTONITE PELLETS (5-GALLON BUCKETS): n/a
BAGS OF VOLCLAY GROUT: n/a
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 3 gallons
OTHER: n/a

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE:

TASK: 3.35

GEOLOGIST/ENGINEER: Tom Anderson

5711

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FEMP RI/FS
FIELD ENG./GEO. Tom Anderson DATE 2-26-92
PROJECT NO. 602.3-35
CHECKED BY C Hinkle DATE 2/6/93
BORING NO. 1799
PIEZOMETER NO. N/A
DATE OF INSTALLATION 10-24-91

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Auger - 8.0 in ID
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A	RISER PIPE MATERIAL N/A
DIAMETER OF PERFORATED SECTION N/A	RISER PIPE DIAMETERS:
PERFORATION TYPE: N/A	O.D. N/A I.D. N/A
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS N/A
AVERAGE SIZE OF PERFORATIONS N/A	JOINING METHOD N/A
TOTAL PERFORATED AREA N/A	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A	OTHER PROTECTION N/A
PROTECTIVE PIPE O.D. N/A	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (ft.)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 3.0	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	3.0			
GWL AFTER INSTALLATION	N/A		N/A	

HE PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☒
S A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☒

REMARKS No well installed in this boring