2731

G-000-102.68

RCRA GROUNDWATER MONITORING PLAN
REVISION 0
DECEMBER 1991 VOLUME 2 OF 2

12/01/91

400
ENCLOSURE

Fernald Environmental Management Project
Westinghouse Environmental Management Co. of Ohio
P.O. Box 398704
Cincinnati Ohio 45239-8704

Prepared for the
U.S. Department of Energy
Fernald Office

G-000-101.281

2731

RCRA GROUNDWATER MONITORING PLAN

REVISION 0
DECEMBER 1991

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Fernald Office

1

APPENDIX A

APPENDIX A

WELL CONSTRUCTION INFORMATION FOR THE 1000-SERIES MONITORING NETWORK

WELL 1004

PAC

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2	
BORING NUMBER: 104	COORDINATES:	DATE: 2-20-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 02/20/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 02/21/88
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				See Well Boring No. 304 For soil Lithology			
2							
3							
4							
5							
6							
7							02/20/88
8	OB 1 E4	N/A	12"	Shelby Tube	N/A	N/A	Pushed 2.3 Ft Recovery 1.0 Ft 1445
9							
10							
11							
12							
13							
14							
15							

NOTES I) Drilling contractor: Pennsylvania Drilling
Driller: Tim Harris
Helper: Craig Coulter

II Background Measurements:

A) Hnu = 0; B) α = 0 C) ΣB = 140 cpm

III) Water used = 75 gallons

IV Samples via Muncell Color chart

PAC

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS 2731

PROJECT NUMBER: 502	PROJECT NAME: FMPC RI/FS T3.2		
BORING NUMBER: 104	COORDINATES:	DATE: 2-20-88	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 02/20/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 02/21/88	
DRILLING METHODS: Cable Tool		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16				See Well Boring			
17				No. 304			
18				FOR			
19				Soil Lithology			
20							
21							
22							
23							
24							
25							02/21/88
26	CS 85	N/A	12"	SHELBY Tube	N/A	N/A	Pushed Tube 2.0 Ft Recovery 1.0 Ft 1000
27							
28							
29							
30							
NOTES: 31							

Bottom of Hole 31 Ft

pAC

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. M. Goldberg DATE 02/24/88
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 104
PIEZOMETER NO. N/A DATE OF INSTALLATION 02/21/88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 30 TO 31 Ft
FLUID _____ FROM _____ TO _____

TYPE OF BIT FLAT Head
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 31 Ft
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010" inches
TOTAL PERFORATED AREA 10 Ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4" inches
LENGTH OF PIPE SECTIONS 10 Ft
JOINING METHOD Thread and couple

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft
PROTECTIVE PIPE O.D. 10" inches

OTHER PROTECTION Lockable cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 Ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 10 Ft	TOP	BOTTOM
BENTONITE	TOP 10 Ft	BOTTOM 15 Ft	TOP	BOTTOM
[redacted]	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP 15 Ft	BOTTOM 31 Ft	TOP	BOTTOM
PERFORATED SECTION	TOP 19 ft	BOTTOM 29 ft	TOP	BOTTOM
PIEZOMETER TIP	31 ft			
BOTTOM OF BOREHOLE	31 ft			
GWL AFTER INSTALLATION	N/A			

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

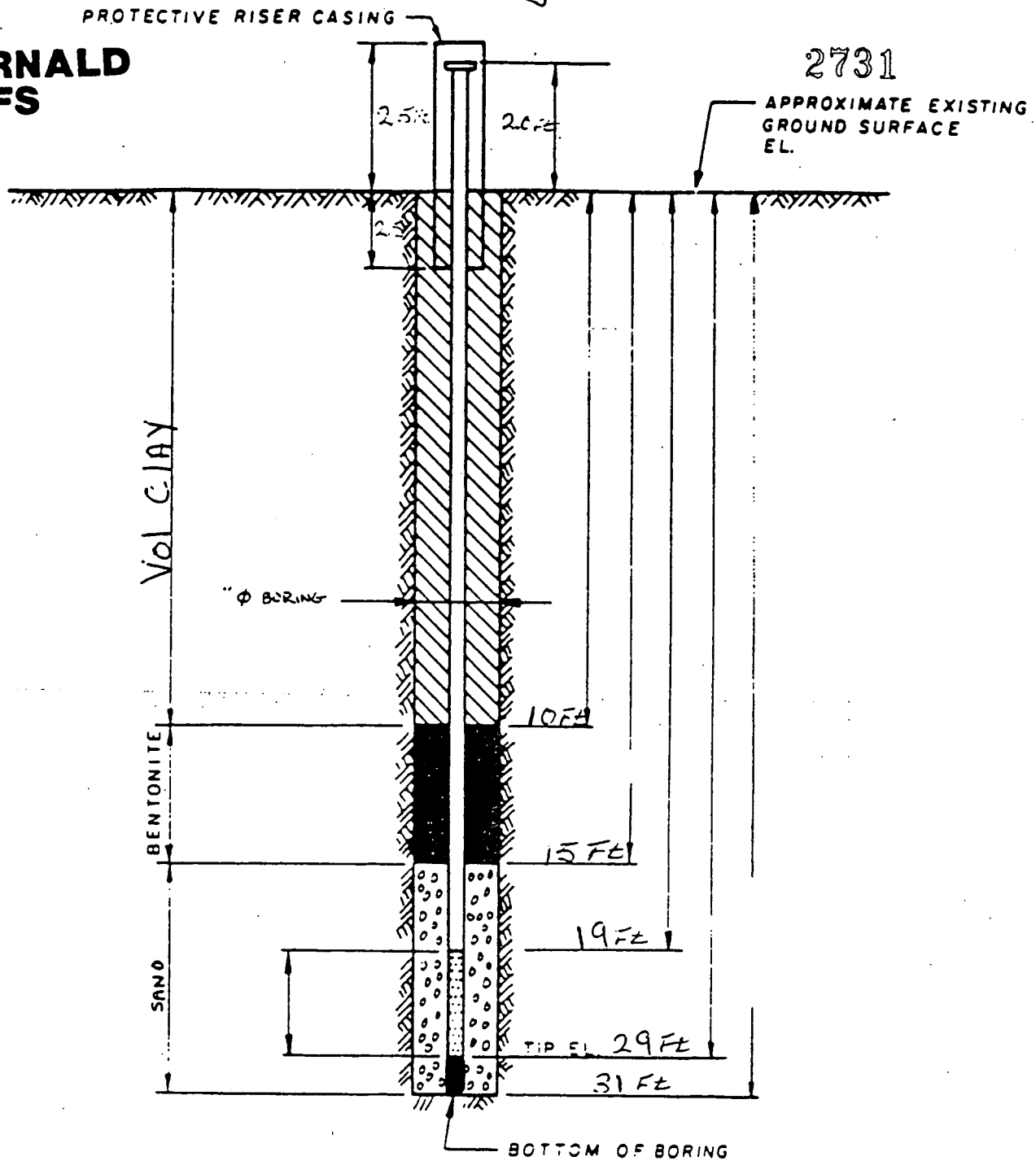
6

REMARKS _____

Monitoring Well 104

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 104

PREPARED FOR
FMPC.

7

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1004	COORDINATES: NORTH 481,421.39 EAST 1,377,897.48	DATE: 02/20/88
GROUND ELEVATION: 579.0	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/20/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 02/21/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
7.0									
8.0	08184 02/20/88 1445				12	SHELBY TUBE.			
25.0									
26.0	08185 02/21/88 1000				12	SHELBY TUBE.			

BOTTOM OF BORING 31

NOTES:
PUSHED TUBE 2.0 FT. RECOVERY 1.0 FT.

WELL 1008

QC/DH/2.3.89

	Initial	Date
1st Key In		
2nd Key In		8/10
Hard Copy Verification		

FERNALD RI/FS

COPY 2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T 3.2	
BORING NUMBER: BB 1-5-89 ~~108~~ 1008	COORDINATES:	DATE: 3-29-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 03/29/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 3-29-88
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH ( )	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				See Soil			
2				Boring 2008			
3				For Lithology			
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							10
15							

NOTES:

Drilling Contractor: Pennsylvania Drilling Co.

I) Driller: Tim Harris

Helper: Craig Coulter

II) Background measurements:

A) Hnu = 0 B) ∝ = 0 C) γR = 260cpm

III Water used =

IV Color via Muncell Color chart

QC/DH/2.3.89

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2	
BORING NUMBER: BB 1-5-88 ~~108~~ 1008	COORDINATES:	DATE: 3-29-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 03/29/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 03/29/88
DRILLING METHODS: Cable Tool		PAGE 2 OF 2

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16				See Soil			
17				Boring 208			
18				for Lithology			
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							11
NOTES:							

Bottom of Boring 31 ft

402-11-86

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 1008
WELL NUMBER: 1008

FIELD ENG./GEO.: M. GOLDBERG DATE: 03/30/88
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 480660.43, 1378925.8
DATE OF INSTAL.: 03/30/88

2731

HOLE DRILLING

DRILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 3 TO: 31
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING
CASING DIAM.:
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 31
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: .010 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: THREAD AND COUPLE

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10 In.
* LOCKABLE CAP

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	579.05
GROUND SURFACE	0.0	N/A
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	6	N/A	N/A
Bentonite Pellets	6	12	N/A	N/A
Gravel	12	31	N/A	N/A
PERFORATED SECTION	19	29	N/A	N/A
WELL TIP	31		N/A	
BOTTOM OF BOREHOLE	31		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

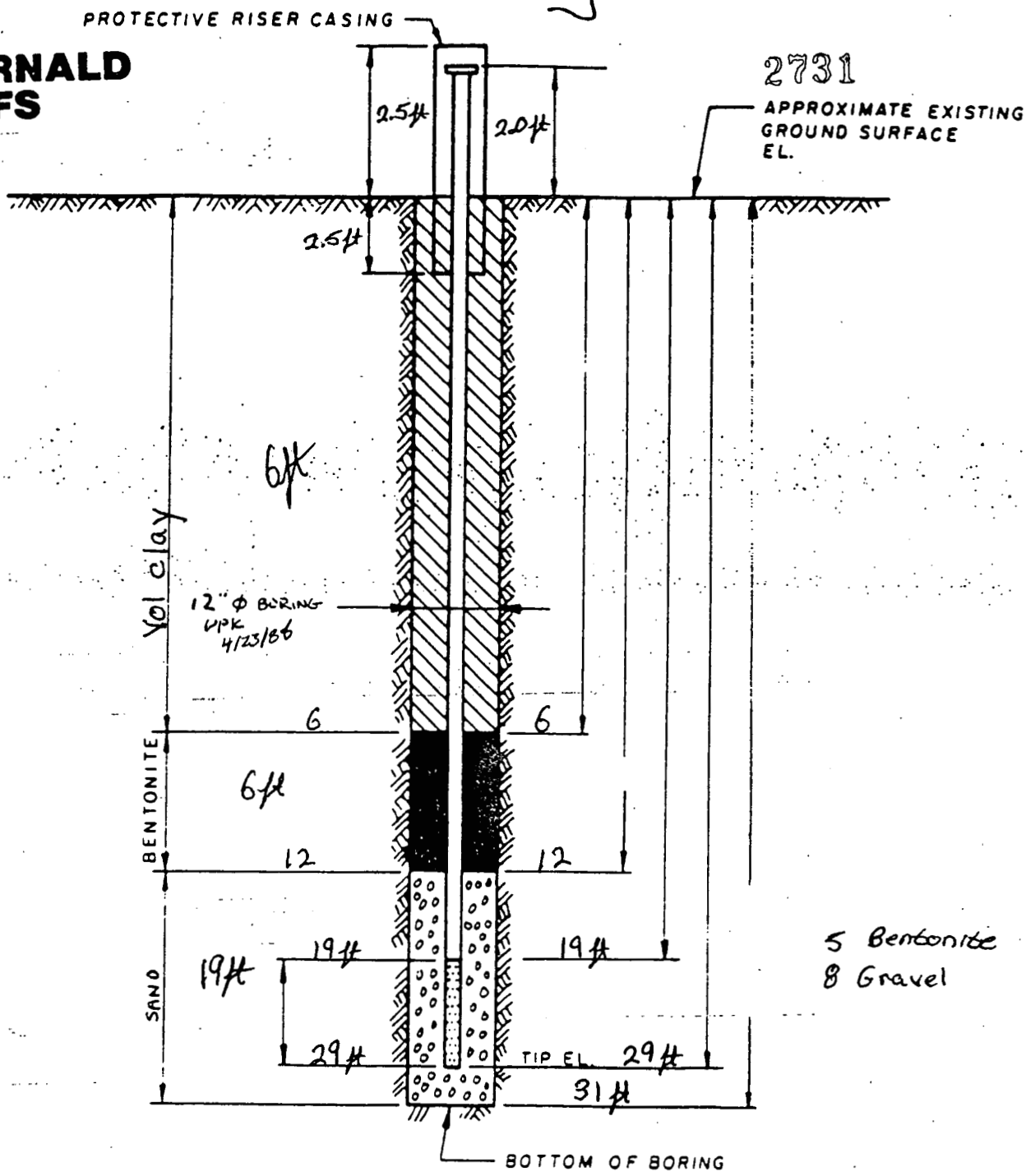
COMMENTS:

QC/DH/2-3-89

Monitoring Well #~~108~~ BG 1-5-
#1008

FERNALD RI/FS

2731



5 Bentonite
8 Gravel

NOTES:

1. RISER PIPE IS IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS IN I.D. PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR 13
FMPC RI/FS

DRAWING NUMBER
CHECKED BY
APPROVED BY
DRAWN BY

QC/DH/2.3.89

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Goldberg DATE 03/30/88
PROJECT NO. 602 T 3.2 CHECKED BY RM Carbonaro DATE 2/6/89
BORING NO. BB1-58 ~~108~~ 1008
PIEZOMETER NO. N/A DATE OF INSTALLATION 03/30/88

BOREHOLE DRILLING

DRILLING METHOD ~~Water~~ Cable Tool
DRILLING FLUID(S) USED:
FLUID H2O FROM 3 TO 31 ft
FLUID _____ FROM _____ TO _____

TYPE OF BIT Flat Head
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 31 ft
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010" inches
TOTAL PERFORATED AREA 10 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10 ft
JOINING METHOD Thread ~~and couple~~ Flush
RMC 2/6/89

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE ~~O~~ I.D. 10"

OTHER PROTECTION Lockable cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 6	TOP	BOTTOM
BENTONITE	TOP 6	BOTTOM 12	TOP	BOTTOM
~~SAND~~	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP 12 ft	BOTTOM 31 ft	TOP	BOTTOM
PERFORATED SECTION	TOP 19 ft	BOTTOM 29 ft	TOP	BOTTOM
PIEZOMETER TIP	31 ft			
BOTTOM OF BOREHOLE	31 ft			
GWL AFTER INSTALLATION	N/A		14	

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

REMARKS

WELL 1024

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

	Initial	Date
1st Key In		
2nd Key In		
Final Verification		

RKA 2/4/87

WPK 2/6/88

R6 # 1

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 88 ~~1124~~ 1024	COORDINATES:	DATE: 10-4-87
ELEVATION:	GWL: Depth 9.3' 100 DPK Date/Time 10-17/1100	DATE STARTED: 10-4-87
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 10/16/87
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				Detailed Continuous Samples were collected on borehole # ~~324~~ 3024 (2486 = 1/6/89). Please refer to that Soil Log for details			
1'							
2'							
3'							
4							
6							
7							
8							
9							
10							
11							
12							
13							
14				Unsuccessful Shelby Tube Attempt.			Attempted to obtain a Shelby Tube from 14'-15.6'. Only recovered 5".
15'							

NOTES: Used a total of 35 gallons of water to drill hole.

16

402-11-86

FERNALD RI/FS

	Initial	Date
1st Key In		
2nd Key In	RAH	10/12
Verification	RIG	

2731 WPIC 4/23/88 RIG 1

MAC RKA 2/4/89

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS	
BORING NUMBER: BB 1-5-89 ~~124~~ 1024	COORDINATES:	DATE: 10/16/87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 10-4-87
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 10/16/87
DRILLING METHODS: Cable Tool		PAGE 2 OF 2

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				See Well Log # ~~3214~~ 3024 for Soil descriptions RAH 2/6/89			
16	ST 07247		≈ 8"		CL		Shelby Tube: Csg began pulling up after 8" collected
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27				Bottom of Boring = 27'			1st well - Drilling Completed but had to be redrilled to to bentonite pellets setting up & lifting Stainless Steel Csg with 10" Temp. Csg.
28							
29							
30							

NOTES:

17

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1024	COORDINATES: NORTH 482,481.12 EAST 1,378,892.92	DATE: 10/06/87
GROUND ELEVATION: 580.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/06/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
15.5									
16.3	07247	10/06/87	0945		8				

BOTTOM OF BORING 27

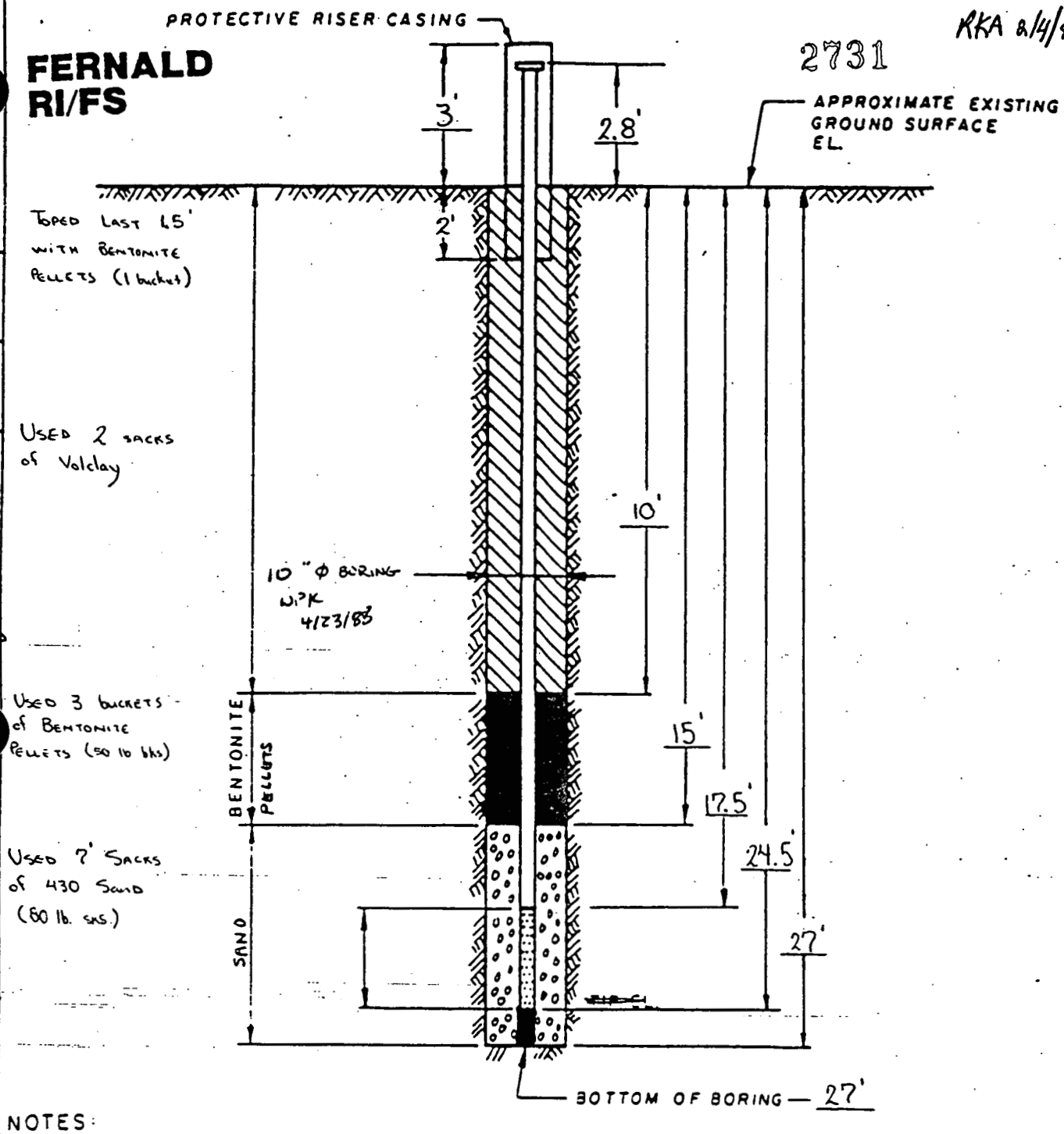
NOTES:
SHELBY TUBE: CSG BEGAN PULLING UP AFTER 8" COLLECTED.

WELL # ~~124~~ 1024 BB 1-5-89

RKA 8/4/89

2731

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL ~~124~~ 1024 RKA 2/6/89

PREPARED FOR

FMPC RI/FS

19

DRAWING NUMBER

CHECKED BY

APPROVED BY

ERNALD
RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

DAC
RKA 2/4/89

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. B. Dunning DATE 10/18/87
PROJECT NO. 602 CHECKED BY R Galkowski DATE 2/4/89
BORING NO. ~~124~~ 1024 OB 1-5-89
PIEZOMETER NO. NA DATE OF INSTALLATION 10-18-87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0' TO 27'
FLUID NA FROM NA TO NA

TYPE OF BIT Hammer
CASING SIZE (S) USED: WPK 4/23/88
SIZE 10" FROM Surface TO 27'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 in.
TOTAL PERFORATED AREA 7'

RISER PIPE MATERIAL Stainless Steel (316)
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10'
JOINING METHOD Flush joint thread

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'
PROTECTIVE PIPE O.D. 10"

OTHER PROTECTION Locking cap with lock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft.)		ELEVATION (Ft.) MSL	
TOP OF RISER PIPE	2.8'			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2'			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0'	BOTTOM 10'	TOP	BOTTOM
BENTONITE	TOP 10'	BOTTOM 15'	TOP	BOTTOM
SAND	TOP 15'	BOTTOM 27'	TOP	BOTTOM
no GRAVEL used	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 17.5'	BOTTOM 24.5'	TOP	BOTTOM
PIEZOMETER TIP	WPK 4/23/88	27.0' (silt trap)		
BOTTOM OF BOREHOLE	27'			
GWL AFTER INSTALLATION	-9'			

20

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

REMARKS The white out corrections were made by B. Dunning at the time the form was completed. WPK 4/23/88

WELL 1027

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 127	COORDINATES:	DATE: 12-21-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-21-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 12-22-87
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				SEE VISUAL CLASSIFICATION FOR WELL # 227.			
10	ST 07505 12:37						12-22-87 8:30
20	ST 07878 10110						
30				WELL TD 31.5 FT.			

NOTES: WATER ADDED TO HOLE

~~HH HH~~ III

EACH MARK REPRESENTS 10 gals.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1027	COORDINATES: NORTH 481,980.78 EAST 1,379,319.44	DATE: 12/21/87
GROUND ELEVATION: 583.0	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/21/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
11.0							
12.0	07805 12/21/87 1537			SHELBY TUBE.			
18.0							
20.0	07878 12/22/87 1010			SHELBY TUBE.			

BOTTOM OF BORING 31.5

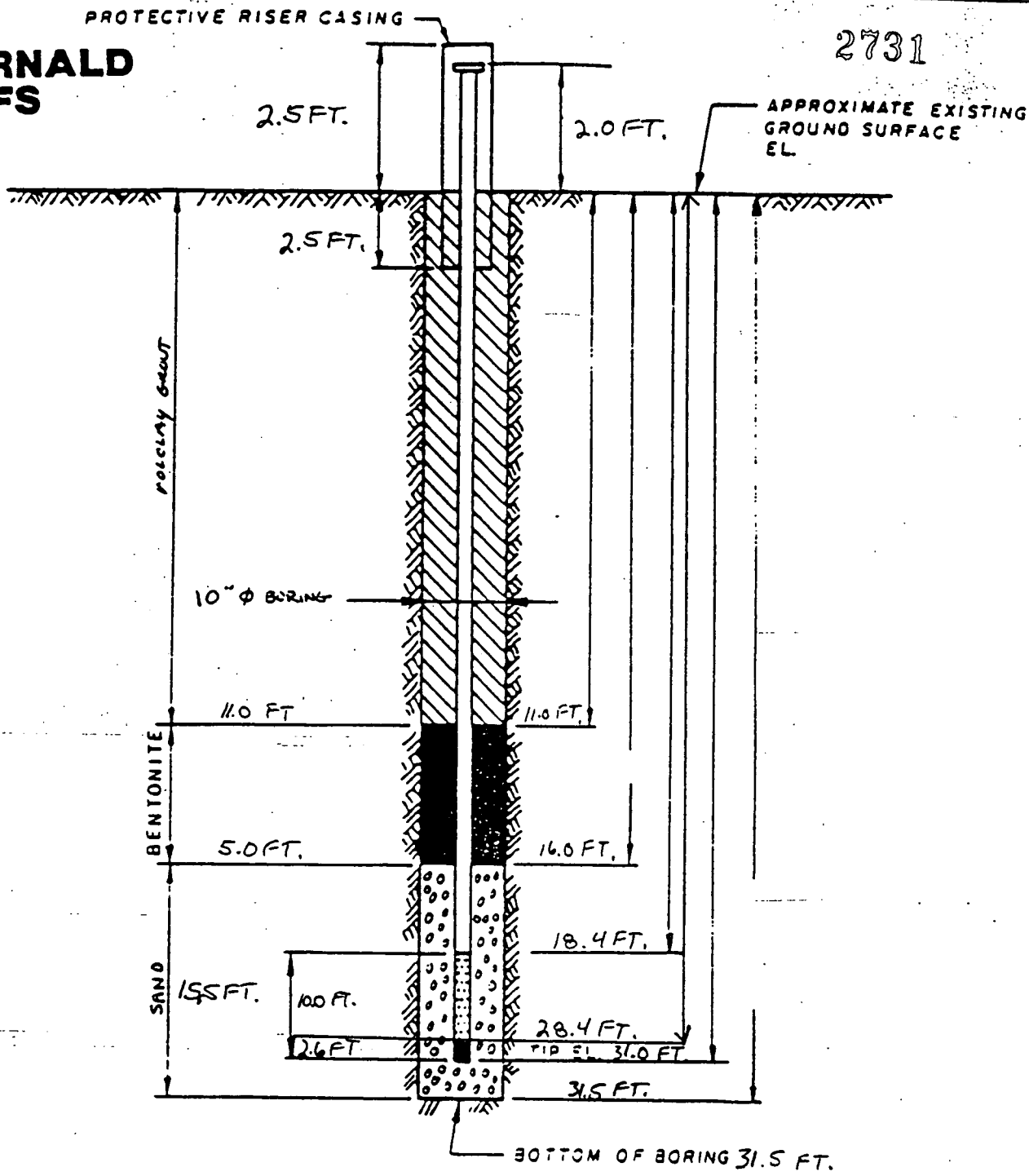
NOTES:

36

WELL # 127

2731

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.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 127

PREPARED FOR

24

DRAWING NUMBER

CHECKED BY

APPROVED BY

D/20

DRAWN BY

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. D. OAKLEY DATE 12-23-87
PROJECT NO. 692 CHECKED BY _____ DATE _____
BORING NO. 127
PIEZOMETER NO. NA DATE OF INSTALLATION 12-22-87 - 12-23-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT FLATHEAD
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM 4.0 TO 31.5 FT	SIZE 10 IN. FROM 0 TO 30 FT.
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE MONITORING	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4 IN	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 IN I.D. 4 IN
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 FT.
AVERAGE SIZE OF PERFORATIONS .010 IN	JOINING METHOD THREAD AND
TOTAL PERFORATED AREA 10 FT.	COUPLE

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.	OTHER PROTECTION LOCKING CAP
PROTECTIVE PIPE O.D. 10 IN.	

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:				
GROUT/SLURRY	TOP 0.0	BOTTOM 11.0 FT.	TOP	BOTTOM
BENTONITE	TOP 11.0	BOTTOM 16.0 FT.	TOP	BOTTOM
SAND	TOP 16.0	BOTTOM 31.5 FT	TOP	BOTTOM
~~GRAVEL~~	TOP N/A	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 18.4 FT.	BOTTOM 28.4 FT.	TOP	BOTTOM
PIEZOMETER TIP	31.0			
BOTTOM OF BOREHOLE	31.5 FT.			
GWL AFTER INSTALLATION	NK			

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

REMARKS _____

25

WELL 1028

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS Task 3.2		
BORING NUMBER: 128	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 01/10/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 01/14/88	
DRILLING METHODS: Cable Tool		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	07 ② 7	27 24 17	14"	Hard, yellowish brown silt (10YR 5/4) Dry	ML	4.5	Hnu = 0 α = 0 δB = 0 0930
2 3	07 ③ 6	11 10 7	12"	Very stiff, yellowish brownish silt w/ trace gravel (10YR 5/4) dry	ML	2.5	Hnu = 0 α = 0 δB = 0 0945
4	07 ④ 9	16 24 27	6"	Silt size Flyash, dry (2.5Y 2/0) Brittle 5Ft	ML	—	Hnu = 0 α = 0 δB = 240 cpm 0955
5 6	07 ⑤ 6	18 19 18	12"	Hard, Dark Brown clay (10YR 4/3) Trace of gravel Dry	CL	4.5	Hnu = 0 α = 0 δB = 240 cpm Ran Shelby #7823 5.5-6.5 1300 1005
7	07 ② 2	18 22 21	18	Very stiff Dark Brown clay (10YR 4/3) trace of gravel. Dry 8Ft	CL	3.5	Hnu = 0 α = 0 δB = 120 cpm 1015
8 9	07 ⑧ 2	16 14 14	18"	Very stiff Dark Brown clay (10YR 4/3) with organics debris. dry 9Ft	OL	2.5	Hnu = 0 α = 0 δB = 120 1020
10	07 ② 24	3 5 6	18"	Very stiff Dark Brown clay (10YR 4/3) with trace of gravel. moist	CL	3.0	Hnu = 0 α = 0 δB = 100 1415
11 12	07 ② 25	13 11 3	18"	Very stiff Dark Brown clay (10YR 4/3) w/ trace of gravel. encountered Lime sludge @ 12 Ft moist		2.5	Hnu = 0 α = 0 δB = 120 3-4 inch lense of lime sludge 11.7-12 Ft 1430
13	07 ⑧ 6	7 9 13	14"	Very stiff Dark Brown clay (10YR 4/3 trace of gravel. moist 13Ft		3.0	Hnu = 0 α = 0 δB = 120 1440
14 15	07 ② 7	13 17 19	18"	Hard Dark grey clay (10YR 4/1) w/ gravel. Trace of lime sludge @ 13.5 Ft moist		4.0	Hnu = 0 α = 0 δB = 120 27 1445

NOTES:

I) Drilling Contractor : Pennsylvania Drilling
Driller : Tim Harris
Helper : Craig Coulter

II) Background Measurements
A) Hnu = 0 B) α = 0 C) δB = 120 cpm.

III) Water used = 55 gallons + 80 = 135 gallons

IV) Samples via Munsell colors ASTM

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2		
BORING NUMBER: 128	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 01/10/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 01/14/88	
DRILLING METHODS: Cable Tool		PAGE 2 OF 2	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16 17	07828	NA	18Ft	Shelby Tube			Hnu=0 α=0 δB=120 1630
18	07829	6 11 50	12"	Hard grey clay w/ trace of gravel (2.5Y 5/0) dry	CL	4.0	Hnu=0 α=0 δB=100 0830
19	07830	12 14 15	12"	Hard Dark grey clay (10YR 4/1) w/ trace of gravel dry	CL	4.0	Hnu=0 α=0 δB=100 0906
20 21	07831	7 11 7	12"	Hard Dark grey clay (10YR 4/1) w/ gravel. Dry 21.5			Hnu=0 α=0 δB=100 0928
22 23	07832	8 13 18	10"	Hard yellowish Brown clay (10YR 5/4) trace of gravel. Dry	CL	4.0	Hnu=0 α=0 δB=100 0955
24	07833	13 18 26	18"	Hard yellowish Brown clay (10yr 5/4) trace of gravel. Dry	CL		Hnu=0 α=0 δB=100 1025
25 26	07834	83 11	10"	Hard yellowish Brown clay (10yr 5/4) trace of gravel w/ Lense of Dark grey clay @ 25Ft (10yr 5/4) Dry 26.5		4.0	Hnu=0 α=0 δB=100 1038
27	07835	16 18 21	18"	Dense yellowish Brown sand (10YR 5/6 Dry trace of gravel	SW	2.0	Hnu=0 α=0 δB=100 1306
28 29	07836	8 10 16	8"	Very stiff dark gray clay (10YR 4/1) moist	CL	3.5	Hnu=0 α= δB=90 1420
30	07837	9 17 29	14"	very stiff dark gray clay (10YR 4/1) moist	CL	3.5	HNU=0 α=0 28 δB=40 1450

NOTES: 26.5 TD

SEE PAGE 1 OF 1

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1028	COORDINATES: NORTH 481,821.60 EAST 1,378,158.07	DATE: 01/10/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/10/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 01/14/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07817	01/10/88 0930	27 24 17	14	HARD YELLOWISH BROWN SILT (10YR, 5/4), DRY.	ML	4.5	Hnu= 0 ppm α = 0 cpm βΓ = 0 cpm
3.0	07818	01/10/88 0945	11 10 7	12	VERY STIFF, YELLOWISH BROWNISH SILT WITH TRACE GRAVEL (10YR, 5/4), DRY.	ML	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 0 cpm
4.5	07819	01/10/88 0955	16 29 27	6	SILT SIZE FLY ASH, DRY (2.5Y, 2/0) BRITTLE.	ML	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
6.0	07820	01/10/88 1008	18 18 18	12	SILT SIZE FLY ASH, DRY (2.5Y, 2/0) BRITTLE: HARD, DARK BROWN CLAY (10YR, 4/3) TRACE OF GRAVEL, DRY.	ML CL	N/A 4.5	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
6.5	07823	01/11/88 1300			SHELBY TUBE.			
7.5	07821	01/10/88 1015	18 22 21	18	VERY STIFF DARK BROWN CLAY (10YR, 4/3) TRACE OF GRAVEL, DRY.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
9.0	07822	01/10/88 1020	16 14 14	18	VERY STIFF DARK BROWN CLAY (10YR, 4/3) TRACE OF GRAVEL, DRY. VERY STIFF DARK BROWN CLAY (10YR, 4/3) WITH ORGANIC DEBRIS, DRY.	CL OL	3.5 2.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
10.5	07824	01/11/88 1415	3 5 6	18	VERY STIFF DARK BROWN CLAY (10YR, 4/3) WITH TRACE OF GRAVEL, MOIST.	CL	3.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
12.0	07825	01/11/88 1430	13 11 3	18	VERY STIFF DARK BROWN CLAY (10YR, 4/3) WITH TRACE OF GRAVEL, ENCOUNTERED LIME SLUDGE AT 12 FT., MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
13.5	07826	01/11/88 1440	7 9 13	14	VERY STIFF DARK BROWN CLAY (10YR, 4/3), TRACE OF GRAVEL, MOIST	CL	3.0	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
15.0	07827	01/11/88 1445	13 17 19	18	HARD DARK GREY CLAY (10YR, 4/1) W/GRAVEL. TRACE OF LIME SLUDGE AT 13.5 FT., MOIST.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm

NOTES:
SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1028	COORDINATES: NORTH 481,821.60 EAST 1,378,158.07	DATE: 01/10/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/10/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 01/14/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 2

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.8	07828	01/11/88	1630			1.8	SHELBY TUBE.			Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
17.0										
18.5	07829	01/12/88	0830	6 11 50		12	HARD GRAY CLAY WITH TRACE OF GRAVEL (2.5Y, 5/0), DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
20.0	07830	01/12/88	0906	12 14 15		12	HARD DARK GRAY CLAY (10YR, 4/1) WITH GRAVEL, DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
21.5	07831	01/12/88	0928	7 11 7		12	HARD DARK GREY CLAY (10YR, 4/1) W/GRAVEL, DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
23.0	07832	01/12/88	0955	8 13 18		10	HARD YELLOWISH BROWN CLAY (10YR, 5/4) TRACE OF GRAVEL, DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
24.5	07833	01/12/88	1025	13 18 26		18	HARD YELLOWISH BROWN CLAY (10YR, 5/4), TRACE OF GRAVEL, DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
26.0	07834	01/12/88	1038	8 3 11		10	HARD YELLOWISH BROWN CLAY (10YR, 5/4), TRACE OF GRAVEL WITH LENSE OF DARK GRAY CLAY AT 25 FEET (10YR, 5/4), DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
27.5	07835	01/12/88	1306	16 18 21		18	HARD YELLOWISH BROWN CLAY (10YR, 5/4) TRACE OF GRAVEL W/LENS OF DARK GREY CLAY AT 25 FT. (10YR, 5/4), DRY. DENSE YELLOWISH BROWN SAND (10YR 5/6) DRY, TRACE OF GRAVEL.	CL SW	4.0 2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
29.0	07836	01/12/88	1420	8 10 16		8	VERY STIFF DARK GRAY CLAY (10YR, 4/1), MOIST.	CL	3.5	Hnu= 0 ppm βΓ = 80 cpm
30.5	07837	01/12/88	1450	9 17 29		14	VERY STIFF DARK GRAY CLAY (10YR, 4/1), MOIST.	CL	3.25	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm

BOTTOM OF BORING 31

30

NOTES:
SAMPLES VIA MUNSELL COLORS, ASTM.

FERNALD
RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS
PROJECT NO. 602
BORING NO. 128
PIEZOMETER NO. N/A

FIELD ENG./GEO. M. Goldberg DATE 01/14/88
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 01/14/88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 3 Ft TO 31 Ft
FLUID NA FROM NA TO NA

TYPE OF BIT Flathead
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 31 Ft
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 inches
TOTAL PERFORATED AREA 10 Feet

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 THread and couple
(PLUSH JOINT THREADED)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft
PROTECTIVE PIPE O.D. 10" inches

OTHER PROTECTION Lockable cap AND lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FEET)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 Ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 10.5	TOP	BOTTOM
BENTONITE	TOP 10.5	BOTTOM 16.5	TOP	BOTTOM
SAND	TOP 16.5	BOTTOM 31	TOP	BOTTOM
~~GRAVEL~~	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 19	BOTTOM 29	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	31 Ft			
GWL AFTER INSTALLATION	NA			

31

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

REMARKS _____

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. M. Goldberg DATE 01/14/88
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 128
PIEZOMETER NO. N/A DATE OF INSTALLATION 01/14/88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 3 Ft TO 31 Ft
FLUID NA FROM NA TO NA

TYPE OF BIT Flathead
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 31 Ft
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 inches
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 Feet

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 THread and couple
(FLUSH JOINT THREADED)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft
PROTECTIVE PIPE ~~O~~ I.D. 10" inches

OTHER PROTECTION Lockable cap AND Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FEET)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 Ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 10.5	TOP	BOTTOM
BENTONITE	TOP 10.5	BOTTOM 16.5	TOP	BOTTOM
SAND	TOP 16.5	BOTTOM 31	TOP	BOTTOM
~~GRAVEL~~	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 19	BOTTOM 29	TOP	BOTTOM
PIEZOMETER TIP	04/24/88 ~~MSL~~ 31 ft			
BOTTOM OF BOREHOLE	31 Ft			
GWL AFTER INSTALLATION	NA			

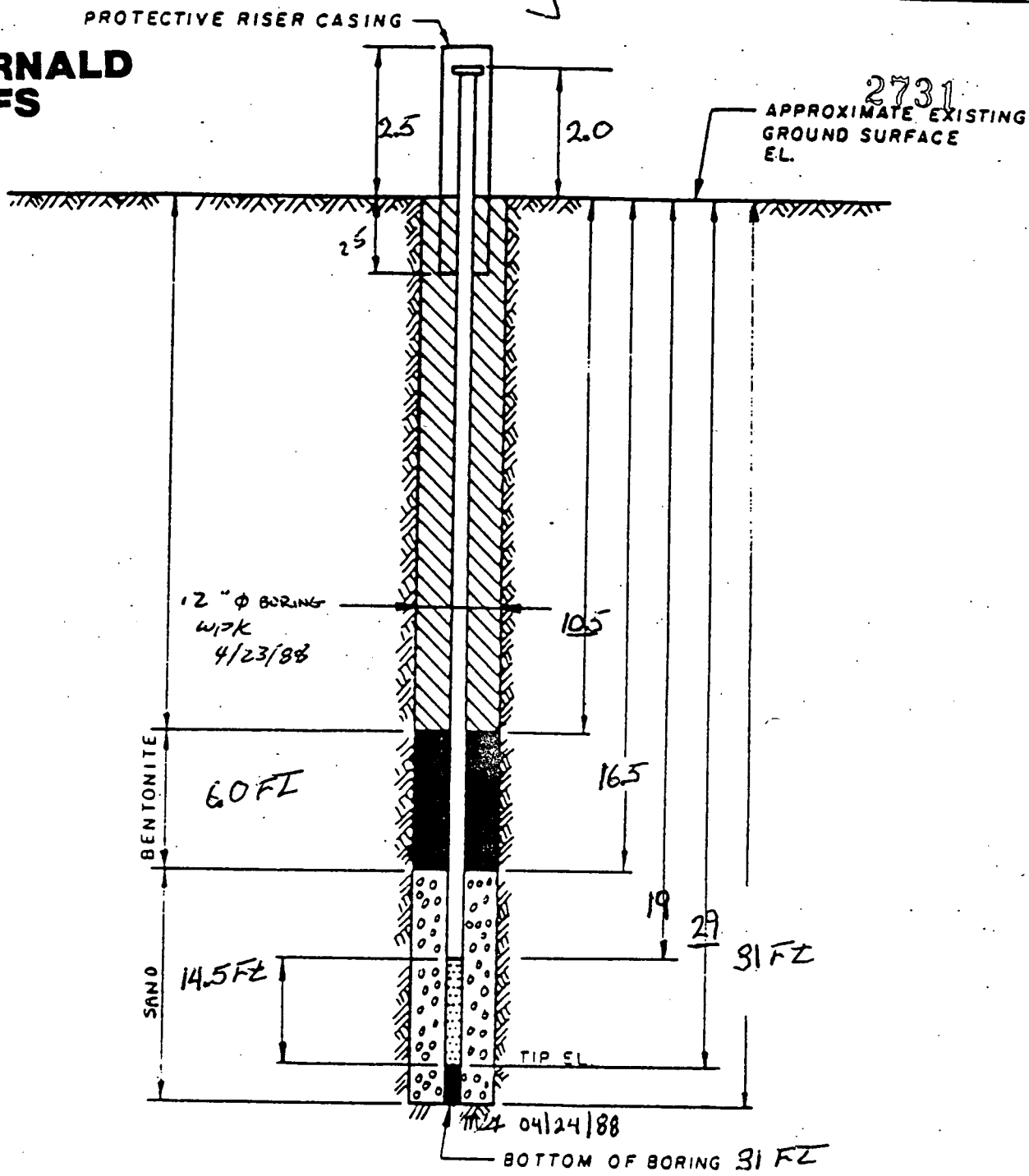
32

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

REMARKS _____

Monitoring Well #128

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 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

INSTALLATION DETAILS
MONITORING WELL 128

PREPARED FOR

FMPC RI/FS

33

WELL 1031

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2		
BORING NUMBER: 131	COORDINATES:	DATE: 4-5-88	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/05/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 4-7-88	
DRILLING METHODS: Cable Tool		PAGE 1 OF 2	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS 04/05/88
1	08832	2 9 13	10"	Hard very dark grayish Brown clay (10YR 3/2) DRY	CL	>4	Hnu=0 α=0 γB=260 0915
2 3	08833	6 6 8	12"	Hard Dark Brown clay (10YR 4/3) DRY.	CL	74	Hnu=0 α=0 γB=260 0920
4	08834	21 10 11	12"	Very STIFF Dark Brown clay (10YR 4/3) DRY	CL	74	Hnu=0 α=0 γB=200 0925
5 6	08835	9 11 7	10"	5.5ft Medium STIFF gray clay (5Y 5/1) moist Trace gravel 6.0ft	CL	<1	Hnu=0 α=0 γB=200 0930
7	08836	8 11 7	10	Medium STIFF Dark Brown clay (10YR 4/3) moist. 7.5	CL	<1	Hnu=0 α=0 γB=220 0935
8 9	08837	9 11 12	12"	Medium STIFF gray clay (5Y 5/1) DRY trace gravel ← Shelby Tube 9.5	CL	<1	Hnu=0 α=0 γB=210 High Plasticity 0937
10	08838	16 11 13	18	Medium STIFF Yellowish Brown clay (10YR 5/8) moist. trace gravel 10.5	CL	<1	Hnu=0 α=0 γB=210 High Plasticity Shelby N008839 13 0940
11 12	08840	4 5 9	18"	Medium STIFF olive gray clay (5Y 4/2) DRY Trace gravel 13ft	CL	<1	Hnu=0 α=0 γB=210 1400
13	08841	5 7 11	18"	Medium STIFF very Dark gray (2.5Y 3/0) Trace gravel 13.5ft	CL	<1	Hnu=0 α=0 γB=210 1410
14 15	08842	7 5 12	10"	Medium STIFF olive gray clay (5Y 4/2) DRY Trace Gravel	CL	<1	Hnu=0 α=0 γB=210 1415

NOTES:

I) Drilling Contractor: Pennsylvania Drilling Co. III) Water used = 100 35

Driller: Tim Harris

Helper: Craig Coalter

II) Background Measurements

A) HNU=0 B) α=0 C) γB=460cpm

IV Color Via Muncell Color Chart

ALD
FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T 3.2		
BORING NUMBER: 131	COORDINATES:	DATE: 4-6-88	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/05/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 4-7-88	
DRILLING METHODS: Cable Tool		PAGE 2 OF 2	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	08 8 4 3	4 5 11	18	Medium STIFF Dark gray clay (5Y 4/1) DRY Trace gravel	CL	<1	Hna = 0 α = 0 δB = 200 1500
17	08 8 4 4	4 10 10	16"	Medium STIFF Dark gray clay (5Y 4/1) DRY Trace grave)	CL	<1	Hna = 0 α = 0 δB = 200 1510
18							
19	08 8 4 5	N/A	18"	SHelby Tube	N/A	N/A	Pushed 2.5Ft Recovered 1.5Ft 1645
20	08 8 4 6	2 2 2	8"	Medium STIFF Yellowish Brown clay (10YR 5/6) Trace gravel	CL	<1	Hna = 0 α = 0 δB = 200 04/07/88 0930
21							
22	08 8 4 7	5 4 7	10"	STIFF Dark Yellowish Brown clay (10YR 4/6) Trace gravel, DRY	CL	1.5	Hna = 0 α = 0 δB = 240 0940
23	08 8 4 8	16 13 14	6"	STIFF Dark Yellowish Brown clay (10YR 5/6) trace gravel. Trace gray clay (5Y 5/1) 24 ft	CL	1.5	Hna = 0 α = 0 δB = 240 0955
24							
25	08 8 4 9	15 22 ~~52~~ 3	18"	Very Dense Dark Brown sandy silt (10YR 4/3) DRY. No clay 26 ft	SM	4.0	Hna = 0 α = 0 δB = 240 1040
26	08 8 5 0	14 32 36	18"	Very Hard Yellowish Brown clay & silt (10YR 5/8) DRY trace gravel	CL	4.0	Hna = 0 α = 0 δB = 240 1055
27							
28	08 8 5 1	16 22 37	18"	Very Hard grayish Brown clay (2.5Y 5/2) Dry. Trace gravel 29 Ft	CL	>4.0	Hna = 0 α = 0 δB = 240 1300
29	08 8 5 2	20 22 19	18"	Dense yellowish Brown sand (10YR 5/8) Dry.	SW	<1	Hna = 0 α = 0 δB = 200 1315
30							
NOTES				Bottom of Boring 30 ft			

36

N/A = NOT Applicable

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1031	COORDINATES: NORTH 481,167.08 EAST 1,378,136.55	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 04/07/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08832	04/05/88 0915	2 9 13	10	HARD VERY DARK GRAYISH BROWN CLAY (10YR, 3/2), DRY.	CL	>4	Hnu= 0 ppm α = 0 cpm βΓ = 260 cpm
3.0	08833	04/05/88 0920	6 6 8	12	HARD DARK BROWN CLAY (10YR, 4/3), DRY.	CL	>4	Hnu= 0 ppm α = 0 cpm βΓ = 260 cpm
4.5	08834	04/05/88 0925	21 10 11	12	VERY STIFF DARK BROWN CLAY (10YR, 4/3) DRY.	CL	>4	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
6.0	08835	04/05/88 0930	9 11 7	10	VERY STIFF DARK BROWN CLAY (10YR, 4/3), DRY. MEDIUM STIFF GRAY CLAY (5Y, 5/1), MOIST, TRACE GRAVEL.	CL CL	>4 <1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
7.5	08836	04/05/88 0935	8 11 7	10	MEDIUM STIFF DARK BROWN CLAY (10YR, 4/3), MOIST.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 220 cpm
9.0	08837	04/05/88 0937	9 11 12	12	MEDIUM STIFF GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
10.5	08839 08838	04/05/88 0940	16 11 13	18	MEDIUM STIFF, GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL. MEDIUM STIFF, YELLOWISH BROWN CLAY (10YR, 5/8) MOIST, TRACE GRAVEL.	CL CL	<1 <1	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
12.0	08840	04/05/88 1400	4 5 9	18	MEDIUM STIFF OLIVE GRAY CLAY (5Y, 4/2) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
13.5	08841	04/05/88 1410	5 7 11	18	MEDIUM STIFF OLIVE GRAY CLAY (5Y, 4/2) DRY, TRACE GRAVEL. MEDIUM STIFF VERY DARK GRAY (2.5Y, 3/0) TRACE GRAVEL.	CL CL	<1 <1	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
15.0	08842	04/05/88 1415	7 5 12	10	MEDIUM STIFF OLIVE GRAY CLAY (5Y, 4/2) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm

NOTES:
COLOR VIA MUNSELL COLOR CHART

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1031	COORDINATES: NORTH 481,167.08 EAST 1,378,136.55	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 04/07/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08843	04/05/88 1500	4 5 11	18	MEDIUM STIFF DARK GRAY CLAY (5Y, 4/1) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
18.0	08844	04/05/88 1510	4 10 10	16	MEDIUM STIFF DARK GRAY CLAY (5Y, 4/1) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
19.5	08845	04/05/88 1645		18	SHELBY TUBE.			
21.0	08846	04/07/88 0930	2 2 2	8	MEDIUM STIFF YELLOWISH BROWN CLAY (10YR, 5/6) TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
22.5	08847	04/07/88 0940	5 4 7	10	STIFF DARK YELLOWISH BROWN CLAY (10YR, 4/6), TRACE GRAVEL, DRY	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
24.0	08848	04/07/88 0955	16 13 14	6	STIFF DARK YELLOWISH BROWN CLAY (10YR, 5/6), TRACE GRAVEL. TRACE GRAY CLAY (5Y, 5/1).	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
25.5	08849	04/07/88 1040	15 22 50	18	VERY DENSE DARK BROWN SANDY SILT (10YR, 4/3) DRY, NO CLAY.	SM	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
27.0	08850	04/07/88 1055	14 32 36	18	VERY DENSE DARK BROWN SANDY SILT (10YR, 4/3) DRY, NO CLAY. VERY HARD YELLOWISH BROWN CLAY WITH SILT (10YR, 4/8) DRY, TRACE GRAVEL.	SM CL	4.0 4.0	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
28.5	08851	04/07/88 1300	16 22 37	18	VERY HARD GRAYISH BROWN CLAY (2.5Y, 5/2) DRY, TRACE GRAVEL.	CL	>4.0	Hnu= 0 ppm α = 0 cpm βΓ = 240 cpm
30.0	08852	04/07/88 1315	20 22 17	18	VERY HARD GRAYISH BROWN CLAY (2.5Y, 5/2) DRY, TRACE GRAVEL. DENSE YELLOWISH BROWN SAND (10YR, 5/8), DRY.	CL SW	>4.0 <1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm

BOTTOM OF BORING 30

NOTES:
COLOR VIA MUNSELL COLOR CHART

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Goldberg DATE 04/07/88
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 131
PIEZOMETER NO. N/A DATE OF INSTALLATION 4-7-88

BOREHOLE DRILLING

DRILLING METHOD Water
DRILLING FLUID (S) USED:
FLUID _____ FROM 3 ft TO 30 ft
FLUID _____ FROM _____ TO _____

TYPE OF BIT Flat Head
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 30 ft
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010" inches
TOTAL PERFORATED AREA 10 Feet

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10 ft
JOINING METHOD Thread and couple

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE O.D. 10"

OTHER PROTECTION Lockable cap

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:				
GROUT/SLURRY	TOP	BOTTOM	TOP	BOTTOM
BENTONITE	TOP 0	BOTTOM 9	TOP	BOTTOM
~~SAND~~	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP 9	BOTTOM 28 ft	TOP	BOTTOM
PERFORATED SECTION	TOP 16 ft	BOTTOM 26 ft	TOP	BOTTOM
PIEZOMETER TIP	28 ft			
BOTTOM OF BOREHOLE	30 ft			
GWL AFTER INSTALLATION				

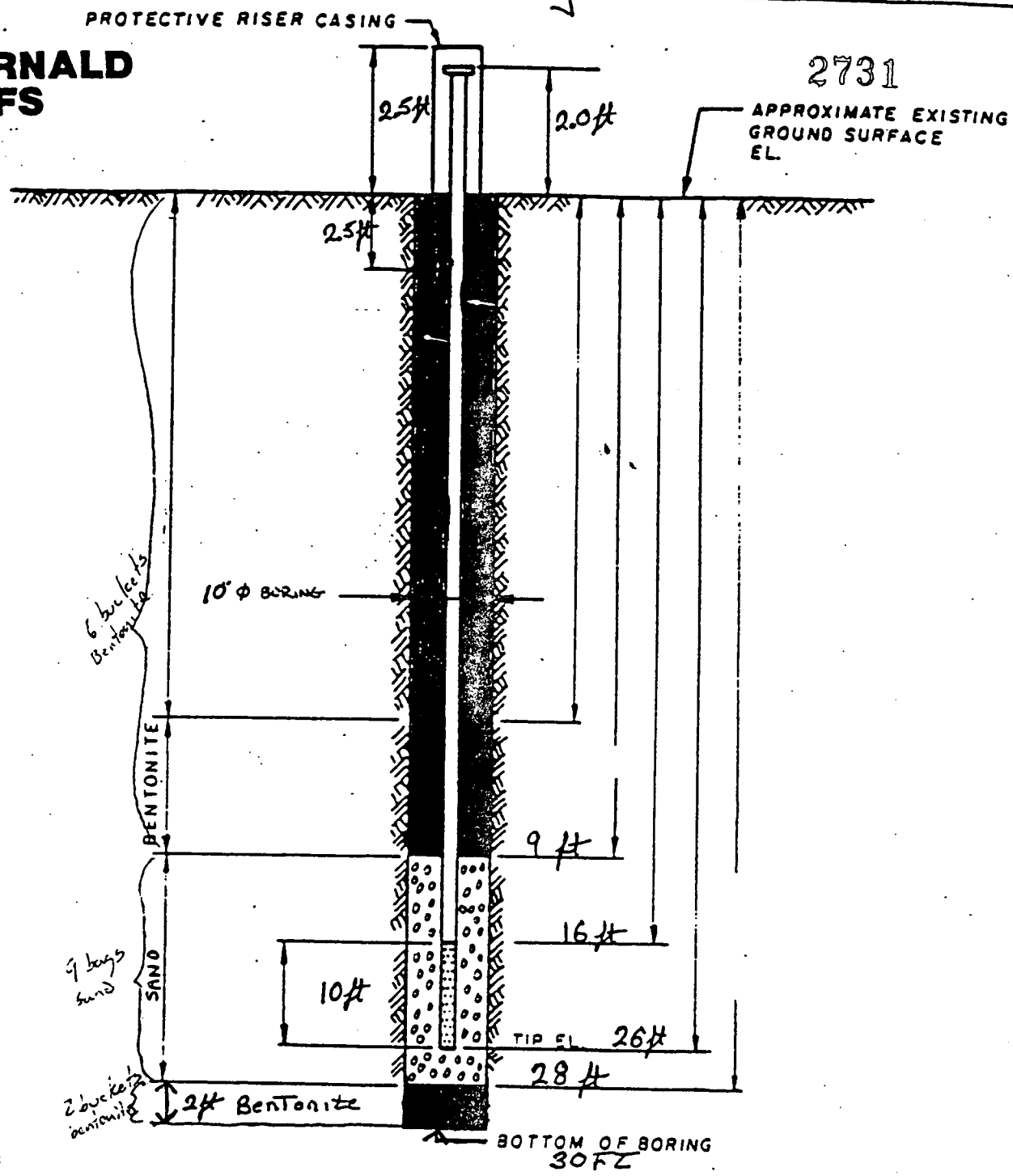
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 39
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS A 2 ft Bentonite Plug was set from 30 ft - 28 ft to seal till/sand contact @ 29 ft

Monitoring Well # 131

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR

FMPC RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

WELL 1039

FERNALD RI/FS

DLG 2/4/89

REVIEWED BY QA K.G. DATE 7/27/91

	Initial	Date
1st Key In		
2nd Key In		
Verification		

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~129~~ 1039 BB 1-5-89	COORDINATES: N 480729.12 E 1379659.05	DATE: 04-09-88
ELEVATION: 577.4 GROUND	GWL: Depth Date/Time	DATE STARTED: 04-08-88
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 04-09-88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	08431 0921 04 08	3 8 10	12	VERY STIFF, BROWN (10YR 3/2) CLAY ROOTLETS, DRY	CL	2.5	HNU = 0 α = – BK = 100 CPM
2 3	08432 0924 04 08	5 7 8	14	STIFF, GREY/BROWN, (10YR 4/1) CLAY DRY	CL	2.0	HNU = 0 α = – BK = 100 CPM
4	08433 0933 04-08	5 9 12	8	VERY STIFF, OLIVE/BROWN (5Y 4/2) MOTTLED, CLAY, DRY	CL	3.5	HNU = 0 α = – BK = 100 CPM
5 6	08434 0936 04 08	11 12 15	10	VERY STIFF, GREY, OLIVE BROWN (5Y 4/2) MOTTLED, CLAY, DRY	CL	2.5	HNU = 0 α = – BK = 100 CPM
7	08435 0941 04 08	15 15 18	12	VERY STIFF, GREY/BROWN (10YR 5/1) MOTTLED, CLAY, DAMP	CL	2.0	HNU = 0 α = – BK = 100 CPM
8 9	08436 0946 04 08	11 14 14	12	STIFF, GREY (2.5Y 6/2) CLAY, DAMP	CL	1.5	HNU = 0 α = – BK = 100 CPM
10 11	08437 1327 04 08		24	PUSHED SHELBY TUBE FROM 9.0 FT TO 11.0 FT. RECOVERED 2.0 FT			HNU = 0 α = – BK = 100 CPM
12	08438 1414 04 08	4 6	10	MEDIUM STIFF, GREY, (5Y 5/1) SILTY CLAY, DAMP	CL	.5	HNU = 0 α = – BK = 100 CPM
13	08439 1421 04-08	4 7 11	14	MEDIUM STIFF, GREY (5Y 5/1) SILTY CLAY, DAMP	CL	1.0	HNU = 0 α = – BK = 100 CPM
14	08440 1426 04-08	10 12 19	12	MEDIUM STIFF, GREY (5Y 5/1) SILTY CLAY, DAMP	CL	1.0	HNU = 0 α = – BK = 100 CPM

NOTES:
CONTRACTOR: TRONDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYKES JR.
ASSISTANT: JOHN VANDINE

SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST 42

COLORS IDENTIFIED USING MUNSELL COLOR CHART

BACKGROUND LEVELS: HNU = 0 LELON OPMIC α = – BK = 100 CPM 21.6% O2

LUNCH ADDED TO BOREHOLE: 150 GALLONS

402-11-86

FERNALD RI/FS

REVIEWED BY QA K.G. DATE 7/29/91 2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1039	COORDINATES: See p1	DATE: 04-09-88
ELEVATION: See p1	GWL: Depth Date/Time	DATE STARTED: 04-08-88
ENGINEER/GEOLOGIST: M. SLUMARSKI	Depth Date/Time	DATE COMPLETED: 04-09-88
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	08441 1430 04-08	17 20 17	14	MEDIUM STIFF, GREY (5Y 5/1) SILTY CLAY, SOME FINE SAND, DAMP	CL		HNU = 0 α = — BS = 80 CPM
17 18	08442 1505 04-08	7 9 12	14	MEDIUM STIFF, GREY (5Y 5/1) SILTY CLAY, SOME FINE SAND, DAMP 18.0	CL		HNU = 0 α = — BS = 80 CPM
19	08443 1508 04-08	6 12 15	14	MEDIUM DENSE, GREY (5Y 4/1) WELL GRADED, GRAVELLY SAND, WET	SW		HNU = 0 α = — BS = 80 CPM
20 21	08444 1511 04-08	10 16 19	14	DENSE, GREY (5Y 4/1) WELL GRADED, GRAVELLY SAND, WET	SW		HNU = 0 α = — BS = 80 CPM
22	08445 1513 04-08	14 20 21	14	DENSE, GREY (5Y 4/1) WELL GRADED, GRAVELLY SAND, WET 22.5	SW		HNU = 0 α = — BS = 80 CPM
23	08446 1651 04-08	10 8 14	14	MEDIUM DENSE, GREY (5Y 4/1) CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE, WET 23.5	GC		HNU = 0 α = — BS = 80 CPM
24				VERY STIFF, GREY (5Y 4/1) CLAY, SOME FINE GRAVEL AND SILT, DRY	CL	2.5	
25	08447 1712 04-08	7 10 11	8	VERY STIFF, GREY (5Y 4/1) CLAY, SOME FINE GRAVEL AND SILT, DRY	CL	2.5	HNU = 0 α = — BS = 80 CPM
26							
27				BOTTOM OF BORING 27.0 FT			
28							
29							

NOTES:

43

402-11-86

FERNALD
RI/FS

REVIEWED BY QA A.C. DATE 7/29/91

2731

PIEZOMETER INSTALLATION SHEET

	Initial	Date
1st Key to		
2nd Key to		
Hard Copy Verification		

PROJECT NAME FERNALD RI/FS
FIELD ENG./GEO. M. SLUSARSKI DATE 04-09-88
PROJECT NO. 602 3.2
CHECKED BY R Calkins DATE 2/6/89
BORING NO. ~~129~~ 1039 BB1-5-89
PIEZOMETER NO. ~~129~~ 1039
DATE OF INSTALLATION 04-09-88

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT. TO 27.0 FT.
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10" ID FROM 0.0 FT TO 27.0 FT.
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4" ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 11.0 FT.

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS
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 LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION (ft.)	
TOP OF RISER PIPE	~~2.5~~ 2.0 RMG 2/6/89		579.27	
GROUND SURFACE	0.0		577.4	
BOTTOM OF PROTECTIVE PIPE	2.5		574.9	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
BENTONITE	TOP 0.0	BOTTOM 8.0	TOP 577.4	BOTTOM 569.4
SAND (10-20)	TOP 8.0 FT	BOTTOM 27.0	TOP 569.4	BOTTOM 550.4
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 13.0	BOTTOM 24.0	TOP 564.4	BOTTOM 553.4
PIEZOMETER TIP	26.5 FT.		550.9	
BOTTOM OF BOREHOLE	27.0 FT.		550.4	
GWL AFTER INSTALLATION				

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

44

REMARKS

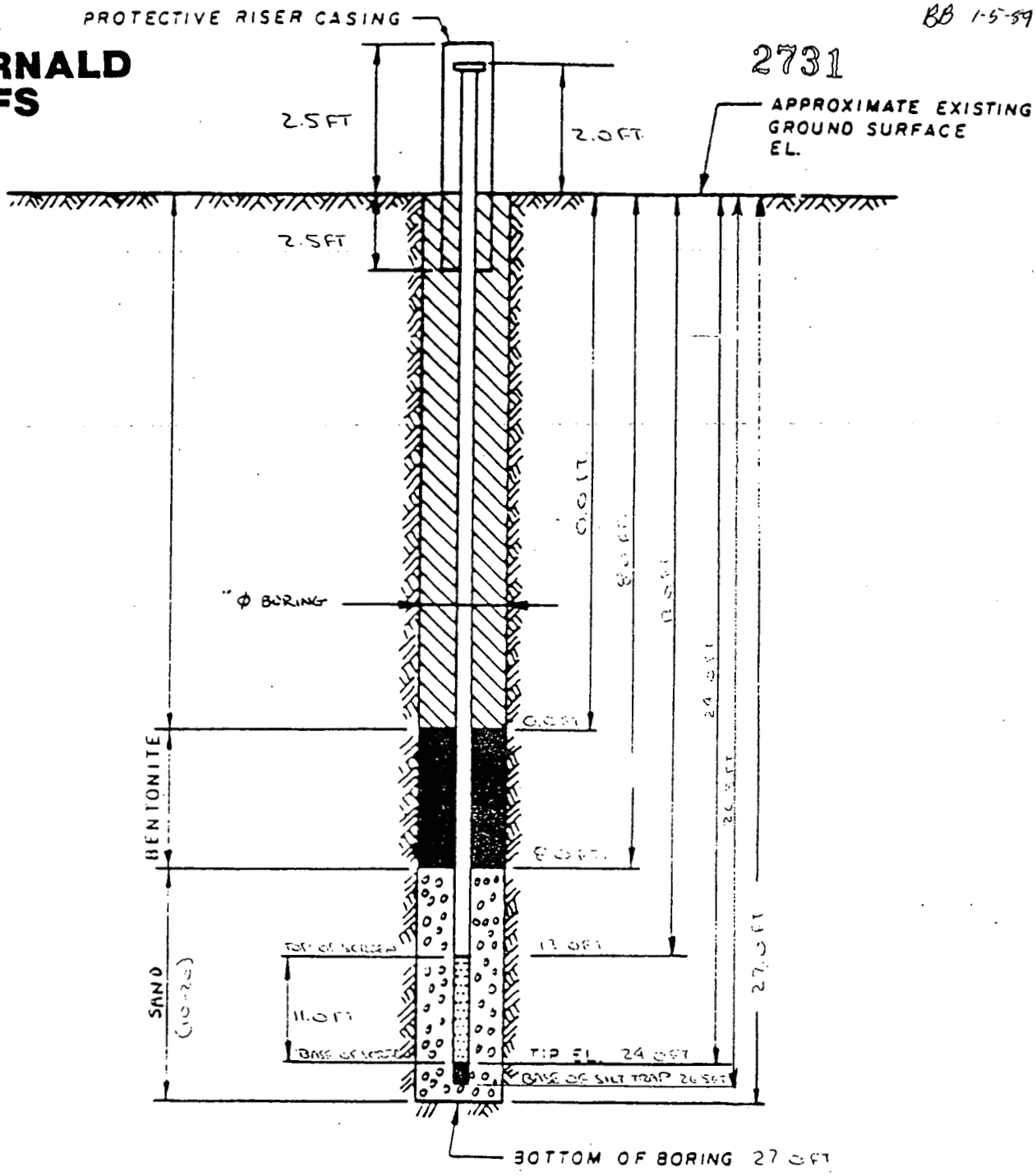
REVIEWED BY QA K.G. DATE 1/27/91 DJH

BORING # 289 1039

BB 1-5-89

FERNALD RI/FS

2731



NOTES:

1. RISER PIPE IS 4 IN 10 SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN 10 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

INSTALLATION DETAILS
MONITORING WELL
04-09-88
PREPARED FOR

BORING # ~~289~~ 1039 BB 1-5-89

45

MATERIALS USED 10-20 SAND (ILLINOIS SACKS) - 7 SACKS
BENTONITE - 8 BUCKETS.

DRAWING NUMBER
CHECKED BY
APPROVED BY
DWN BY

WELL 1042

QC/DH/2.4.89

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T 3.2	
BORING NUMBER: BB 1-509 ~~1412~~ 1042	COORDINATES:	DATE: 4-21-88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/21/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 04/21/88
DRILLING METHODS: Cable Tool		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				RLG 2/6/89 See Boring 2042 For Soil Lithology			
2							
3							
4							
5							
6							
7				COPY			
8							
9							
10							
11							
12							
13							
14							
15							

NOTES:
I) Drilling Contractor: Pennsylvania Drilling Co
Driller: Tim Harris
Helper: Craig Coulter
II Background measurements
A) HNU = 0 B) α = 0 C) γB = 140 cpm
III Water used = 100 gallons
47
IV Color via Munsell Color chart

402-11-86

QC/DH/2.4.89

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2		
BORING NUMBER: BB 15-89 ~~142~~ 1042	COORDINATES:	DATE: 4-21-88	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/21/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 04/21/88	
DRILLING METHODS: Cable Tool		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16				See Boring 2042 QC 6-2/6/89			
17				FOR			
18				Soil Lithology			
19							
20							
21				Bottom of Boring 21 ft			

NOTES:

48

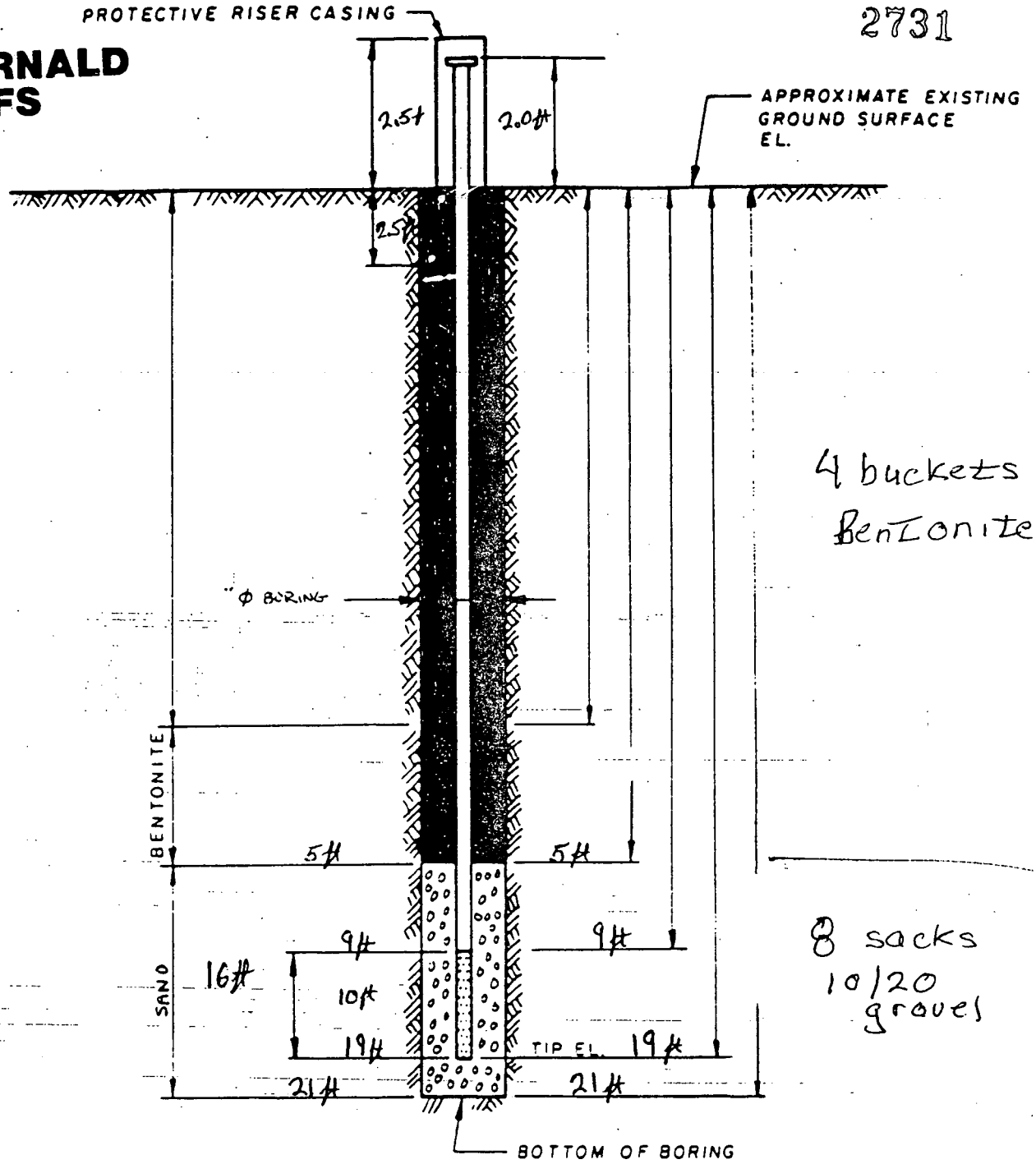
402-11-86

cc/DH/2-4-89

Monitoring Well #142 1042 BB 1-5-89

2731

FERNALD RI/FS



4 buckets Bentonite

8 sacks 10/20 gravel

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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR
FMPC RI/FS

DRAWING NUMBER
CHECKED BY
APPROVED BY
DRAWN BY

CC/DH/2.4.89

	Initial	Date
1st Key In		
2nd Key In		011889
Hard Copy Verification		

2731

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS T32 FIELD ENG./GEO. M. Goldberg DATE 04/21/88
PROJECT NO. 602 CHECKED BY R Galkowitz DATE 2/6/89
BORING NO. 142/042 BB 1-5-89
PIEZOMETER NO. N/A 1042 DATE OF INSTALLATION 04/21/88

BOREHOLE DRILLING

DRILLING METHOD Water
DRILLING FLUID (S) USED:
FLUID _____ FROM 3ft TO 21ft
FLUID _____ FROM _____ TO _____

TYPE OF BIT Flat Head
CASING SIZE (S) USED:
SIZE 10" FROM 0ft TO 21ft
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 inches
TOTAL PERFORATED AREA 10ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" inches I.D. 4" inches
LENGTH OF PIPE SECTIONS 10ft
JOINING METHOD Thread and couple

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft
PROTECTIVE PIPE O.D. 10" inches

OTHER PROTECTION Lockable cap

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:				
GROUT/SLURRY	TOP N/A	BOTTOM N/A	TOP	BOTTOM
BENTONITE	TOP 0ft	BOTTOM 5ft	TOP	BOTTOM
SAND	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP 5ft	BOTTOM 21ft	TOP	BOTTOM
PERFORATED SECTION	TOP 9ft	BOTTOM 19ft	TOP	BOTTOM
PIEZOMETER TIP	21ft			
BOTTOM OF BOREHOLE	21ft			
GWL AFTER INSTALLATION	5.3 Ft @ 0830 04/22/88			

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

50

REMARKS _____

QC/DH/2.4.89

FERNALD RI/FS

REVIEWED BY QA K6 DATE 8/7/91 2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T 3.2	
BORING NUMBER: BB 1-5-89 242 2042	COORDINATES: 480344.27 N 1379592.73 E	DATE: 4/11/88
ELEVATION: 575.58	GWL: Depth — Date/Time —	DATE STARTED: 04/11/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth — Date/Time —	DATE COMPLETED: 04/19/88
DRILLING METHODS: Cable Tool		PAGE 1 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	08 8 6 7	2 3 6	14"	Very STIFF Dark Yellowish Brown clay (10YR 4/4) DRY 1.5	CL	2.5	Hnu=0 α=0 δB=90 0845
2 3	08 8 6 8	6 10 9	14"	Very STIFF Dark Brown clay (10YR 3/3) DRY 3.0	CL	2.5	Hnu=0 α=0 δB=90 0850
4	08 8 6 9	10 11 11	18"	STIFF Dark Yellowish Brown clay (10YR 4/6) DRY	CL	1.0	Hnu=0 α=0 δB=90 0852
5 6	08 8 7 0	8 8 8	8"	STIFF Dark Yellowish Brown clay (10YR 4/6) DRY 6.5	CL	1.0	Hnu=0 α=0 δB=90 0855
7	08 8 7 1	5 6 6	18"	Loose Yellowish Brown silty sand (10YR 5/8) wet 7.0	SM		Hnu=0 α=0 δB=90 0900
8 9	08 8 7 2	6 6 7	18	STIFF light gray silty clay (10YR 7/1) wet STIFF light gray silty clay (10YR 7/1) wet. Trace sand wet 9.5	CL CL	1.5 1.0	Hnu=0 α=0 δB=100 Pushed Shelby No.08874 @ 1330 0903
10	08 8 7 3	6 8 10	18"	STIFF Yellowish Brown silty clay (10YR 5/8) Trace sand. Wet 10.5	CL	1.0	Hnu=0 α=0 δB=100 0905
11 12	08 4 9 0	4 7 6	12"	STIFF light gray silty clay w/ sand (10YR 7/1) wet 12.4	CL	1.0	Hnu=0 α=0 δB=100 1355
13	08 4 9 1	9 7 13	14"	Medium dense light gray silty sand (10YR 7/1) wet	SM		Hnu=0 α=0 δB=100 1400
14 15	08 4 9 2	9 11 13	14"	Medium dense gray silty sand (10YR 5/1) wet	SM		Hnu=0 α=0 δB=100 1405

NOTES:

I) Drilling Contractor: Pennsylvania Drilling Co
Driller: Tim Harris
Helper: Craig Coulter

II) Background Measurements
A) HNU=0 B) α=0 C) δB=140 ppm

III) Water used = 600 gallons

51

IV Color via Munsell Color chart

402-11-86

QC/D # 2-4-89

FERNALD RI/FS

REVIEWED BY QA KG DATE 8/7/91

2731

	Initial	Date
1st Key In		
2nd Key In		8/14
Hard Copy Verification		

PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: BG 7-5-89 242 2042	COORDINATES: Seep1	DATE:
ELEVATION: Seep1	GWL: Depth 9.3ft Date/Time 04/11/88 0830	DATE STARTED: 04/11/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 4/19/88 RHG 2/6/89
DRILLING METHODS: Cable Tool		PAGE 2 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	08493	11 12 15	18"	medium dense gray silty sand (10YR5/1) wet 16.5ft	SM	<1	Hna=0 α=0 δB=90 1410
17 18	08494	8 9 9	18"	Medium dense gray sand (10YR5/1 wet, Trace silt 18.0	SP	<1	Hna=0 α=0 δB=90 1415
19	08495	3 3 3	10"	STIFF gray clay (10YR 5/1) wet Trace sand 19.5	CL	1.5	Hna=0 α=0 δB=90 1535
20 21	08496	10 15 11	8"	Medium dense gray sand (10YR 5/1) wet 20.5 / Hard Dark gray clay (5Y 4/1) DRY	SW / CL	<1 / ≥4	Hna=0 α=0 δB=90 1540
22	08497	N/A	12"	Shelby Tube	N/A	NA	Pushed 1.5ft Recovery 1.0ft 1630
23	08498	6 10 12	14"	Medium STIFF Dark gray clay (5Y 4/1) DRY	CL	1.0	Hna=0 α=0 δB=90 04/12/88 0830
24 25	08499	3 4 8	18"	STIFF Dark gray clay (5Y 4/1) DRY.	CL	2.0	Hna=0 α=0 δB=100 0845
26	08500	1 2 3	10"	STIFF olive gray clay (5Y 5/2) Trace gravel. DRY	CL	1.5	Hna=0 α=0 δB=90 0920
27 28	08501	10 13 16	14"	Very STIFF Dark gray clay (5Y4/1) trace gravel. DRY	CL	4.0	Hna=0 α=0 δB=90 0940
29 30	08502	10 16 21 24	20"	Very STIFF Dark gray clay (5Y4/1) Trace gravel. DRY	CL	4.0	Hna=0 α=0 δB=90 0950

NOTES:

402-11-86

FERNALD RI/FS

REVIEWED BY QA K6 DATE 8/7/91

QC/DM/2.4.89

	Initial	Date
1st Key In		
2nd Key In		8/16
Hard Copy Verification		

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T 3.2	
BORING NUMBER: BB 1-5-89 242 2042	COORDINATES: See P1	DATE:
ELEVATION: See P1	GWL: Depth – Date/Time –	DATE STARTED: 04/11/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth – Date/Time –	DATE COMPLETED: 4/19/88 R 4/14/89
DRILLING METHODS: Cable Tool		PAGE 3 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	08503	8 13 50	18"	Hard gray clay (5Y5/1) trace gravel. DRY	CL	>4.0	Hnu=0 α=0 δB=90 1020
32	08504	15 14 21	18"	Very STIFF gray clay (5Y 5/1) Trace gravel. DRY.	CL	3.0	Hnu=0 α=0 δB=90 1030
33							
34	08505	8 14 15	18"	Very STIFF gray clay (5Y 5/1) trace gravel. DRY	CL	2.5	Hnu=0 α=0 δB=90 1050
35	08506	8 12 14	18"	Very STIFF gray clay (5Y5/1) trace gravel. DRY	CL	2.0	Hnu=0 α=0 δB=90 1320
36				36.5			
37	08507	5 9 20	18"	Very STIFF Dark Yellowish Brown clay (10YR 4/6) DRY. Trace gravel 37.5	CL	2.5	Hnu=0 α=0 δB=90 1340
38	08508	10 16 50	10"	Very Dense yellowish Brown Sand (10YR 5/8) DRY	SW	<1	Hnu=0 α=0 δB=90 1400
39							
40							
41							
42							
43							
44							
45							

NOTES:

402-11-86

QC/DH/2-4-89

	Initial	Date
1st Key In		
2nd Key In		8/16
Hard Copy Verification		

FERNALD RI/FS

REVIEWED BY QA KG DATE 8/9/91 2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2	
BORING NUMBER: 1-5-89 242 2042	COORDINATES: Seep1	DATE:
ELEVATION: Seep1	GWL: Depth - Date/Time -	DATE STARTED: 04/11/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth - Date/Time -	DATE COMPLETED: 4/19/88 RMB 2/16/89
DRILLING METHODS: Cable Tool		PAGE 4 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
46	08 5 09	25 30 50	18"	Very dense Gravel (10YR/5/8) DRY yellowish Brown 46	GW	<1	Hna=0 α=0 δB=80 1610
47				Very dense yellowish Brown sand (10YR5/8) DRY	SW	<1	04/13/88
48							
49							
50	08 5 10	10 23 27	16"	Dense yellowish Brown sand (10YR 5/8) DRY	SW	<1	Hna=0 α=0 δB=80 0910
52							
53							
54							
55							
56	08 5 11	6 10 14	14"	Dense yellowish Brown sand (10YR5/8) wet	SW	<1	Hna=0 α=0 δB=80 1040
57							
58							
59							
60							

NOTES:

402-11-86

QC/DH/2-4-89

	Initial	Date
1st Key In		
2nd Key In		8/16
Hard Copy Verification		

FERNALD RI/FS

REVIEWED BY QA KC DATE 8/1/91 2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2	
BORING NUMBER: 88 1-5-89 242 2042	COORDINATES: See p1	DATE:
ELEVATION: See p1	GWL: Depth 54.85 Date/Time 04/13/88-1905	DATE STARTED: 04/11/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth 56.0 Date/Time 04/20/88-0845	DATE COMPLETED: 4/19/88 RM2 4/14/89
DRILLING METHODS: Cable Tool		PAGE 5 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	0 8 5 1 2	12 19 23	18"	Dense Yellowish Brown gravel (10YR5/8) Trace sand & wet	GW	<1	Hnu=0 α=0 δB=80 1110
62							
63							
64							
65							
66	0 8 5 1 3	18 16 19	16"	Dense Yellowish Brown gravel (10YR5/8) wet	GW	<1	Hnu=0 α=0 δB=80 1430
67							
68				Bottom of Boring 68 ft			
69							
70							
71							
72							
73							
74							
75							

NOTES:

55

402-11-86

QC/DH/2.4.89

FERNALD RI/FS

REVIEWED BY QA KG DATE 8/1/91 2731

	Initial	Date
1st Key In		
2nd Key In		2/1/89
Hard Copy Verification		

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS T-3.2 FIELD ENG./GEO. M. Goldberg DATE 04/14/88
PROJECT NO. 602 CHECKED BY R Galloway DATE ~~04/19~~ 7/6/89
BORING NO. 242 2042 1-5-89
PIEZOMETER NO. N/A 2042 DATE OF INSTALLATION 04/19/88

BOREHOLE DRILLING

DRILLING METHOD Water
DRILLING FLUID (S) USED:
FLUID ____ FROM 3 ft TO 68 ft
FLUID ____ FROM ____ TO ____

TYPE OF BIT Flat Head
CASING SIZE (S) USED:
SIZE ____ FROM 0 TO 68 ft
SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Monitoring
DIAMETER OF PERFORATED SECTION 4"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010" inches
TOTAL PERFORATED AREA 15 Ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4" inches
LENGTH OF PIPE SECTIONS 10 ft
JOINING METHOD Thread and couple

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE O.D. 10" inches

OTHER PROTECTION Lockable cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0 ft		577.58	
GROUND SURFACE	0.0		575.58	
BOTTOM OF PROTECTIVE PIPE	2.5 ft		573.08	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0 ft	BOTTOM 42.9 ft	TOP 575.58	BOTTOM 532.68
BENTONITE	TOP 42.9 ft	BOTTOM 46 ft	TOP 532.68	BOTTOM 529.58
SAND	TOP N/A	BOTTOM N/A	TOP –	BOTTOM –
GRAVEL	TOP 46 ft	BOTTOM 68 ft	TOP 529.58	BOTTOM 507.58
PERFORATED SECTION	TOP RNC 2/6/89 50 ft	BOTTOM 66 ft	TOP 524.58	BOTTOM 509.58
PIEZOMETER TIP	68 ft		507.58	
BOTTOM OF BOREHOLE	68 ft		507.58	
GWL AFTER INSTALLATION	56 ft @ 0845 4/20/88		Jamble	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 56
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

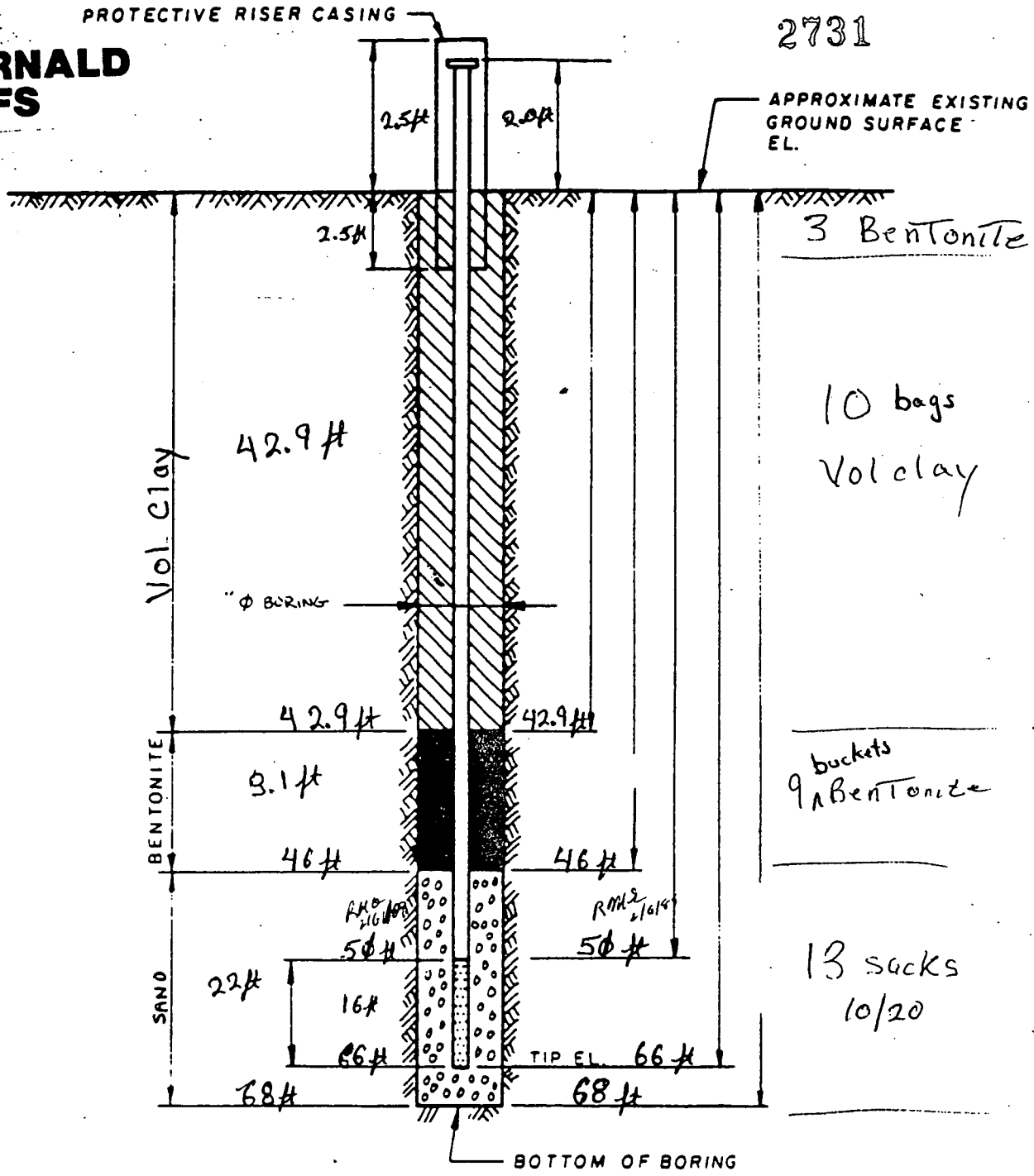
REMARKS Screen Interval is 16 ft Due to No 15 Ft screens left, a 10 ft and 5 ft were put Together Total length 16 ft.

w/DH/2-4-89

Monitoring Well # ~~2422~~ 2042 BB 1-5-89

2731

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.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 2042

PREPARED FOR
FMPC RI/FS

DRAWING NUMBER
CHECKED BY
APPROVED BY
DRAWN BY

REVIEWED BY QA DATE 8/2/89

WELL 1052

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS TASK 3.2		
BORING NUMBER: 152	COORDINATES:	DATE: 11/5 & 11/6/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/5 @ 1500	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 11/10/87	
DRILLING METHODS: Cable Tool		PAGE 1 OF 2	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5, 1, 1.5, 2'				SEE DETAILED SOIL DESCRIPTIONS ON WELL LOG FOR BOREHOLE 252			BEGAN WELL AT 1500 11/5/87
3'	ST 075602		16"	SHELBY TUBE	CL		SAMPLE DRIVEN AT 1700. 3'-4.4'
4							
5							End of Day 11/5/87 Start of Day 11/6/87
6							
7							
8							
9							
10							
11							
12	ST C7563		8½"	Shelby Tube			TAKEN @ 11/5 - 10/6/87
13							
14							
15							End of Day 11/6/87

NOTES: 1.) Drilling Contractor: Pennsylvania Drilling
Driller: Tim Harris
Helper: Craig Coulter
Rig #2
Type: 71 Speed Star

2.) Water Used (1-5 gal.)

3.) Background Readings for 11/5 & 11/6
α B = 60-140
γ = 0

59

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 152	COORDINATES:		DATE: 11/7/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 11/5 @ 1500
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 11/10/87
DRILLING METHODS: Cable Tool			PAGE 2 OF 2

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							Beginning of Day 11/10/87
16'							
17'							
18'							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30				BOB(*) = 30 Feet			End of Day 11/10/87

NOTES: 1.) Background Level 11/10/87 * BOB - BOTTOM OF BORING

Hmu = 0

γ = 0

$\alpha\beta$ = 40-140 cpm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1052	COORDINATES: NORTH 482,506.58 EAST 1,380,147.55	DATE: 11/05/87
GROUND ELEVATION: 584.8	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/05/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 11/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
3.0								
4.4	07562 11/05/87 1700			16	SHELBY TUBE. SEE DETAILED SOIL DESCRIPTIONS ON WELL LOG FOR BOREHOLE 252.	CL	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 60-140 cpm
12.0								
12.7	07563 11/06/87 1115				8 1/2.			Hnu= 0 ppm α = 0 cpm Bγ = 60-140 cpm

BOTTOM OF BORING 30

NOTES:
SHELBY TUBE. SEE DETAILED SOIL DESCRIPTIONS ON WELL LOG FOR BOREHOLE 252. TAKEN AT 1115 - 11-6-87

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. B DUNNING DATE 11/10/87
PROJECT NO. 602 CHECKED BY DATE
BORING NO. 152
PIEZOMETER NO. 152 DATE OF INSTALLATION 11/10/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED: Potable Water
FLUID H_2O FROM 0 TO 30'
FLUID NA FROM NA TO NA

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 30'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL (316)
DIAMETER OF PERFORATED SECTION 4" INCHES
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. 4 3/8 INCHES I.D. 4 IN.
LENGTH OF PIPE SECTIONS 10'
JOINING METHOD FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'
PROTECTIVE PIPE O.D. 10"

OTHER PROTECTION LOCKING CAP AND LOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	3A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	1.4			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 10'	TOP	BOTTOM
BENTONITE	TOP 10'	BOTTOM 15'	TOP	BOTTOM
SAND	TOP 15'	BOTTOM 30'	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 16.5	BOTTOM 26.5	TOP	BOTTOM
PIEZOMETER TIP	NA 28A (SUMP)			
BOTTOM OF BOREHOLE	30'			
GWL AFTER INSTALLATION	23.5			

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

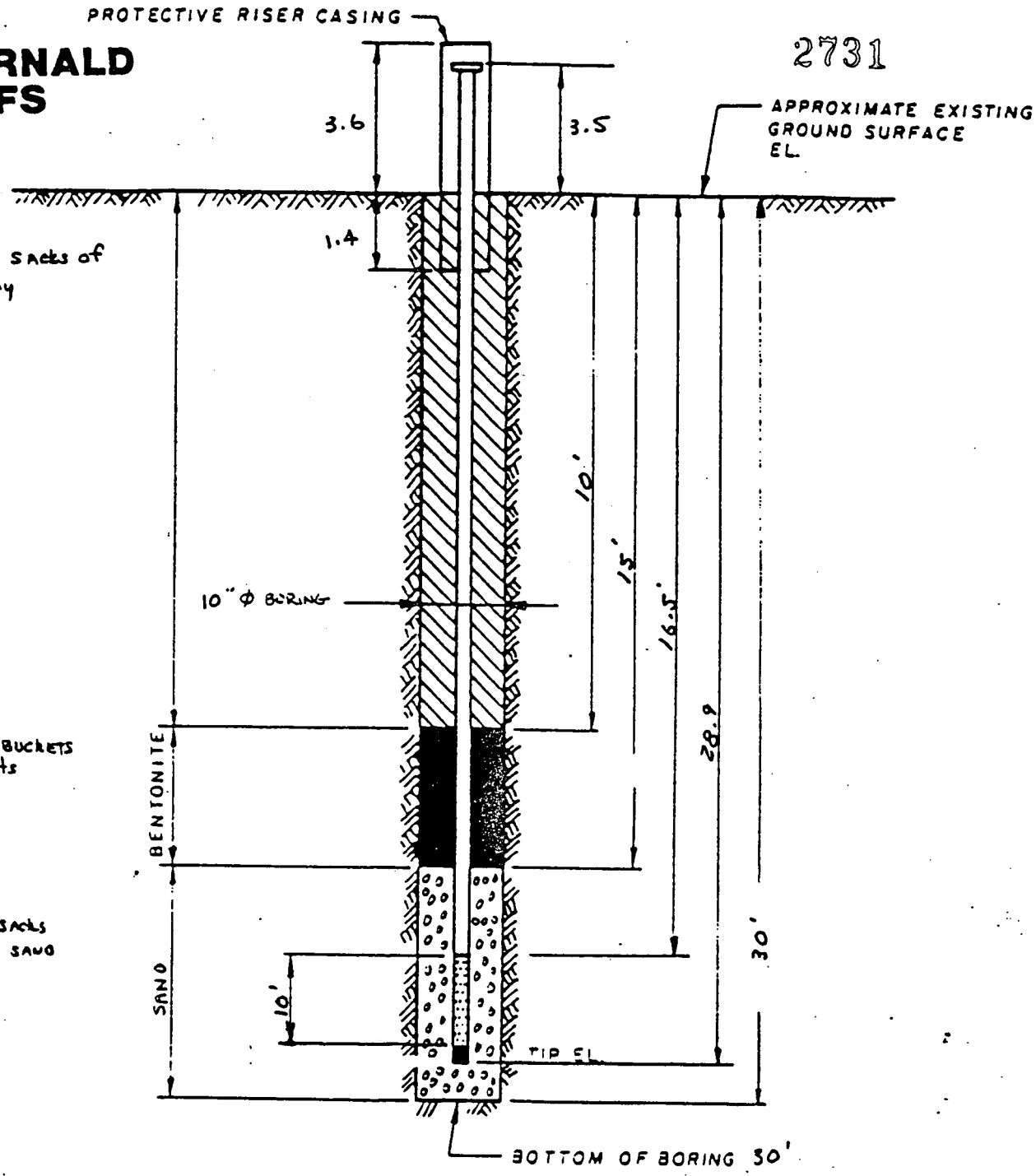
62

REMARKS

409-11-86

FERNALD RI/FS

2731



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

used 2 sacks of volclay

used 5 buckets of pellets

used 12 sacks of 10-20 sand

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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 152

PREPARED FOR

63

* According to drillers 25 Bag Sand
12 Bucket Pellets
13 Bags Volclay

possibly abandoned and redrilled? or 2 well total 152 + 21

WELL 1064

FERNALD RI/FS

RECEIVED 5/24/89

2731

	Initial	Date
Field Check	WAH	01/06/89
1st Key In		5/23/89
2nd Key In		5/23/89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1064	COORDINATES:	DATE: 12-07-88
ELEVATION: Approx. 588.30	GWL: Depth Date/Time	DATE STARTED: 12-05-88
ENGINEER/GEOLOGIST: L. ADAMS M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 12-07-88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (0.5 FT)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				* DETAILED SAMPLE DESCRIPTION OF INTERVAL 0.0 FT TO 31.0 FT IS AVAILABLE FROM VISUAL CLASSIFICATION OF SOILS LOG FOR BORING # 3064			
10							
20							
30				BOTTOM OF BORING = 31.0 FT.			WAH 01-06-89 Base of till in M.W. 3064 = 32.5 Ft

FILE

32.1.9.1.2

NOTES: CONTRACTOR: PENN DRILL
RIG: CYCLONE 42
DRILLER: JOE BARILE
ASSISTANT: SID SMITH

BACKGROUND LEVELS: HNU: 0 PPM
65
α: 0.2 CPM
β: 40 CPM
LEL O_2: 0 PPM LEL
20.6% O_2

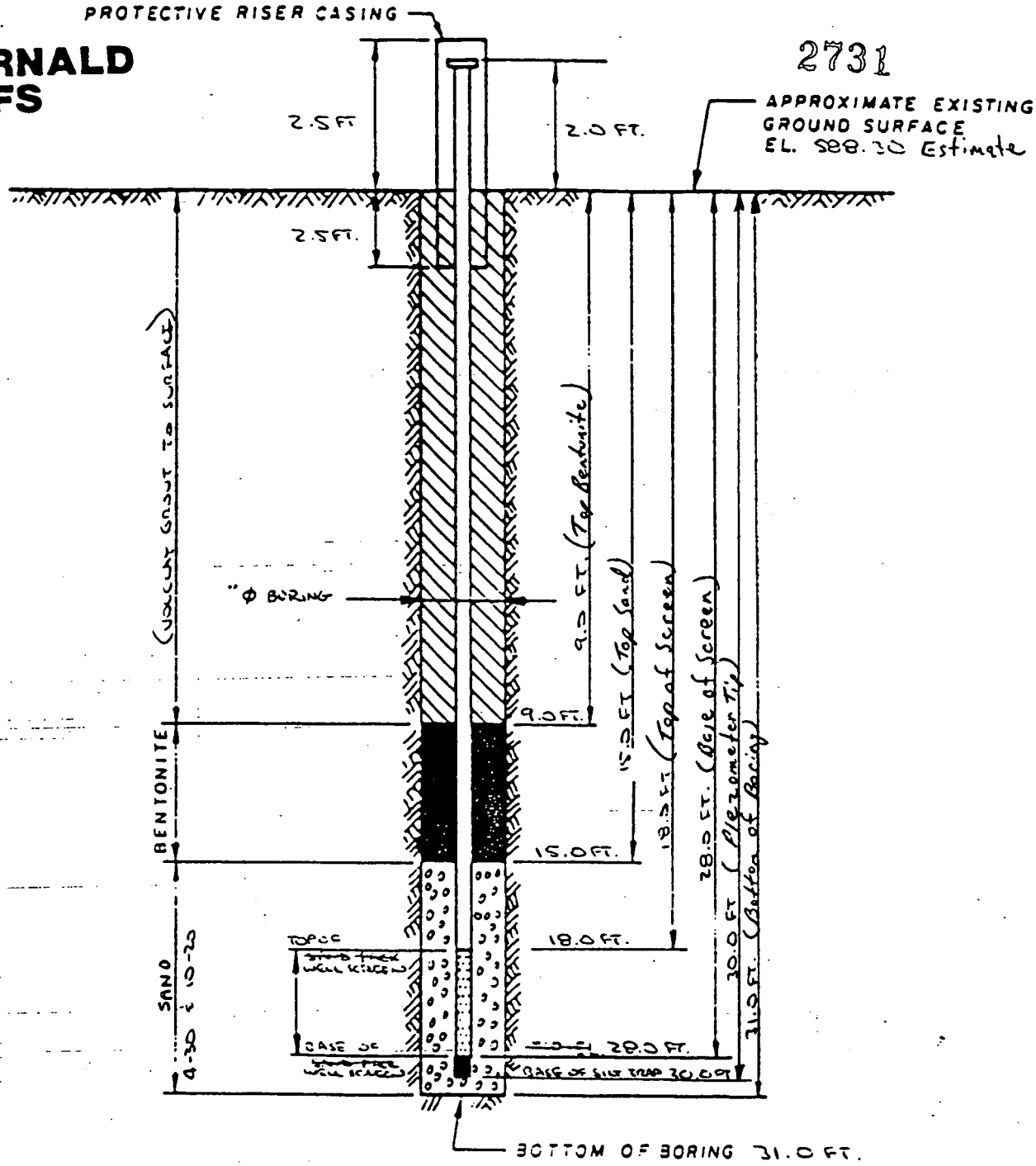
WATER USED DURING DRILLING ACTIVITIES: 175 GALLONS (INCLUDING WELL INSTALLATION ACTIVITIES)

402-11-86

BORING # 1064

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

MATERIALS USED DURING WELL INSTALLATION

2 -- 4-30 SAND (80LB SACKS)
9 - 10-20 SAND (80LB SACKS)
3 - VOLCLAY GROUT (40LB SACKS)
8 - BENTONITE (BUCKETS) PELLETS

WATER ADDED TO HOLE DURING DRILLING & WELL INSTALLATION ACTIVITIES: 175 GALLONS

INSTALLATION DETAILS
MONITORING WELL 1064

PREPARED FOR

66

DRAWING NUMBER	
WAM	
CHECKED BY	
APPROVED BY	
HLS	
DRAWN BY	

FERNALD RI/FS

2731

1/13/89 GMT 1/18/89 PAC

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. M. SLUSARSKI DATE 12-07-88
PROJECT NO. 602 3.2 CHECKED BY W.A. Herted DATE 01-06-89
BORING NO. 1064
PIEZOMETER NO. 1064 DATE OF INSTALLATION 12-07-88

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM 0.0 FT TO 31.0 FT	SIZE 10 3/4 IN OD FROM 0.0 FT. TO 30.0 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 10.0 FT. 2.0 FT
AVERAGE SIZE OF PERFORATIONS 0.010 IN	JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 10.0 FT.	THREAD

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.	OTHER PROTECTION LOCKING CAP
PROTECTIVE PIPE O.D. 10 3/4 IN.	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	-2.5 FT			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (VOLCLAY)	TOP 0.0	BOTTOM 9.0	TOP	BOTTOM
BENTONITE	TOP 9.0	BOTTOM 15.0	TOP	BOTTOM
SAND (10-20)	TOP 15.0	BOTTOM 28.0	TOP	BOTTOM
GRAVEL (4-30)	TOP 28.0	BOTTOM 31.0	TOP	BOTTOM
PERFORATED SECTION	TOP 18.0	BOTTOM 28.0	TOP	BOTTOM
PIEZOMETER TIP	30.0 FT			
BOTTOM OF BOREHOLE	31.0 FT			
GWL AFTER INSTALLATION				

67

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

REMARKS 1 (ONE) BUCKET OF BENTONITE PELLETS WAS POURED AROUND PROTECTIVE WELL COVER @ THE SURFACE TO SERVE AS PACKING MATERIAL & SURFACE SEAL

MONITORING WELL INSTALLATION RECORD
11/21/91

ROJECT NAME: Fernald RI/FS
ROJECT NO. : 602.3.2
ORING NO. : 1064
ELL NUMBER: 1064

FIELD ENG./GEO.: M. SLUSARSKI DATE: 12/07/88
CHECKED BY : W.A. HERTEL DATE: 01/06/89
N,E COORDINATES: 480718.78, 1382192.9
DATE OF INSTAL.: 12/07/88

2731

OLE DRILLING

ILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0.0TO: 31.0
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0.0 TO: 30.0
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.010 (In.)
TOTAL PERFORATED AREA: 10. Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10.0 Ft.
2ND PIPE SECTION: 2.0 Ft.
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH THREAD

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
* LOCKING CAP

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		589.92	
GROUND SURFACE	0.0		588.0	
BOTTOM OF PROTECTIVE PIPE	-2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0.0	9.0	N/A	N/A
Bentonite Pellets	9.0	15.0	N/A	N/A
Sand	15.0	28.0	N/A	N/A
Gravel	28.0	31.0	N/A	N/A
PERFORATED SECTION	18.0	28.0	N/A	N/A
WELL TIP	30.0		N/A	
BOTTOM OF BOREHOLE	31.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

AS THE WELL FLUSHED AFTER INSTALLATION? : No
AS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

EMARKS : 1 (ONE) BUCKET OF BENTONITE PELLETS WAS POURED AROUND PROTECTIVE WELL COVER AT THE SURFACE TO SERVE AS PACKING MATERIAL & SURFACE SEAL

OMMENTS:

WELL 1072

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FMPC RI/FS T 3.2		
BORING NUMBER 1072	COORDINATES	DATE 3-6-88	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 03/06/88	
ENGINEER/GEOLOGIST M Goldberg	Depth Date/Time	DATE COMPLETED 03/15/88	
DRILLING METHODS Cable Tool		PAGE 1 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	C 8 1 8	3 5 7	12"	Very STIFF light olive brown clay (2.5Y 5/4) DRY 1.5ft	2.5	CL	Hnu=0 α=0 βB=120 1035
2 3	C 8 1 8	3 6 6	14"	STIFF Dark grayish Brown clay (10YR 4/2) DRY 3 Ft	2.0	CL	Hnu=0 α=0 βB=100 1045
4	C 8 1 8	7 13 14	14"	STIFF yellowish Brown clay (10YR 5/6) DRY Trace sand & silt	1.5	ML	Hnu=0 α=0 βB=120 1050
6	C 9 1 9	14 34 43	18"	Very STIFF Yellowish Brown clay (10YR 5/6) Trace sand and silt 6 Ft	2.5	ML	Hnu=0 α=0 βB=120 1055
7	C 8 1 9 2	NA	12"	Shelby Tube 7 Ft	N/A	N/A	Hnu= α= βB= 1600
8 9	C 8 1 9 3	2 2 3 2	12"	STIFF Yellowish Brown clay (10YR 5/6) WET 9 Ft	2.0	CL	Hnu=0 α=0 βB=140 very plastic 1635
10	C 8 1 9 4	3 4 3	18"	Very SOFT yellowish Brown clay (10YR 5/4) WET 10.5 Ft	<1	CH	Hnu=0 α=0 βB=160 Very plastic 1640
11 12	C 8 1 9 5	13 16 23	18"	Very STIFF yellowish BROWN clay (10YR 5/8) DRY 12 Ft	2.5	CL	Hnu=0 α=0 βB=150 3/7/88 0850
13 14	C 8 1 9 6	20 23 26	18"	Very STIFF Reddish Brown clay (5YR 4/4) Trace gravel DRY 14 Ft	2.5	CL	Hnu=0 α=0 βB=150 0900
15	C 8 1 9 7	11 12 16	18"	STIFF gray clay (5Y 5/1) DRY Trace gravel	1.5	CL	Hnu=0 α=0 βB=130 0935

Drilling Contractor: Pennsylvania Drilling
Driller: Tim Harris
Helper: Craig Coulter

III Water used ≈ 400 gallons

II) Background measurements
a) Hnu = 0 b) α = 0 c) βB = 120 cpm

IV Samples via Muncell Color Chart

NA = not Applicable

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FMPC RI/FS T 3.2		
BORING NUMBER ~~1055~~ 1072	COORDINATES	DATE 3-7-88	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 3-6-88	
ENGINEER/GEOLOGIST M Goldberg	Depth Date/Time	DATE COMPLETED 3-15-88	
DRILLING METHODS Cable Tool		PAGE 2 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	08198	3 5 7	12"	STIFF gray clay (5Y 5/1) DRY trace gravel	1.5	CL	Hnu = 0 α = 0 δB = 130 0940
17	08199	6 7 9	12"	Medium STIFF gray clay (5Y 5/1) Dry trace gravel	1.0	CL	Hnu = 0 α = 0 δB = 120 0945
18 19	08200	2 6 6	18"	Soft gray clay (5Y 5/1) Dry Trace gravel	<1	CL	Hnu = 0 α = 0 δB = 140 1410
20	08201	6 7 12	18"	Soft gray clay (5Y 5/1) DRY Trace gravel	<1	CL	Hnu = 0 α = 0 δB = 140 1417
21 22	08202	NA	24"	SHELBY Tube	NA	NA	~~Hnu~~ = ~~α~~ = ~~δB~~ = ~~Hnu~~ = 1555
23 24	08203	3 8 6	12"	medium STIFF gray clay (5Y 5/1) DRY trace gravel	1.0	CL	α = 0 Hnu = 0 δB = 140 1635
25	08204	5 6 13	12"	Medium STIFF Dark gray clay (5Y 5/1) Dry trace gravel			Hnu = 0 α = 0 δB = 110 0830
26 27	08205	3 4 6	10"	STIFF Dark gray clay (5Y 5/1) DRY Trace gravel	1.5	CL	Hnu = 0 α = 0 δB = 100 0915
28	08206	4 6 18	16"	STIFF Dark gray clay (5Y 5/1) DRY Trace gravel.	1.5		Hnu = 0 α = 0 δB = 100 1020
29 30	08207	22 30 41	18"	Hard Dark gray clay (5Y 5/1) DRY Trace gravel. Blue gravel and clay STRINGERS	4.0	CL	Hnu = 0 α = 0 δB = 120 Bright Blue Traces of clay 1105

NOTES.

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FMPC RI/FS T 3.2		
BORING NUMBER 172 1072	COORDINATES	DATE 3-8-88	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 03/06/88	
ENGINEER/GEOLOGIST M. Goldberg	Depth Date/Time	DATE COMPLETED 3-15-88	
DRILLING METHODS Cable Tool		PAGE 3 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	08208	12 22 41	18"	Very Stiff Dark olive grey clay (5Y 3/2) Abundant Gravel. DRY.	3.5	CL	Hnu=0 α=0 γB=100 1425
32	09209	12 22 38	18"	Very Stiff Yellowish Brown silty clay (10YR 6/6) DRY 32.5	2.5	CL	Hnu=0 α=0 γB=100 1600
33				Dense Yellowish Brown sand (10YR 6/6) - dry 32.5	<1	SW	
34							
35							
36							
37							
38	10210	17 31 37	18"	Very Dense Yellowish Brown sand (10YR 6/6) DRY	<1	SW	Hnu=0 α=0 γB=140 03/09/88 0930
39							
40							
41							
42							
43	11211	26 28 34	18"	Very Dense Yellowish Brown sand (10YR 6/6) DRY. Trace gravel	<1	SW	Hnu=0 α=0 γB=160 1035
44							
45							

NOTES.

FERNALD
RI/FS

2-4

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FMPC RI/FS T3.2		
BORING NUMBER: 102	COORDINATES:	DATE 3-8-88	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 03/06/88	
ENGINEER/GEOLOGIST M Goldberg	Depth Date/Time	DATE COMPLETED 3-15-88	
DRILLING METHODS Cable Tool		PAGE 4 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
46							
47							
48							
49	8 2 1/2	10 28 50 30	20"	Very Dense yellowish Brown sand (10YR 6/6) DRY trace gravel	SW		Hnu = 0 ∝ = 0 δB = 140cpm 1115
50				Bottom of Boring 50 FT			

NOTES

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1072	COORDINATES: NORTH 481,025.93 EAST 1,378,476.33	DATE: 03/06/88
GROUND ELEVATION: 575.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/06/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/15/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 3

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08188	03/06/88	1035	3 5 7	12	VERY STIFF LIGHT OLIVE BROWN CLAY (2.5Y, 5/4) DRY.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
3.0	08189	03/06/88	1045	3 6 6	14	STIFF DARK GRAYISH BROWN CLAY (10YR, 4/2) DRY.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
4.5	08190	03/06/88	1050	7 13 14	14	STIFF YELLOWISH BROWN CLAY (10YR, 5/6) DRY, TRACE SAND AND SILT.	ML	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
6.0	08191	03/06/88	1055	14 34 43	18	VERY STIFF YELLOWISH BROWN CLAY (10YR, 5/6), TRACE SAND AND SILT.	ML	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
7.0	08192	03/06/88	1600		12	SHELBY TUBE.			
9.0	08193	03/06/88	1635	2 3 2	12	STIFF YELLOWISH BROWN CLAY (10YR, 5/6) WET.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 140 cpm
10.5	08194	03/06/88	1640	3 4 3	18	VERY SOFT YELLOWISH BROWN CLAY (10YR, 5/4) WET.	CH	<1	Hnu= 0 ppm α = 0 cpm βΓ = 160 cpm
12.0	08195	03/07/88	0850	13 16 23	18	VERY STIFF YELLOWISH BROWN CLAY (10YR, 5/8) DRY.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 150 cpm
13.5	08196	03/07/88	0900	20 23 26	18	VERY STIFF REDDISH BROWN CLAY (5YR, 4/4), TRACE GRAVEL, DRY.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 150 cpm
15.0	08197	03/07/88	0935	11 12 16	18	VERY STIFF REDDISH BROWN CLAY (5YR, 4/4), TRACE GRAVEL, DRY. STIFF GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL CL	2.5 1.5	Hnu= 0 ppm α = 0 cpm βΓ = 130 cpm

NOTES:
SAMPLES VIA MUNSELL COLOR CHART

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1072	COORDINATES: NORTH 481,025.93 EAST 1,378,476.33	DATE: 03/06/88
GROUND ELEVATION: 575.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/06/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/15/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 3

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08198	03/07/88	0940	3 5 7	12	STIFF GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 130 cpm
18.0	08199	03/07/88	0945	6 7 9	18	MEDIUM STIFF GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 120 cpm
19.5	08200	03/07/88	1410	2 6 6	18	SOFT GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm Bγ = 140 cpm
21.0	08201	03/07/88	1417	6 7 12	18	SOFT GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	<1	Hnu= 0 ppm α = 0 cpm Bγ = 140 cpm
23.0	08202	03/07/88	1555		24	SHELBY TUBE.			
24.0	08203	03/07/88	1635	3 6	12	MEDIUM STIFF GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 140 cpm
25.5	08204	03/08/88	0850	5 6 13	12	MEDIUM STIFF DARK GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.			Hnu= 0 ppm α = 0 cpm Bγ = 110 cpm
27.0	08205	03/08/88	0915	3 4 6	10	STIFF DARK GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
28.5	08206	03/08/88	1020	4 6 18	16	STIFF DARK GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL.		1.5	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
30.0	08207	03/08/88	1105	22 30 41	18	HARD DARK GRAY CLAY (5Y, 5/1) DRY, TRACE GRAVEL. BLUE GRAVEL AND CLAY STRINGERS.	CL	4.0	Hnu= 0 ppm α = 0 cpm Bγ = 120 cpm

NOTES:
BRIGHT BLUE TRACES OF CLAY. SAMPLES VIA MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

2731

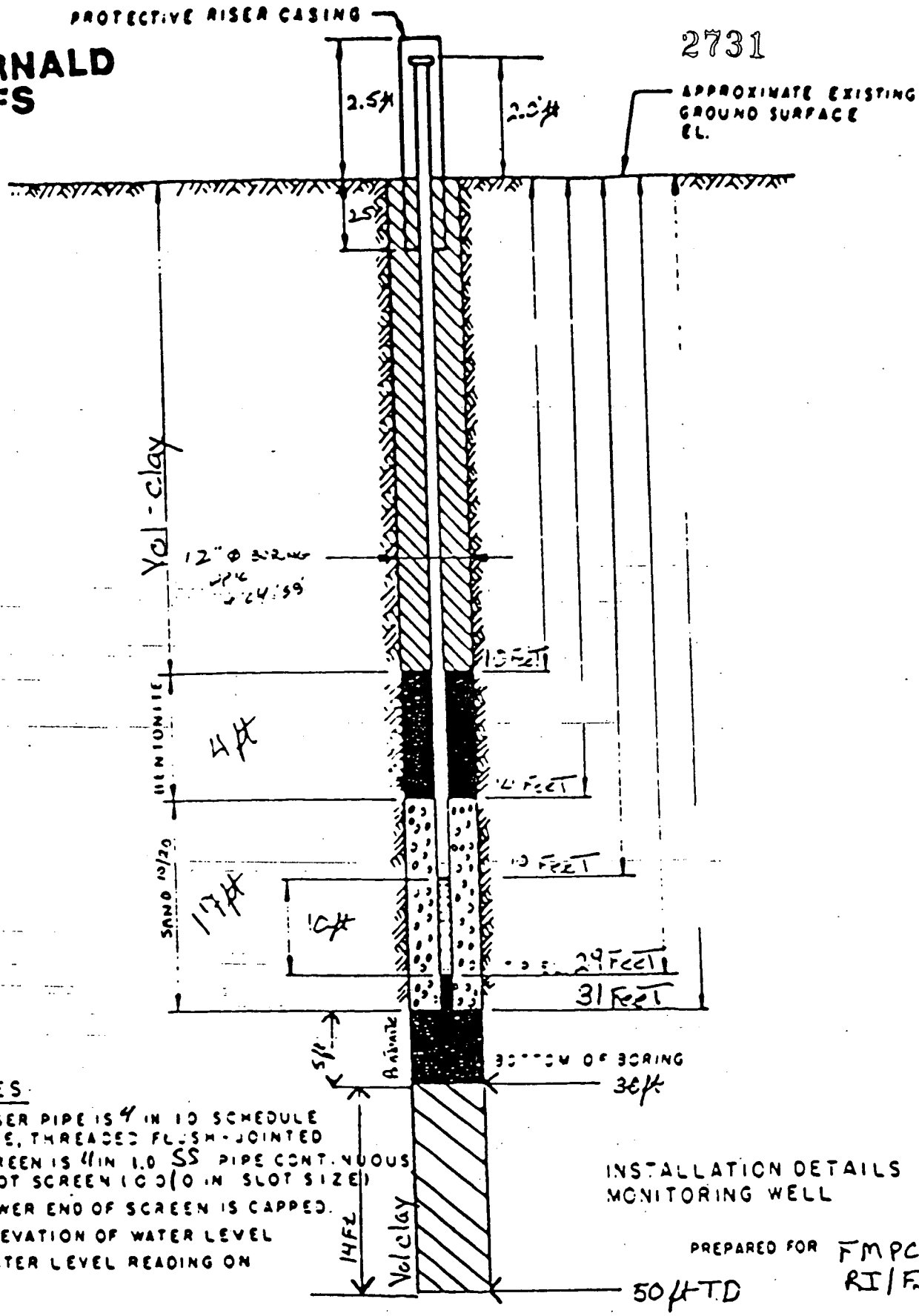
PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1072	COORDINATES: NORTH 481,025.93 EAST 1,378,476.33	DATE: 03/06/88
GROUND ELEVATION: 575.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/06/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/15/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 3

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY IN INCHES		USCS SYMBOL	TSF	REMARKS
31.5	08208	03/08/88 1425	12 22 41	18	VERY STIFF DARK OLIVE GREY CLAY (5Y, 3/2), ABUNDANT GRAVEL, DRY.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
33.0	08209	03/08/88 1600	12 22 38	18	VERY STIFF DARK OLIVE GREY CLAY (5Y, 3/2), ABUNDANT GRAVEL, DRY. VERY STIFF YELLOWISH BROWN SILTY CLAY (10YR, 6/8), DRY. DENSE YELLOWISH BROWN SAND (10YR, 6/6), DRY.	CL CL SW	3.5 2.5 <1	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
38.0								
39.5	08210	03/09/88 0930	17 31 37	18	VERY DENSE YELLOWISH BROWN SAND (10YR, 6/6), DRY.	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 140 cpm
43.0								
44.5	08211	03/09/88 1035	26 28 34	18	VERY DENSE YELLOWISH BROWN SAND (10YR, 6/6), DRY, TRACE GRAVEL	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 160 cpm
48.0								
50.0	08212	03/09/88 1115	10 28 50	20	VERY DENSE YELLOWISH BROWN SAND (10YR, 6/6), DRY, TRACE GRAVEL	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 140 cpm

BOTTOM OF BORING 31

NOTES:
SAMPLES VIA MUNSELL COLOR CHART.

FERNALD RI/FS



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

INSTALLATION DETAILS MONITORING WELL

PREPARED FOR FMPC RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

FERNALD
RI/FS

2-4-89

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO M. Goldberg DATE 03/15/88
PROJECT NO. 602 CHECKED BY R. Carbrink DATE 4/7/88
BORING NO. 172 1172 88-59
PIEZOMETER NO. N/A 1172 DATE OF INSTALLATION 03/15/88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Flat Head
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 3 TO 50 ft	SIZE 10" FROM 3 ft TO 50 ft
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4" inches
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 Ft
AVERAGE SIZE OF PERFORATIONS .010" inches	JOINING METHOD Thread ~~and couple~~
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 Feet	Flush Jointed Rubber

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft	OTHER PROTECTION Lockable cap
PROTECTIVE PIPE O.D. 10" inches	

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:				
GROUT/SLURRY	TOP 0	BOTTOM 10 Ft	TOP	BOTTOM
BENTONITE	TOP 10 Ft	BOTTOM 14 ft	TOP	BOTTOM
~~SAND~~	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP 14 Ft	BOTTOM 31 Ft	TOP	BOTTOM
PERFORATED SECTION	TOP 19 Ft	BOTTOM 29 Ft	TOP	BOTTOM
PIEZOMETER TIP	31 ft			
BOTTOM OF BOREHOLE	31 ft			
GWL AFTER INSTALLATION	N/A			

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

78

REMARKS Well 172 was overdrilled to 50 ft to determine Lithology. A Volclay pkg was set from 50 ft → 36 ft with a 5 Ft Bentonite Plug from 36 ft → 31 ft to seal Till/sand contact @ 33 Ft.

WELL 1079

RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

BKG #2

PROJECT NUMBER 602	PROJECT NAME FERNALD RI/FS		
BORING NUMBER 125	COORDINATES		DATE 10.19.87
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10.19.87
ENGINEER/GEOLOGIST D. OATLEY	Depth	Date/Time	DATE COMPLETED 10.20.87
DRILLING METHODS CABLE TOOL			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.5	7369	5 13 17	13	HARD, VERY PALE BROWN CLAY, TRACE SILT AND SAND-DRY	ML CL	4.5+	MUNSELL 10YR 5/4 MUNSELL 10YR 7/4 SAMPLE SCANNED AT BACKGROUND
2.0	7370	26 24 33	18	HARD, LIGHT YELLOWISH BROWN CLAY AND SILT, TRACE SAND-DRY	CL ML	4.5+	MUNSELL 10YR 6/4 SAMPLE SCANNED-AT BACKGROUND
4.5	7371	50 25	4	HARD, LIGHT YELLOWISH BROWN CLAY, SOME SILT AND SAND, TRACE GRAVEL-DRY	CL	4.5+	MUNSELL 10YR 6/4 SAMPLE SCANNED-AT BACKGROUND
6.0	7372	8 11 13	14	MEDIUM STIFF BROWN SILT, TRACE CLAY AND SAND - DRY	ML	4.5+	MUNSELL 5Y 6/1 SAMPLE SCANNED-AT BACKGROUND
				MEDIUM STIFF LIGHT YELLOWISH BROWN CLAY, TRACE SILT, GRAVEL, AND SAND-DRY	CL	3.5	MUNSELL 10YR 6/4
2.5	7373	8 8 8	12	MEDIUM STIFF BROWN SILT, TRACE CLAY AND SAND - DRY	ML	NK	1ST SPOON EMPTY SAMPLE SCANNED-AT BACKGROUND
5.0	7374	6 8 13	14	MEDIUM STIFF BROWN SILT, SOME CLAY, TRACE SAND - DRY	ML	2.0	SAMPLE SCANNED-AT BACKGROUND
				MEDIUM STIFF, OLIVE CLAY, SOME SILT DRY	CL		MUNSELL 5/3
10.5	7375	5 6 8	16	STIFF YELLOWISH RED CLAY, TRACE SILT, 8-DRY WOOD FRAGMENTS	CL	1.25	MUNSELL 5YR 5/6 SAMPLE SCANNED-AT BACKGROUND. MUNSELL 5Y 5/1
				STIFF BROWN SILT, SOME CLAY - MOIST	ML	.1	MUNSELL 10YR 6/4
				MEDIUM YELLOWISH BROWN SILT, TRACE BROWN CLAY	ML	.1	
12.0	7376	5 6 8	18	STIFF REDDISH YELLOW CLAY - TRACE SILT AND SAND - DRY	CL	1.75	MUNSELL 7.5YR 6/8 SAMPLE SCANNED-AT BACKGROUND.
				SOFT CLAY SOME SILT TRACE SAND - DRY	CL		MUNSELL 5Y 5/1
13.5	7377	2 10 12	10	OLIVE GRAY SILT, TRACE GRAVEL AND SAND - MOIST	ML		MUNSELL 5Y 5/2
				MEDIUM DENSE OLIVE YELLOW SAND, SOME GRAVEL, SOME CLAY, TRACE SILT	SC	.2	MUNSELL 2.5Y 5/4 SAMPLE SCANNED-AT BACKGROUND.
15.0	7378	8 10 15	12	DARK OLIVE CLAY, TRACE SILT, GRAVEL, SAND MOIST	CL	-	MUNSELL 5Y 6/3 SAMPLE SCANNED-AT BACKGROUND
				VERY STIFF LIGHT YELLOWISH BROWN GRAVEL, SOME CLAY TRACE SILT AND SAND MOIST	GC	-	
				LIGHT OLIVE BROWN CLAY SOME SILT TRACE SILT, MOIST	CH	.	

NOTES

216 - CYCLONE 42
DRILLER - HARRY DYKES JR
ASSISTANT - JOE BARILE
JOHN VARIONE
WATER ADDED TO HOLE - TOTAL = 5 GALLONS

BACKGROUND
HNU - ZERO
LEL - ZERO
ALPHA - ZERO
BETA/GAMMA - 40 COUNTS/MIN

80

602-11-4

RI/FS 2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FERNALD RI/FS		
BORING NUMBER 1079	COORDINATES		DATE 10.19.87
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10.19.87
ENGINEER/GEOLOGIST D. OAHLEY	Depth	Date/Time	DATE COMPLETED 10.20.87
DRILLING METHODS CABLE TOOL			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16.5	7379	10 16 27	12	15.5 GRAY CLAY, SOME SILT ~~GRAVEL~~, TRACE SAND / HARD, GRAY CLAY, SOME GRAVEL, TRACE SILT AND SAND, MOIST	CL / CL	1.25	MUNSELL 5Y 5/1 / MUNSELL 2.5Y N/6 SAMPLE SAVED AT BACKLAND 7810-3
18.0	7381 / 7380	2 1 13	10	VERY STIFF, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST	CH	.25	ST 7 SQ FULL SIZE. MUNSELL 2.5Y 6/2
19.5	7382	2 6 10	5	VERY STIFF, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST	CL	2.0	MUNSELL 2.5Y 6/2
21.0	7383	10 12 20	13	HARD, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - WET	CL	1.25	MUNSELL 2.5Y 6/2
22.5	7384	8 5 10	3	STIFF LIGHT YELLOWISH BROWN CLAY SOME GRAVEL, TRACE SILT AND SAND - WET	CH		1ST BARREL EMPTY MUNSELL 2.5Y 6/2
24.0	7385	4 6 9	15	STIFF, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - WET	CH	1.25	MUNSELL 2.5Y 6/2 LESS WATER THAN PREV. SAMPLES.
25.5	7386	4 6 15	10	STIFF, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CH	1.25	MUNSELL 2.5Y 6/2
27.0	7387	5 20 48	13	STIFF LIGHT YELLOWISH BROWN CLAY, WET / LIGHT GRAVEL, TRACE SAND AND SILT / VERY DENSE, GRAY GRAVEL SOME SAND, TRACE CLAY AND SILT - MOIST	CH / GC	1.0	MUNSELL 2.5Y 6/2 / MUNSELL 2.5Y N5/1
28.5	7388	34 20 29	15	DENSE, LIGHT YELLOWISH BROWN WET GRAVEL, SOME SAND, TRACE CLAY / HARD, LIGHT YELLOWISH BROWN CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST	GC / CL	4.5	MUNSELL 2.5Y 6/2
30.0	7389	10 17 35	15	HARD, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL AND SILT, TRACE SAND - MOIST	CL	4.5	MUNSELL 2.5Y 6/2

NOTES: WATER ADDED TO HOLE - TILL = SWALLOWS

~~HH HHT~~ 1

RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FERNALD RI/FS		
BORING NUMBER 1079	COORDINATES		DATE 10.20.87
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10.19.87
ENGINEER/GEOLOGIST D OATLEY	Depth	Date/Time	DATE COMPLETED 10.20.87
DRILLING METHODS CABLE TOOL			PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				[illegible]	CL		MUNSELL 5Y 6/2
32.5	7390	12 22 32	17	HARD OLIVE CLAY, SOME GRAVEL AND SILT, TRACE SAND - DRY.	CL	4.5	MUNSELL 5Y 5/3
				32.0 OLIVE CLAY, SOME GRAVEL AND SILT AND SAND DRY			MUNSELL 5Y 5/3
33.0	7391	11 SOFT	12	HARD LIGHT BROWNISH GRAY SILT, SOME SAND [illegible], - DRY MOIST	ML	2.0	MUNSELL 2.5Y 6/2
34.5	7392	20 28 30	18	HARD LIGHT BROWNISH GRAY SILT, SOME SAND, TRACE GRAVEL - DRY MOIST 34.1	ML	2.5	MUNSELL 2.5Y 6/2
				HARD OLIVE CLAY, SOME FINE GRAVEL, TRACE SILT AND SAND	CL	4.5	MUNSELL 5Y 5/3
36.0	7393	9 17 27	18	HARD OLIVE CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST	CL	4.25	MUNSELL 5Y 5/3
37.5	7394	9 10 13	13	VERY STIFF, OLIVE SILT, TRACE CLAY - WET 37.5	ML	1.25	LAMINATION DOUBLE SLAKED SILT MUNSELL 5Y 5/3
				OLIVE SILT, SOME CLAY - WET 37.9 OLIVE BROWN SILTY CLAY, TRACE SAND - WET	ML		MUNSELL 5Y 5/3
39.0	7395	0 18 30	15	HARD BROWNISH YELLOW SILT, SOME CLAY - MOIST 38.3	ML	3.5	MUNSELL 10YR 6/8
				DENSE YELLOWISH BROWN SAND, TRACE SILT	SW	1.5	MUNSELL 10YR 5/6
				TD 39.0 FT.			

NOTES

82

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1079	COORDINATES: NORTH 482,273.70 EAST 1,378,165.47	DATE: 10/19/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/19/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 10/21/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 3

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07369	10/19/87 1035	5 13 17	13	YELLOWISH BROWN SILT, TRACE SAND AND CLAY AND GRAVEL - DRY. HARD, VERY PALE BROWN CLAY, SILT, TRACE SAND - DRY.	ML CL	4.5+ 4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
3.0	07370	10/19/87 1045	26 24 33	18	HARD, LIGHT YELLOWISH BROWN CLAY AND SILT, TRACE SAND - DRY.	CL	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
4.5	07371	10/19/87 1050	50	4	HARD, LIGHT YELLOWISH BROWN CLAY, SOME SILT AND GRAVEL, TRACE SAND, DRY.	CL	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
6.0	07372	10/19/87 1520	8 11 13	14	MEDIUM STIFF GRAY SILT, TRACE CLAY AND SAND - DRY. MEDIUM STIFF LIGHT YELLOWISH BROWN CLAY, TRACE SILT, GRAVEL, AND SAND - DRY.	ML CL	4.5+ 3.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
7.5	07373	10/19/87 1600	6 8 15	12	GRAY GRAVEL AND SILT, TRACE SAND AND CLAY. MEDIUM STIFF GRAY SILT, TRACE CLAY AND SAND - DRY.	GM ML	3.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
9.0	07374	10/19/87 1615	6 8 13	14	MEDIUM STIFF GRAY SILT, SOME CLAY, TRACE GRAVEL AND SAND - DRY MEDIUM STIFF OLIVE CLAY, SOME SILT - DRY.	ML CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
10.5	07375	10/19/87 1645	5 6 8	16	STIFF YELLOWISH RED CLAY, TRACE SILT, DRY WOOD FRAGMENTS. STIFF GRAY SILT, SOME CLAY - MOIST. LIGHT YELLOWISH BROWN SILT, TRACE SAND AND CLAY.	CL ML ML	1.25 .1 .1	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
12.0	07376	10/19/87 1700	5 6 8	18	LIGHT YELLOWISH BROWN SILT, TRACE SAND AND CLAY. STIFF REDDISH YELLOW CLAY - TRACE SILT AND SAND - DRY. GRAY CLAY, SOME SILT, TRACE SAND - DRY.	ML CL CL	.1 1.75	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
13.5	07377	10/19/87 1730	2 10 18	10	OLIVE GRAY SILT, TRACE GRAVEL AND SAND - MOIST. MEDIUM DENSE, OLIVE YELLOW SAND, SOME GRAVEL, SOME CLAY, TRACE SILT.	ML SC	N/A .2	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
15.0	07378	10/19/87 1800	8 10 15	12	PALE OLIVE CLAY, TRACE SILT, GRAVEL, SAND - MOIST. VERY STIFF, LIGHT YELLOWISH BROWN GRAVEL, SOME CLAY, TRACE SILT AND SAND - MOIST. LIGHT OLIVE BROWN CLAY, SOME SILT, TRACE SILT - MOIST.	CL GC CH	N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm

NOTES:
MUNSELL 5Y 6/3, SAMPLE SCANNED AT BACKGROUND.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1079	COORDINATES: NORTH 482,273.70 EAST 1,378,165.47	DATE: 10/19/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/19/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 10/21/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 3

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07379	10/19/87 1830	10 16 27	12	GRAY CLAY, SOME GRAVEL, TRACE SAND AND SILT, DRY. HARD, GRAY CLAY, SOME GRAVEL, TRACE SILT AND SAND, MOIST.	CL CL	1.25 1.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
18.0	07381	10/20/87 0940	2 7 13	18	VERY STIFF, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST.	CH	.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
18.5	07380	10/20/87 0915			SHELBY TUBE.	CH	.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
19.5	07382	10/20/87 1010	2 6 10	5	VERY STIFF, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
21.0	07383	10/20/87 1030	10 12 20	13	HARD, LIGHT GRAYISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - WET.	CL	1.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
22.5	07384	10/20/87 1045	8 5 10	3	STIFF LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SILT AND SAND - WET.	CH	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
24.0	07385	10/20/87 1115	4 6 9	15	STIFF, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - WET.	CH	1.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
25.5	07386	10/20/87 1320	4 6 15	10	STIFF, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CH	1.25	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
27.0	07387	10/20/87 1335	5 20 48	13	STIFF, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - WET. VERY DENSE, GRAY GRAVEL, SOME SAND, TRACE CLAY AND SILT - MOIST.	CH GC	1.0 N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
28.5	07388	10/20/87 1400	39 20 29	15	DENSE, LIGHT YELLOWISH BROWN GRAVE, SOME SAND, TRACE CLAY - WET. HARD, LIGHT YELLOWISH BROWN CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST.	GC CL	N/A 4.5	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
30.0	07389	10/20/87 1520	10 17 35	15	HARD, LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL AND SILT, TRACE SAND - MOIST.	CL	4.5	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm

NOTES:
MUNSELL 2.5Y 6/2

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1079	COORDINATES: NORTH 482,273.70 EAST 1,378,165.47	DATE: 10/19/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/19/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 10/21/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 3

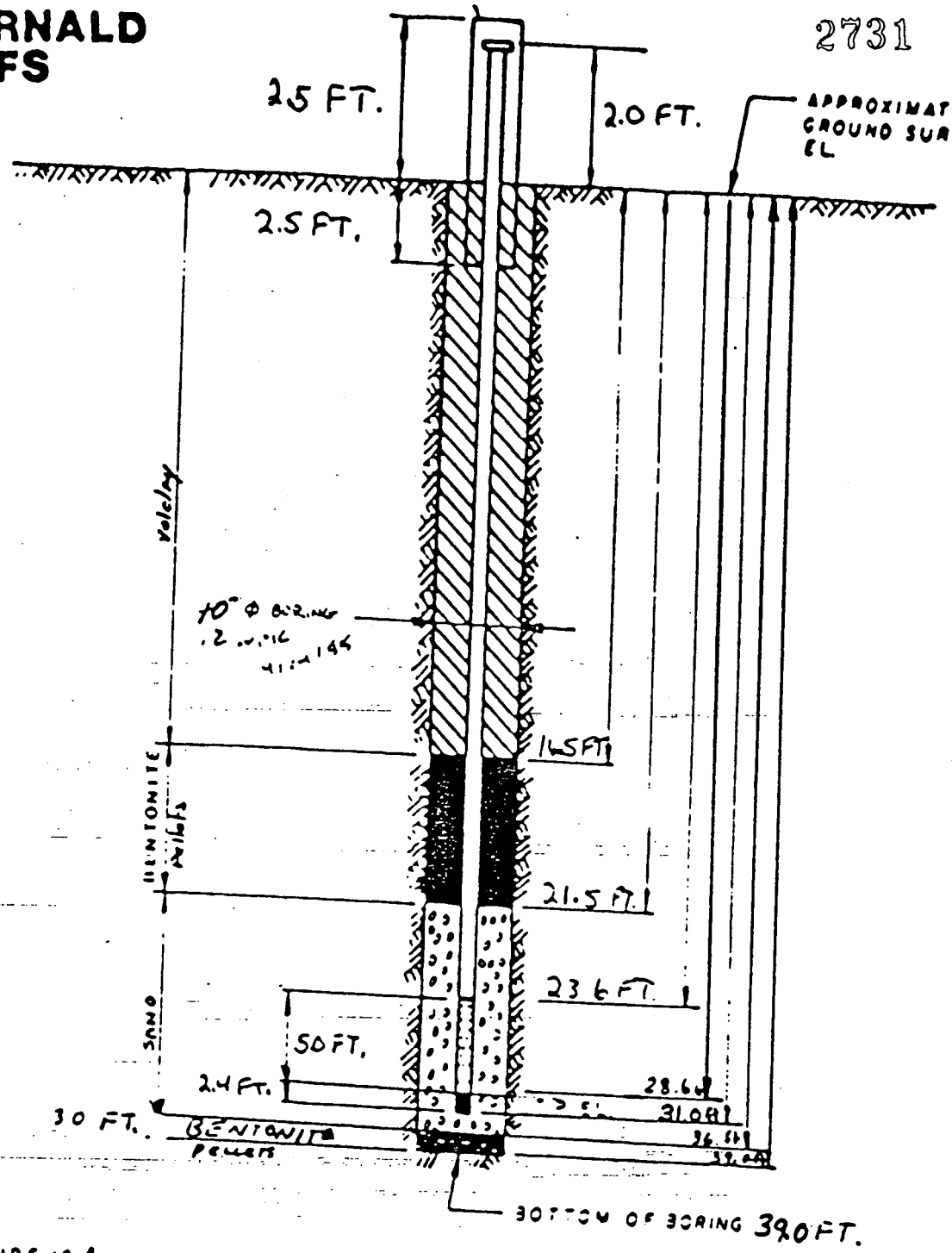
DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07390	10/20/87	1530	12 22 32	17	LIGHT YELLOWISH BROWN CLAY, SOME GRAVEL, TRACE SAND AND SILT - DRY. HARD OLIVE CLAY, SOME GRAVEL, AND SILT, TRACE SAND - DRY.	CL CL	4.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
33.0	07391	10/20/87	1600	11 50	12	OLIVE CLAY, SOME GRAVEL, TRACE SILT AND SAND - DRY. HARD, LIGHT BROWNISH GRAY SILT, SOME SAND - MOIST.	CL ML	4.5 2.0	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
34.5	07392	10/20/87	1615	20 28 30	18	HARD LIGHT BROWNISH GRAY SILT, SOME SAND, TRACE GRAVEL - MOIST HARD OLIVE CLAY, SOME FINE GRAVEL, TRACE SILT AND SAND.	ML CL	2.5 4.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
36.0	07393	10/20/87	1645	9 17 27	18	HARD OLIVE CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST.	CL	4.25	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
37.5	07394	10/20/87	1700	9 10 13	13	VERY STIFF, OLIVE SILT, TRACE CLAY - WET. OLIVE SILT, SOME CLAY - WET.	ML ML	1.25 1.25	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
39.0	07395	10/20/87	1810	8 18 30	15	OLIVE SILT, SOME CLAY, TRACE SAND - WET. HARD BROWNISH YELLOW SILT, SOME CLAY - MOIST. DENSE YELLOWISH BROWN SAND, TRACE SILT.	ML ML SW	1.25 3.5 1.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm

BOTTOM OF BORING 39.0

NOTES:
MUNSELL 5Y 5/3, MUNSELL 10YR 6/8, MUNSELL 10YR 5/6

FERNALD RI/FS

2731



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

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

While out corrections were made by D. Oakley at the time this form was completed.

INSTALLATION DETAILS
MONITORING WELL ~~174~~ 1C74 C8

PREPARED FOR

86

RI/FS

PIEZOMETER INSTALLATION SHEET

2731

PROJECT NAME FERNALD FIELD ENG./GEO. D. OAKLEY DATE 10. 21. 87
PROJECT NO. 602 CHECKED BY R Colburn DATE 3/7 '88
BORING NO. 1079
PIEZOMETER NO. NA 1079 DATE OF INSTALLATION 10.21.87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT FLATHEAD HAMMER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM 1 TO 26 FT.	SIZE 10 IN FROM 0 TO 35 FT.
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING 316 STAINLESS	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4 IN	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 IN I.D. 4 IN
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 FT.
AVERAGE SIZE OF PERFORATIONS .010 INCH	JOINING METHOD THREAD AND COUPLE
TOTAL ~~PERFORATED~~ SCREEN LENGTH AREA 5 FT.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.	OTHER PROTECTION LOCKABLE CAP
PROTECTIVE PIPE ~~Ø~~ D 10 INCH	AND LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT.			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 16.5 FT.	TOP	BOTTOM
BENTONITE	TOP 16.5 FT	BOTTOM 21.5 FT.	TOP	BOTTOM
SAND	TOP 21.5 FT	BOTTOM 36.0 FT.	TOP	BOTTOM
~~NO GRAVEL USED~~ BENTONITE	TOP 36.0	BOTTOM 39.0	TOP	BOTTOM
PERFORATED SECTION	TOP 23.6 FT.	BOTTOM 28.6 FT.	TOP	BOTTOM
PIEZOMETER TIP	31.0			
BOTTOM OF BOREHOLE	39.0 FT.			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS While corrections were made by D. Oakley at the time this form was completed 87

WELL 1080

RI/FS

2731

KKP 2/4/87

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 60232	PROJECT NAME FERNALD RI/FS	
BORING NUMBER: HSO 1:5" 10.5"	COORDINATES:	DATE 4/26/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/26/88
ENGINEER/GEOLOGIST DAVIES	Depth Date/Time	DATE COMPLETED 4/27/88
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	08780	3 7 5	6	A Dark Very Pale Brown (10YR 8/4) Gravelly Sand. Fill Dry			ℓ: 0918 Hm: 0ppm α: 2cpm γ/β: 40cpm
2.5	08781	4 5 6	4	Very St H, Dark Yellowish Brown (10YR 4/4) Clay, some silt, Moist.	CL		ℓ: 0924 Hm: 0ppm α: 2cpm γ/β: 40cpm Pebble blocks spoon
	08782	5 9 11	12	Very St H, Dark Brown (10YR 3/3) Silty Clay, trace sand, trace gravel, Moist	CL	3.7	ℓ: 0928 Hm: 0ppm α: 2cpm γ/β: 40cpm
5.0	08783	8 10 14	13	Very St H, Dark Yellowish Brown (10YR 4/4) w/ L gray mottled Silty Clay, trace gravel trace sand Moist.	CL	2.7	ℓ: 0933 Hm: 0ppm α: 2cpm γ/β: 40cpm
	08784	14 17 19	13	Very St H, Very Dark Brown (10YR 2/2) Silty Clay, trace gravel, trace sand Moist	CL	3.3	ℓ: 0940 Hm: 0ppm α: 2cpm γ/β: 40cpm
7.5	08785	5 11 15	14	Very St H Dark Gray (2.5Y 4/1) Clay, some silt, trace gravel trace sand Moist	CL	3.5	ℓ: 1145 Hm: 0ppm α: 2cpm γ/β: 40cpm
10.0	08786	2 10 17	12	Very St H, Very Dark Gray (2.5Y 3/0) Clay, some silt, trace sand, Moist	CL	2.8	ℓ: 1142 Hm: 0ppm α: 2cpm γ/β: 55cpm
	ST 08787	NA	12				ℓ: 1327 Pushed Shelby 1.5 ft 1.0 ft recovery
12.5	08788	10 24 32	18	Hard Yellowish Brown (10YR 5/6) Silty Clay, trace sand and gravel, Moist	CL	4.1	ℓ: 1339 Hm: 0ppm α: 2cpm γ/β: 40cpm
15.0	08789	4 14 25	9	Very St H, Brownish Yellow (10YR 6/8) Silty Clay, trace sand and gravel ~~Moist~~ Dry	CL	2.5	ℓ: 1355 Hm: 0ppm α: 2cpm γ/β: 40cpm

NOTES Drilling Contractor: Pennsylvania Drilling
Driller: Joe Barile
Helper: John Vandine
Rig: 72 Speedster

Water Used During Drilling = 350 gallons
Soil Sampling as per ASTM
Color Descriptions as per Munsell 89
Field Measurements: Hm, γ/β, α

402-11

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	[illegible]	PROJECT NAME	[illegible]
BORING NUMBER	[illegible]	COORDINATES:	DATE 4/26/88
ELEVATION:		GWL: Depth / Date/Time	DATE STARTED 4/26/88
ENGINEER/GEOLOGIST	DAVIES	Depth / Date/Time	DATE COMPLETED 4/27/88
DRILLING METHODS	CABLE TOOL		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
	08790	9 14 14	16	Hard yellowish Brown (10YR 5/4) S. Hy Clay, trace sand and gravel Moist 16.4	CL	>4.5	t: 1410 Hm: 0.5tsf α: 2cpm r/β: 40cpm
17.5	08791	3 8 11	12	Very St. H. Gray (2.5Y 5/0) S. Hy Clay, trace sand and gravel Moist.	CL	2.5	t: 1430 Hm: 0tsf α: 2cpm r/β: 40cpm
	08792	4 8 13	17	St. H. Dark Gray (2.5Y 4/0) S. Hy Clay trace sand and gravel. Moist	CL	1.6	t: 1450 Hm: 0tsf α: 2cpm r/β: 40cpm
20.0	08793	2 5 8	14	St. H. Gray (2.5Y 5/0) S. Hy Clay trace sand and gravel. Moist	CL	1.6	t: 1501 Hm: 0tsf α: 2cpm r/β: 40cpm
							t 1605 Pushed Shelby No recovery
22.5	08795	8 10 15	13	St. H. Gray (2.5Y 5/0) S. Hy Clay trace sand and gravel Moist.	CL	1.1	t: 1629 Hm: 0tsf α: 2cpm r/β: 40cpm
25.0	08794	NA	21				t: 1715 Pushed Shelby 20.0 ft 23.0 175 ft recovery
	08795	5 9 40	5	St. H. Gray (2.5Y 5/0) S. Hy Clay, some gravel, trace sand Moist	CL	1.5	t: 0743 4/27/88 Hm: 0tsf α: 2cpm r/β: 40cpm
27.5	08796 08797 08798	12 36 58	14	Hard Dark Gray (2.5Y 4/0) S. Hy Clay, some gravel, trace sand. Moist.	CL	>4.5	t: 0805 Hm: 0tsf α: 2cpm r/β: 40cpm
30.0	08799	15 53 50/4"	16	Hard, Gray (2.5Y 5/0) S. Hy Clay, trace sand and gravel Moist. 29.6	CL	>4.5	t: 0833 Hm: 0tsf α: 2 r/β: 40cpm
				Very Dense, Gray 2.5Y 5/0 fine sand some silt 29.8	SW		

NOTES:

Pushed Shelby from 21.0-23.0 Feet. No recovery.

See Following page

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 603 3.2	PROJECT NAME Fairchild RI/FS	
BORING NUMBER: ~~180~~ 1680 RB	COORDINATES.	DATE 7/27/88
ELEVATION.	GWL: Depth Date/Time	DATE STARTED 4/26/88
ENGINEER/GEOLOGIST DAVIES	Depth Date/Time	DATE COMPLETED 4/27/11
DRILLING METHODS CABLE TOOL		PAGE 3 OF 4

2731

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	68900	38 50/4	10	Hard. Dark Gray (5Y 4/1) Sandy Silt. Some clay. Moist ~31.0	ML	>4.5	C: 3357 Hm: 0ppm α: 2cpm T/B: 40cpm
32.5	C8801	14 24 29	18	Very Stiff. Dark Gray (5Y 4/1) Clay. Some silt. Trace sand and gravel. Moist	CL	3.5	C: 0958 Hm: 0ppm α: 2cpm T/B: 40
	08802	5 11 18	4	Dark Gray (5Y 4/1) Clay. Some silt and gravel. Moist.	CL		C: 1015 Hm: 0cpm α: 2cpm T/B: 40cpm Rock in end of sampler
35.0	08803	5 9 12	17	Very Stiff. Dark Gray (5Y 4/1) Silty Clay Trace sand and gravel. Moist			C: 1027 Hm: 0ppm α: 2cpm T/B: 40cpm
	C8804	7 21 27	15	Very Stiff. Dark Gray (5Y 4/1) Silty Clay Trace sand & gravel Moist. 36.6 Hard. Brown to Yellow (10YR 5/8) Silty Clay Moist.	CL CL	2.1 >4.5	C: 1042 Hm: 0ppm α: 2cpm T/B: 50cpm
37.5				Very Dense Very Pale Brown (10YR 7/4) Fine sand, well sorted, trace silt. Dry	SW		
40.0	C9805	16 36 50	16	Very Dense, Very Pale Brown (10YR 7/4) Fine Sand, well sorted, trace silt. Slightly Moist.	SW		C: 1100 Hm: 0ppm α: 2cpm T/B: 50cpm
42.5							
45.0							

NOTES

Bottom of hole 36.8 Feet

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6C1.:.2	PROJECT NAME Ferrolite RI/FS	
BORING NUMBER: RSC	COORDINATES:	DATE. 4/27/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 4/26/88
ENGINEER/GEOLOGIST. DAVIES	Depth Date/Time	DATE COMPLETED: 4/27/88
DRILLING METHODS		PAGE 4 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
	C3666	35 49 44	18	very dense very pale brown (10YR 7/4) fine sand, trace med. sand to fine gravel trace silt slightly moist	SW		C: 1458 Hm: 0 ppm x: 2 ppm r/a: 40 ppm
42.5							
50	C3667	22 33 50	17	very dense brownish yellow (10YR 6/6) fine sand trace med sand to fine gravel trace silt. moist.			C: 1411 Hm: 0 ppm x: 2 ppm r/a: 40 ppm
51.5				END OF BORING 51.5 FT			

NOTES

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1080	COORDINATES: NORTH 482,229.86 EAST 1,378,630.45	DATE: 04/26/88
GROUND ELEVATION: 581.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/26/88
ENGINEER/GEOLOGIST: DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08780	04/26/88 0918	3 7 5	6	M. DENSE, VERY PALE BROWN (10YR, 8/4) GRAVELLY SAND, FILL, DRY			Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
3.0	08781	04/26/88 0924	4 5 6	4	VERY STIFF, DARK YELLOWISH BROWN (10YR, 4/4) CLAY, SOME SILT, MOIST.	CL		Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
4.5	08782	04/26/88 0928	5 9 11	12	VERY STIFF, DARK BROWN (10YR, 3/3) SILTY CLAY, TRACE SAND, TRACE GRAVEL, MOIST.	CL	3.7	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
6.0	08783	04/26/88 0933	8 10 14	13	VERY STIFF, DARK YELLOWISH BROWN (10YR, 4/4) WITH GRAY MOTTLED SILTY CLAY, TRACE GRAVEL, TRACE SAND, MOIST.	CL	2.7	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
7.5	08784	04/26/88 0940	14 17 19	13	VERY STIFF, VERY DARK BROWN (10YR, 2/2) SILTY CLAY, TRACE GRAVEL, TRACE SAND, MOIST.	CL	3.3	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
9.0	08785	04/26/88 1118	5 11 15	14	VERY STIFF, DARK GRAY (2.5Y, 4/0) CLAY, SOME SILT, TRACE GRAVEL, TRACE SAND, MOIST.	CL	3.5	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
10.5	08786	04/26/88 1142	2 10 17	12	VERY STIFF, VERY DARK GRAY (2.5Y, 3/0) CLAY, SOME SILT, TRACE SAND, MOIST.	CL	2.8	Hnu= 0 ppm α = 2 cpm Bγ = 55 cpm
12.0	08787	04/26/88 1327		12	SHELBY TUBE.. PUSHED SHELBY 1.5 FT., 1.0 FT. RECOVERY.			
13.5	08788	04/26/88 1339	16 24 32	18	HARD, YELLOWISH BROWN (10YR, 5/6) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	4.1	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
15.0	08789	04/26/88 1355	4 14 25	9	VERY STIFF, BROWNISH YELLOW (10YR, 6/8) SILTY CLAY, TRACE SAND AND GRAVEL, DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm

NOTES:
SOIL SAMPLING AS PER ASTM. COLOR DESCRIPTION AS PER MUNSELL.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1080	COORDINATES: NORTH 482,229.86 EAST 1,378,630.45	DATE: 04/26/88
GROUND ELEVATION: 581.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/26/88
ENGINEER/GEOLOGIST: DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08790	04/26/88 1416	9 34 14	16	HARD, YELLOWISH BROWN (10YR, 5/4) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
18.0	08791	04/26/88 1430	3 8 11	12	VERY STIFF, GRAY (2.5Y, 5/0) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
19.5	08792	04/26/88 1450	4 8 13	17	STIFF, DARK GRAY (2.5Y, 4/0) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	1.6	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
21.0	08793	04/26/88 1501	2 5 8	14	STIFF, GRAY (2.5Y, 5/0) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	1.6	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
22.0								
23.5	08668	04/26/88 1629	8 10 15	13	STIFF, GRAY (2.5Y, 5/0) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL	1.1	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
25.5	08794	04/26/88 1715		21	SHELBY TUBE.. PUSHED SHELBY 2.0 FT., 1.75 FT. RECOVERY..			
27.0	08795	04/27/88 0743	5 9 40	5	STIFF, GRAY (2.5Y, 5/0) SILTY CLAY, SOME GRAVEL, TRACE SAND, MOIST.	CL	1.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
28.5	08796 08798	04/27/88 0805	12 36 58	14	HARD, DARK GRAY (2.5Y, 4/0) SILTY CLAY, SOME GRAVEL, TRACE SAND, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
28.5	08797	04/27/88 0805	12 36 58	14	HARD, DARK GRAY (2.5Y, 4/0) SILTY CLAY, SOME GRAVEL, TRACE SAND, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
30.0	08799	04/27/88 0833	15 50 50	16	HARD, GRAY (2.5Y, 5/0) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST. V. DENSE, GRAY 2.5Y, 5/0 FINE SAND, SOME SILT. HARD, DARK GRAY (5Y, 4/1) SANDY SILT, SOME CLAY, MOIST.	CL SW ML	>4.5 N/A >4.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm

NOTES:
SOIL SAMPLING AS PER ASTM. COLOR DESCRIPTIONS AS PER MUNSELL.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1080	COORDINATES: NORTH 482,229.86 EAST 1,378,630.45	DATE: 04/26/88
GROUND ELEVATION: 581.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/26/88
ENGINEER/GEOLOGIST: DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	08800	04/27/88 0857	38 50	10	HARD, DARK GRAY (5Y, 5/1) SANDY SILT, SOME CLAY, MOIST. VERY STIFF, DARK GRAY (5Y,4/1) CLAY, SOME SILT, TRACE SAND AND GRAVEL, MOIST.	ML CL	>4.5 3.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
33.0	08801	04/27/88 0958	14 24 29	18	VERY STIFF, DARK GRAY (5Y, 4/1) CLAY, SOME SILT, TRACE SAND AND GRAVEL, MOIST.	CL	3.5	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
34.5	08802	04/27/88 1015	5 11 18	4	DARK GRAY (5Y, 4/1) CLAY, SOME SILT AND GRAVEL, MOIST.	CL		Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
36.0	08803	04/27/88 1027	5 9 12	17	VERY STIFF, DARK GRAY (5Y, 4/1) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST.	CL		Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
37.5	08804	04/27/88 1042	7 21 27	15	VERY STIFF, DARK GRAY (5Y, 4/1) SILTY CLAY, TRACE SAND AND GRAVEL, MOIST. HARD, BROWNISH YELLOW (10YR, 6/8) SILTY CLAY, MOIST. VERY DENSE, VERY PALE BROWN (10YR, 7/4) FINE SAND, WELL SORTED, TRACE SILT, DRY.	CL CL SW	2.1 >4.5 N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
40.0								
41.5	08665	04/27/88 1100	16 36 50	16	VERY DENSE, VERY PALE BROWN (10YR, 7/4) FINE SAND, WELL SORTED, TRACE SILT, SLIGHTLY MOIST.	SW	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
45.0								

NOTES:
SOIL SAMPLING AS PER ASTM. COLOR DESCRIPTIONS AS PER MUNSELL.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1080	COORDINATES: NORTH 482,229.86 EAST 1,378,630.45	DATE: 04/26/88
GROUND ELEVATION: 581.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/26/88
ENGINEER/GEOLOGIST: DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 4

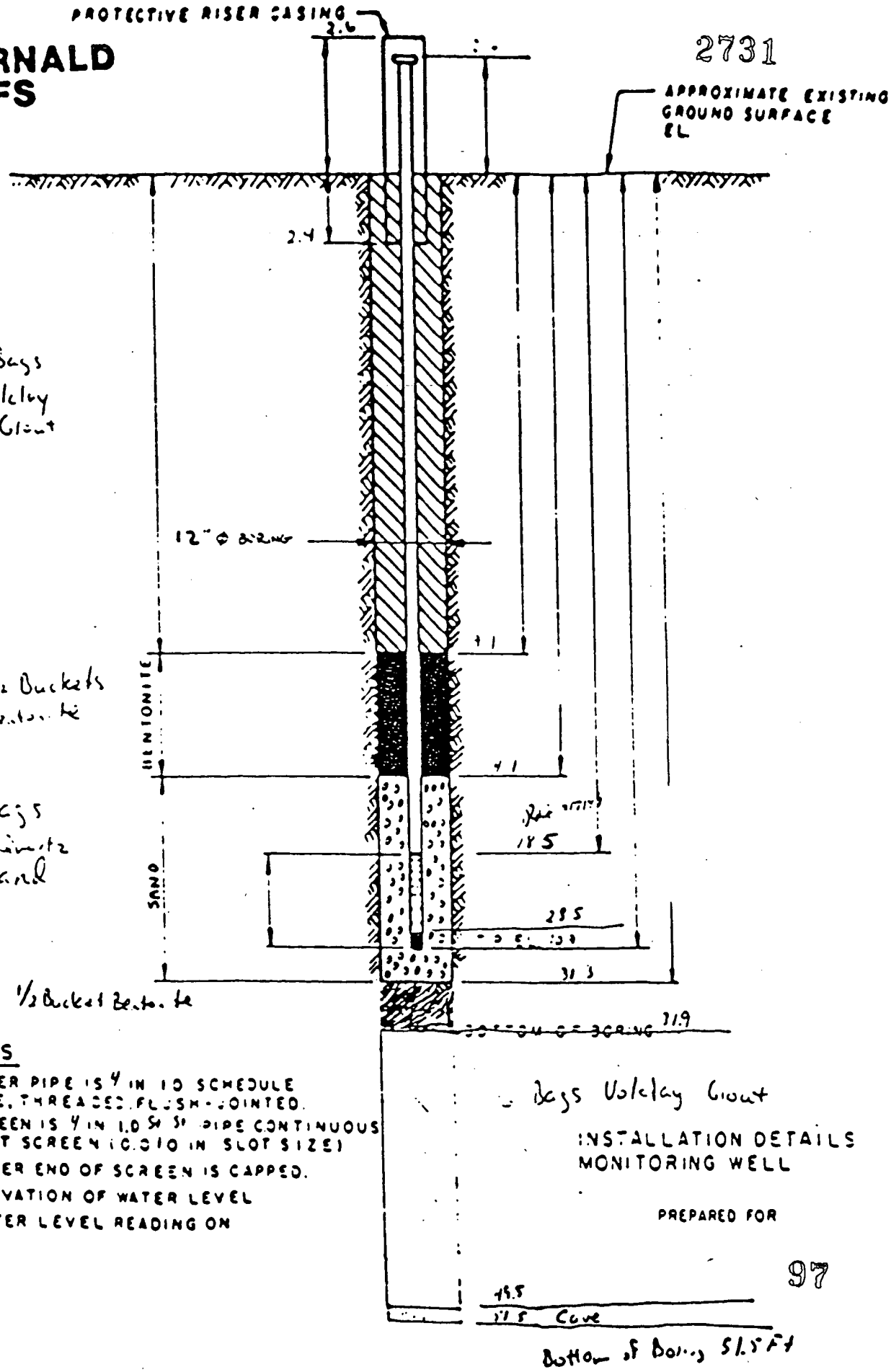
DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	08666	04/27/88 1258	35 49 44	18	VERY DENSE, VERY PALE BROWN (10YR, 7/4) FINE SAND, TRACE MED. SAND TO FINE GRAVEL, TRACE SILT, SLIGHTLY MOIST.	SW	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
50.0								
51.5	08667	04/27/88 1411	22 33 50	17	VERY DENSE, BROWNISH YELLOW (10YR, 6/6) FINE SAND, TRACE MED. SAND TO FINE GRAVEL, TRACE SILT, MOIST.			Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm

BOTTOM OF BORING 51.5

NOTES:
SOIL SAMPLING AS PER ASTM. COLOR DESCRIPTIONS AS PER MUNSELL.

FERNALD RI/FS

2731



DRAWING NUMBER

CHECKED BY

APPROVED BY

DD

DRAWN BY

NOTES

1. RISER PIPE IS 4 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D SCH 5 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

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR

97

WELL 1081

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FERRALLOY RI/FS		
BORING NUMBER 081	COORDINATES		DATE 12.1.87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 12.1.87
ENGINEER/GEOLOGIST D. OAKLEY	Depth	Date/Time	DATE COMPLETED 12.2.87
DRILLING METHODS CABLE TOOL			PAGE 1 OF 3

2731

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				2.3 STIFF BROWNISH YELLOW (10YR, 5/3) SILT, TRACE CLAY, MOISTURE	ML	3.0	
1	07633 8:50	5 6 6	12	STIFF LIGHT GRAY (5Y, 6/1) SILT, SOME CLAY, TRACE GRAVEL AND SAND - DRY	ML	3.5	HNU - 0 PPM Bd - 60 CPM γ - 0 CPM
2 3	07634 9:20	4 9 19	14	VERY STIFF LIGHT GRAY (5Y, 6/1) SILT, SOME CLAY AND GRAVEL - DRY.	ML	4.0	HNU - 0 PPM Bd - 50 CPM γ - 0 CPM
4	07635 10:00	12 16 17	15	3.4 HARD YELLOWISH BROWN (10YR, 5/4) CLAY, SOME SAND AND SILT, TRACE FINE GRAVEL DRY	CL	4.0	HNU - 0 PPM Bd - 70 CPM γ - 0 CPM
				4.5 HARD SILTY BROWN (10YR, 6/3) CLAY, SOME SAND, TRACE SILT - DRY	CL	3.5	
5 6	07636 10:15	12 12 8	11	VERY STIFF BROWNISH YELLOW (10YR, 6/4) CLAY, SOME SILT AND, TRACE GRAVEL AND SILT - DRY	CL	2.25	HNU - 0 PPM Bd - 70 CPM γ - 0 CPM
7	07637 10:50	4 5 4	14	6.6 STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, 7.2 SOME SILT - MOIST	CL	1.0	HNU - 0 PPM Bd - 50 CPM γ - 0 CPM
				STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE SAND AND FINE GRAVEL - DRY.	CL	2.5	
8 9	07638 11:00	6 6 7	13	STIFF BROWN (10YR, 5/4) CLAY, SOME SILT, TRACE SAND AND GRAVEL - DRY	CL	2.5	HNU - 0 PPM Bd - 60 CPM γ - 0 CPM
10	07639 14:50	9 9 13	14	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SAND AND SILT - MOIST.	CL	2.5	HNU - 0 PPM Bd - 40 CPM γ - 0 CPM
11 12	07640 15:10	5 7 9	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SAND AND SILT, TRACE GRAVEL - MOIST	CL	2.5	HNU - 0 PPM Bd - 40 CPM γ - 0 CPM
				12.2 VERY STIFF DARK BROWNISH GRAY (10YR 4/2) SILT, SOME CLAY, TRACE SAND DRY	ML	—	
13	07641 15:25	7 9 10	4	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SAND AND SILT - MOIST.	CL	2.5	HNU - 0 PPM Bd - 90 CPM γ - 0 CPM
14 15	07642 16:50	3 7 9	9	VERY STIFF YELLOWISH BROWN (10YR, 5/4) SILTY CLAY, TRACE GRAVEL AND SAND - MOIST	CL	2.25	HNU - 0 PPM Bd - 50 CPM γ - 0 CPM

NOTES: CONTRACTOR: PENNDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYKES JR.
ASSISTANT: JOHN VANDINE.
WATER ADDED TO HOLE: 1 TRK - 5 GALLONS.
~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ 11

SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST.
COLORS CLASSIFIED USING MUNSELL COLOR CHARTS, 99
BACKGROUND
HNU - 0 PPM
LEL - 0 %
γ - 0 CPM
Bd 60-140 CPM
(AIR) (GROUND)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FERNALD RI/FS	
BORING NUMBER LST 1151 DD 5 30	COORDINATES:	DATE 12-2-87
ELEVATION	GWL: Depth Date/Time	DATE STARTED 12-1-87
ENGINEER/GEOLOGIST D. OAMISH	Depth Date/Time	DATE COMPLETED 12-2-87
DRILLING METHODS CABLE TOOL		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	ST-07643 0.7644 11:50	4 7 10	6	VERY STIFF BROWNISH GRAY (2.5Y 6/1) CLAY, SOME GRAVEL AND SILT, TRACE SAND - MOIST	CL	1.25	MN - 0PPM BZ - 300PPM F - 0PPM
17	0.7645 10:00	3 4 16	10	STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST	CL	1.5	MN - 0PPM BZ - 40PPM F - 0PPM
18	0.7646 10:30	5 [illegible] 18	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST	CL	3.0	MN - 0PPM BZ - 50PPM F - 0PPM
19							
20	0.7647 10:50	3 12 18	14	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME SILT, SAND, AND FINE GRAVEL - MOIST	CL	2.75	MN - 0PPM BZ - 50PPM F - 0PPM
21							
22	0.7648 11:15	5 14 22	16	HARD LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME GRAVEL, SILT, AND SAND - MOIST	CL	4.0	MN - 0PPM BZ - 600PPM F - 0PPM
23	0.7649 13.20	3 [illegible] 10	6	STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME GRAVEL, SILT, AND SAND - MOIST	CL	2.0	MN - 0PPM BZ - 400PPM F - 0PPM
24							
25	0.7650 13.45	4 10 13	9 11	VERY STIFF GRAYISH BROWN (2.5Y 5/2) CLAY, SOME SAND, TRACE FINE GRAVEL - MOIST	CL	1.0	MN - 0PPM BZ - 400PPM F - 0PPM
26	0.7651 14:00	2 8 12	14	VERY STIFF GRAYISH BROWN (2.5Y 5/2) CLAY, TRACE SILT, SAND, AND GRAVEL - MOIST	CH	.75	MN - 0PPM BZ - 40PPM F - 0PPM
27							
28	0.7652 14:45	1 4 7	5	STIFF GRAYISH BROWN (2.5Y 5/2) CLAY, TRACE GRAVEL, TRACE SILT AND SAND - MOIST	CH	.75	MN - 0PPM BZ - 40PPM F - 0PPM
29	0.7653 15:00	5 7 9	13	VERY STIFF GRAYISH BROWN (2.5Y 5/2) CLAY, TRACE SAND, GRAVEL, AND SILT, MOIST	CH	.5	MN - 0PPM BZ - 40PPM F - 0PPM

Rec.

NOTES

2731

100

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME [illegible]	
BORING NUMBER [illegible]	COORDINATES	DATE 12 2 87
ELEVATION	GWL: Depth Date/Time	DATE STARTED 12/1/87
ENGINEER/GEOLOGIST D CAHLEN	Depth Date/Time	DATE COMPLETED 12 2 87
DRILLING METHODS CAR TCA		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
31	07654 15:46	1 7 10	14	VERY STIFF GRAYISH-BROWN (2.5Y 5/2) CLAY SOME GRAVEL, TRACE SAND AND SILT - MOIST	CH	1.0	HNU-0PPM .3α - 6CPM γ-0CPM
32	07653 15:53	3 7 9	14	VERY STIFF GRAYISH-BROWN (2.5Y 5/2) CLAY SOME GRAVEL, TRACE SAND AND SILT - MOIST	CH	1.0	HNU-0PPM .3α - 5CPM γ-0CPM
33				WELL TD 33.0 FT. Bottom of Boring			

NOTES:

403-11-8

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1081	COORDINATES: NORTH 482,041.23 EAST 1,379,003.69	DATE: 12/01/87
GROUND ELEVATION: 590.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/01/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 3

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07633	12/01/87 0850	5 6 6	12	STIFF BROWN (10YR, 5/3) SILT, TRACE CLAY AND SAND - DRY. STIFF LIGHT GRAY (5Y, 6/1) SILT, SOME CLAY, TRACE GRAVEL AND SAND - DRY.	ML ML	3.0 3.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
3.0	07634	12/01/87 0920	4 9 19	14	VERY STIFF LIGHT GRAY (5Y, 6/1) SILT, SOME CLAY AND GRAVEL - DRY.	ML	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
4.5	07635	12/01/87 1000	12 16 17	15	VERY STIFF LIGHT GRAY (5Y, 6/1) SILT, SOME CLAY AND GRAVEL - DRY. HARD YELLOWISH BROWN (10YR, 5/4) CLAY, SOME SAND AND SILT, TRACE FINE GRAVEL - DRY. HARD PALE BROWN (10YR, 6/3) CLAY, SOME SAND, TRACE SILT - DRY.	ML CL CL	4.0 4.0 3.5	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
6.0	07636	12/01/87 1015	12 12 8	11	VERY STIFF BROWNISH YELLOW (10YR, 6/4) CLAY, SOME SAND, TRACE GRAVEL AND SILT - DRY.	CL	2.25	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
7.5	07637	12/01/87 1050	4 5 4	14	VERY STIFF BROWNISH YELLOW (10YR, 6/4) CLAY, SOME SAND, TRACE GRAVEL AND SILT - DRY. STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT - MOIST. S	CL CL CL	2.25 1.0 2.5	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
9.0	07638	12/01/87 1100	6 6 7	13	STIFF BROWN (10YR, 5/4) CLAY, SOME SILT, TRACE SAND AND GRAVEL - DRY.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
10.5	07639	12/01/87 1450	9 9 13	14	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SAND AND SILT - MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
12.0	07640	12/01/87 1510	5 7 9	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SAND AND SILT, TRACE GRAVEL - MOIST. VERY STIFF DARK GRAYISH BROWN (2.5Y, 4/2) SILT, SOME CLAY, TRACE SAND - DRY.	CL ML	2.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
13.5	07641	12/01/87 1525	7 9 10	4	VERY STIFF DARK GRAYISH BROWN (2.5Y, 4/2) SILT, SOME CLAY, TRACE SAND - DRY. VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4)	ML	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
15.0	07642	12/01/87 1550	3 7 9	9	VERY STIFF YELLOWISH BROWN (10YR, 5/4) SILTY CLAY, TRACE GRAVEL AND SAND - MOIST.	CL	2.25	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm

NOTES:
SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST. —COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1081	COORDINATES: NORTH 482,041.23 EAST 1,379,003.69	DATE: 12/01/87
GROUND ELEVATION: 590.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/01/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 3

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07644 12/02/87 0950	4 7 10	8	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME GRAVEL AND SILT, TRACE SAND - MOIST.	CL	1.25	Hnu= 0 ppm α = 0 cpm BΓ = 30 cpm
17.0	07643 12/02/87 0900			SHELBY TUBE.			
18.0	07645 12/02/87 1000	3 4 10	10	STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm
19.5	07646 12/02/87 1030	5 12 18	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST.	CL	3.0	Hnu= 0 ppm α = 0 cpm BΓ = 50 cpm
21.0	07647 12/02/87 1050	3 12 18	14	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, SAND, AND FINE GRAVEL - MOIST.	CL	2.75	Hnu= 0 ppm α = 0 cpm BΓ = 50 cpm
22.5	07648 12/02/87 1115	5 14 27	16	HARD LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME GRAVEL, SILT, AND SAND - MOIST.	CL	4.0	Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm
24.0	07649 12/02/87 1320	3 5 8	6	STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME GRAVEL, SILT, AND SAND - MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm
25.5	07650 12/02/87 1345	4 10 13	11	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, SOME SAND AND SILT, TRACE FINE GRAVEL - MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm
27.0	07651 12/02/87 1400	2 8 12	14	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, TRACE SILT, SAND AND FINE GRAVEL - MOIST.	CH	.75	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm
28.5	07652 12/02/87 1445	1 4 7	5	STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST.	CH	.75	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm
30.0	07653 12/02/87 1500	5 7 9	13	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, TRACE SAND, GRAVEL, AND SILT - MOIST.	CH	.5	Hnu= 0 ppm α = 0 cpm BΓ = 40 cpm

NOTES:
SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1081	COORDINATES: NORTH 482,041.23 EAST 1,379,003.69	DATE: 12/01/87
GROUND ELEVATION: 590.7	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/01/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 3

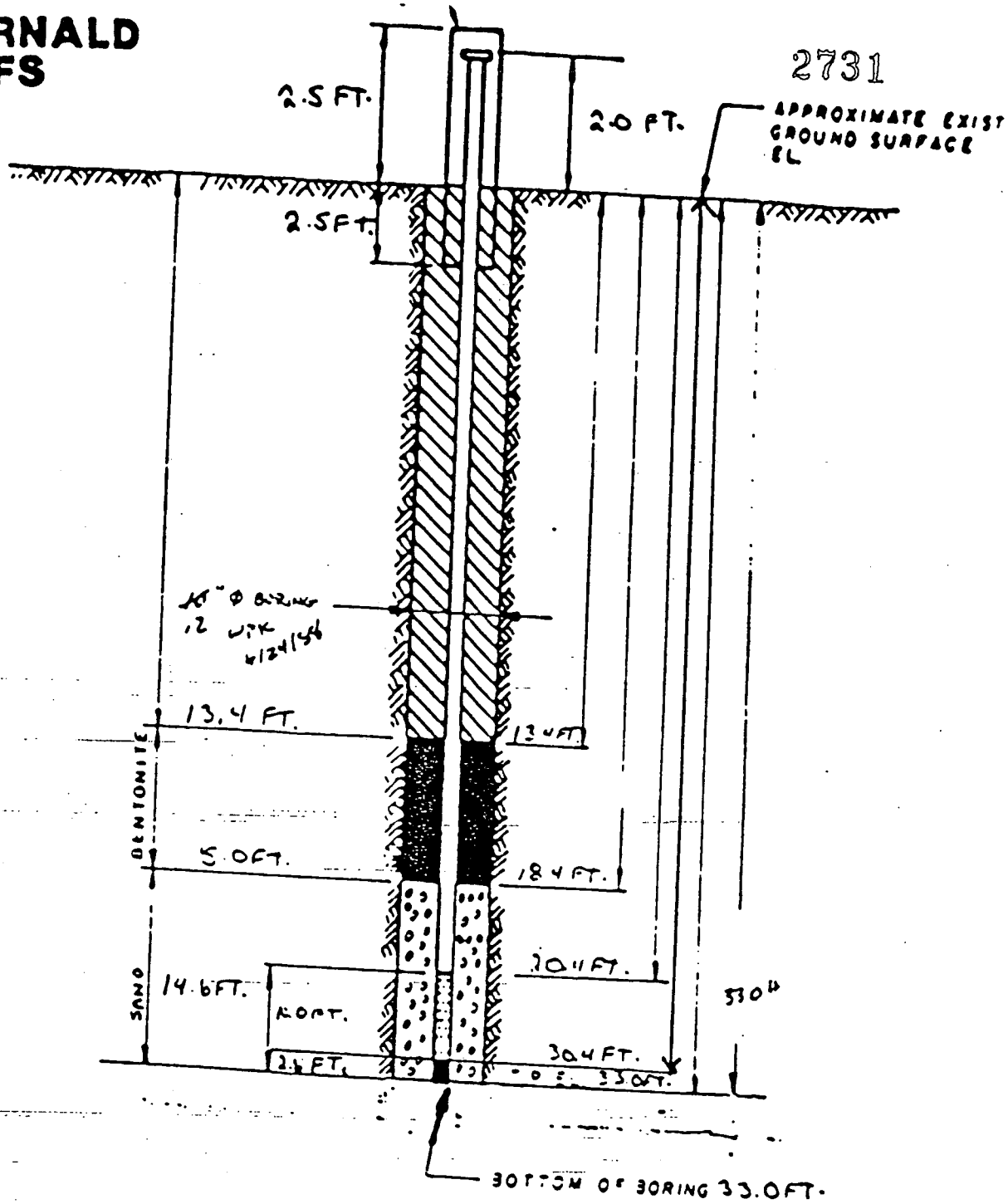
DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07654 12/02/87 1540		4 7 10	14	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CH	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
33.0	07655 12/02/87 1555		3 7 9	14	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CH	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm

BOTTOM OF BORING 33.0

NOTES:
SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

FERNALD RI/FS

2731



NOTES.

1. RISER PIPE IS 4 IN 10 SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4 IN 10 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

~~white out corrections~~ this form did not represent the installed monitoring well, therefore it has been modified with white out by D. Oakley, WJK 4/24/88

INSTALLATION DETAILS
MONITORING WELL ~~101~~ 104 UB
PREPARED FOR

105

DRAWN BY | DSO | CHECKED BY | APPROVED BY | DRAWING NUMBER

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. DAVIES DATE 4/28/88
PROJECT NO. 6021 2 CHECKED BY R Galbraith DATE 3/7/89
BORING NO. 1087 1135 rb
PIEZOMETER NO. 1090 DATE OF INSTALLATION 4/28/88

2731

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT Steel
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID 350 gallons H_2O FROM 0 TO 51.5	SIZE ~~4.5~~ 3.0 FROM ~~32.7~~ 0.0 TO
FLUID FROM TO	SIZE 10.0 FROM 0.0 TO 46.0 ft

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0	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 Screw wrench tight
TOTAL PERFORATED AREA 10 ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft	OTHER PROTECTION Steel cover locked &
PROTECTIVE PIPE O.D. 6 3/4 in	Stainless Steel capped cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 9.1	TOP	BOTTOM
BENTONITE	TOP 9.1	BOTTOM 14.1	TOP	BOTTOM
SAND	TOP 14.1	BOTTOM 31.3	TOP	BOTTOM
~~GRAVEL~~ Bentonite Grout	TOP 31.3 31.9	BOTTOM 31.9 44.3	TOP	BOTTOM
PERFORATED SECTION	TOP 18.5	BOTTOM 28.5	TOP	BOTTOM
PIEZOMETER TIP	30.9			
BOTTOM OF BOREHOLE	51.5			
GWL AFTER INSTALLATION	NA			

106

IS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
IS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Screen section measured 10.5 ft w.h 10.0 ft perforated

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD FIELD ENG./GEO. D. OAKLEY DATE 12-3-87
PROJECT NO. 602 CHECKED BY [illegible] DATE 2/7/[illegible]
BORING NO. [illegible] 1031 BB [illegible]
PIEZOMETER NO. ~~NA~~ 1031 WPK 4/24/88 DATE OF INSTALLATION 12-3-87 2731

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT FLATHEAD
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM 4 TO 33 FT	SIZE 10" FROM 0 TO 30 FT
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4 INCH	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 IN. I.D. 4 IN
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10.0 FT.
AVERAGE SIZE OF PERFORATIONS .010 INCH	JOINING METHOD THREAD ~~AND COUPLE~~
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10.0 FT.	(FLUSH JOINT THREAD)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.	OTHER PROTECTION LOCKING CAP
PROTECTIVE PIPE ~~O~~ D. 10 INCH	WITH LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 FT.			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT.			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0 FT.	BOTTOM 13.4 FT.	TOP	BOTTOM
BENTONITE	TOP 13.4 FT.	BOTTOM 18.4 FT.	TOP	BOTTOM
SAND	TOP 18.4 FT.	BOTTOM 33.0 FT.	TOP	BOTTOM
~~GRAVEL~~	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 20.4 FT.	BOTTOM 30.4 FT.	TOP	BOTTOM
PIEZOMETER TIP	33.0 FT.			
BOTTOM OF BOREHOLE	33.0 FT.			
GWL AFTER INSTALLATION	NA			

107

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

REMARKS Units and corrections were made by D. Oakley at the time the form was completed. WPK 4/24/88

WELL 1083

RI/FS

[illegible] was collected beside boring 183 and PAC tube was pushed from 3 to 5.0 feet with 1.9 foot recovery. WPR 4/24/88

VISUAL CLASSIFICATION OF SOILS

2731

WPR 4/24/88 RIG #2

PROJECT NUMBER 602 T3.2	PROJECT NAME FINAL RI/FS		
BORING NUMBER 183 1053	COORDINATES.	DATE 01 07 88	
ELEVATION.	GWL: Depth Date/Time	DATE STARTED 01 07 88	
ENGINEER/GEOLOGIST W. KEGLEY	Depth Date/Time	DATE COMPLETED 01 09 88	
DRILLING METHODS CABLE TOOL / SPLIT SPOON		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	07 8 7 1365	9 9 5	13	VERY STIFF, BROWN (10YR 5/3) SILT and clay with gravel - Dry	ML	3.5	HNU: 0ppm BG: 180 cpm unshielded α: 0cpm
2	07 8 8 9 1350	6 7 11	12	HARD BROWN (10YR 5/3) clay and silt with gravel - DRY	CL	4.5	HNU: 0ppm BG: 180 cpm unshielded α: 0cpm
3				Shelby Tube			
4	07 8 8 1 1355	9 10 11	12	3.8' VERY STIFF LIGHT YELLOWISH BROWN (10YR 6/4) MOTTLED CLAY WITH SILT - DRY	CL	2.5	HNU: 0ppm Shelby Tubed 0.1 BG: 180 cpm unshielded α: 0cpm
5 6	07 8 8 2 1400	13 12 10	UNE 2.5'	STIFF LIGHT YELLOWISH BROWN (10YR 6/4) MOTTLED CLAY WITH SAND	CL	1.5	HNU: 0ppm BG: 180 cpm unshielded α: 0cpm
7	07 8 8 3 1405	5 5	18	6.5' MEDIUM DENSE, LIGHT YELLOWISH BROWN (10YR 6/4) SAND AND CLAY - WET 7.4'	SC	0.5	HNU: 0ppm BG: 200 cpm unshielded α: 0cpm
8 9	07 8 8 4 1300	6 14 11	15	MEDIUM STIFF LIGHT YELLOWISH BROWN (10YR 6/4) CLAY AND SILT SOME SAND - MOIST	CL	1.5	HNU: 0ppm BG: 180 cpm α: 0 cpm
10	07 8 8 5 1305	2 3 18	8	9.5' MEDIUM DENSE, YELLOWISH BROWN (10YR 5/6) SAND AND GRAVEL SOME SILT - WET	SW		HNU: 0ppm BG: 180 cpm α: 0cpm
11 12	07 8 8 6 1430	30 16 21	16	10.9 DENSE YELLOWISH BROWN (10YR 5/4) SAND SOME SILT AND CLAY - WET	SP		HNU: 0ppm BG: 180 cpm α: 0cpm
13	07 8 8 7 1500	12 23 7	15	MEDIUM DENSE YELLOWISH BROWN (10YR 5/4) GRAVEL AND SAND SOME SILT - WET	GW		HNU: 0ppm BG: 120 included α: 0cpm
14	07 8 8 8 1530	6 4 7	7	13.9 VERY SOFT OLIVE GREY (5Y 5/2) clay SOME SILT TRACE GRAVEL - DRY	CL	0.25	HNU: 0ppm BG: 120 included α: 0cpm

NOTES CONTRACTOR: BEAUDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYKES JR.
ASSISTANT: JOHN VANDINE
WATER ADDED HOLE: 1 TICK = 5 gal
LIT LIT LIT LIT LIT

SAMPLES TAKEN USING ASTM STANDARD Penetration Test.

COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

BACKGROUND LEVELS
LEL - O_2: 0.1 ppm HNU: 0 ppm BG: 180 cpm α: 0 cpm

602-11.

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 T3.2	PROJECT NAME FMPC RI/FS	
BORING NUMBER 1083	COORDINATES.	DATE 01 08 87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 01 07 87
ENGINEER/GEOLOGIST W. KEGLEY	Depth Date/Time	DATE COMPLETED 01 09 87
DRILLING METHODS CABLE TOOL / SPLIT SPOON		PAGE 2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	0 7 8 9 1 1105	2 2 2	6 in	SOFT OLIVE GREY ~~CLAY~~ (5Y 5/2) Clay with gravel moist	CL	0.5	Sample 7889 is another time taken at 1545 hr Hv: 0.1 tsf Bx: 1.0 tsf shelby 8.0 tsf
17							Tried to ~~take~~ drive sample three times no recovery BEGIN 01 09 88
18	0 7 8 9 1 1105	1 2 12	5	VERY SOFT OLIVE GREY (5Y 5/2) CLAY with gravel ~~moist~~ WET	CL	0.25	Hv: 0.1 tsf Bx - 1.20 tsf shelby 1.5 0 tsf
19							
20	0 7 8 9 2 1105	2 4 5	10	VERY SOFT OLIVE GREY (5Y 5/2) clay with gravel - moist	CL	0.25	Hv: 0.1 tsf Bx - 1.0 tsf sh. shelby 1.5 0 tsf
21							
22	0 7 8 9 3 1110	1 2 3	8	VERY SOFT OLIVE GREY (5Y 5/2) clay with gravel - wet	CL	0.25	Hv: 0.1 tsf Bx - 1.0 tsf sh. shelby 1.5 0 tsf
				BOTTOM OF BORING 22.5' WJK 4/24/85			

NOTES

110

602-11-01

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1083	COORDINATES: NORTH 481,804.99 EAST 1,379,239.99	DATE: 01/07/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/07/88
ENGINEER/GEOLOGIST: W. KEGLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 01/09/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07879	01/07/88 1345	9 9 5	13	VERY STIFF, BROWN (10YR 5/3) SILT AND CLAY WITH GRAVEL - DRY.	ML	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
3.0	07880	01/07/88 1350	6 7 11	12	HARD, BROWN (10YR, 5/3) CLAY AND SILT WITH GRAVEL - DRY.	CL	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
4.5	07881	01/07/88 1355	9 10 11	12	SHELBY TUBE. VERY STIFF LIGHT YELLOWISH BROWN (10YR 6/4) MOTTLED CLAY WITH SILT - DRY,.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 140 cpm
4.9	07894	01/10/88 1130			SHELBY TUBE.			
6.0	07882	01/07/88 1400	13 12 10	12	STIFF LIGHT YELLOWISH BROWN (10YR 6/4) MOTTLED CLAY WITH SAND.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 140 cpm
7.5	07883	01/07/88 1405	5 5 6	18	MEDIUM DENSE, LIGHT YELLOWISH BROWN (10YR 6/4) SAND AND CLAY - WET.	SC	0.5	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
9.0	07884	01/08/88 1300	6 14 11	15	MEDIUM STIFF, LIGHT YELLOWISH BROWN (10YR 6/4) CLAY AND SILT SOME SAND - MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
10.5	07885	01/08/88 1305	2 3 18	8	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4) SAND AND GRAVEL SOME SILT - WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
12.0	07886	01/08/88 1430	30 16 21	16	DENSE YELLOWISH BROWN (10YR 5/4) SAND SOME SILT AND CLAY - WET	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
13.5	07887	01/08/88 1500	12 23 7	15	MEDIUM DENSE YELLOWISH BROWN (10YR 5/4) GRAVEL AND SAND SOME SILT - WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
15.0	07888	01/08/88 1530	6 4 7	7	VERY SOFT OLIVE GRAY(5Y 5/2) CLAY SOME SILT TRACE GRAVEL - DRY	CL	0.25	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm

NOTES:
CONTRACTOR: PENNDRILL. RIG: CYCLONE 42. DRILLER: HARRY DYKES, MR. ASSISTANT: JOHN VAN DINE. 125 GALLONS OF WATER ADDED TO HOLE. SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS. BACKGROUND LEVELS:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1083	COORDINATES: NORTH 481,804.99 EAST 1,379,239.99	DATE: 01/07/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/07/88
ENGINEER/GEOLOGIST: W. KEGLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 01/09/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 2

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07890 07889	01/08/88	1545					SHELBY TUBE.			
18.0											
19.5	07891	01/09/88	1055	1 2 12		5		VERY SOFT OLIVE GREY (5Y 5/2) CLAY WITH GRAVEL - WET.	CL	0.25	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
21.0	07892	01/09/88	1105	2 4 5		10		VERY SOFT OLIVE GREY (5Y 5/2) CLAY WITH GRAVEL - MOIST.	CL	0.25	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
22.5	07893	01/09/88	1110	1 2 3		8		VERY SOFT OLIVE GREY (5Y 5/2) CLAY WITH GRAVEL -WET.	CL	0.25	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm

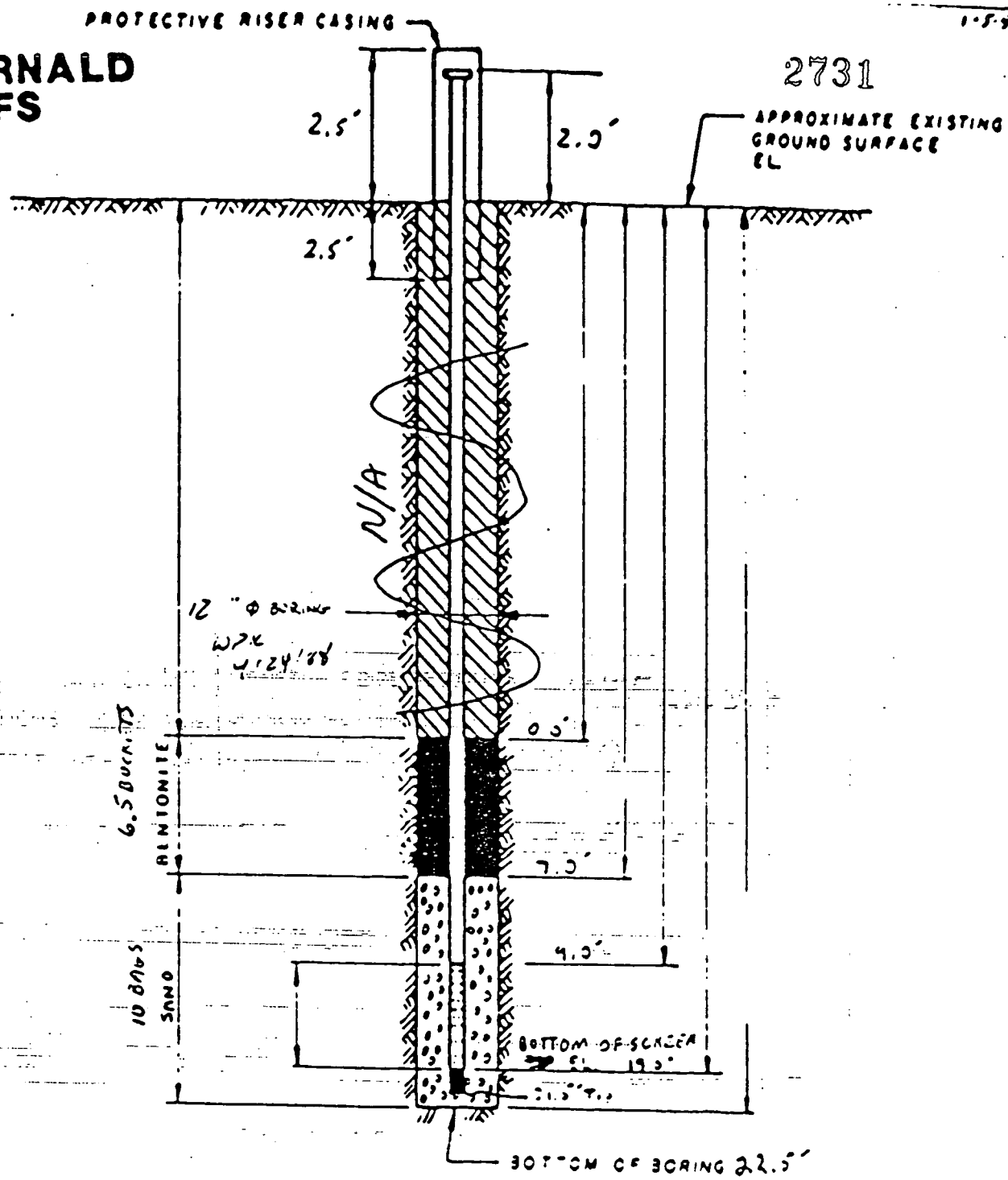
BOTTOM OF BORING 22.5

NOTES:

FERNALD RI/FS

2731

1-5-89



NOTES:

1. RISER PIPE IS IN 10 SCHEDULE PIPE, THREADED FLUSH-JOINTED.
2. SCREEN IS IN 1.0 PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL ~~185~~ 1083

PREPARED FOR BB 1-5-89

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER

113

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 T3.2
BORING NO. HP 1C93 36 [illegible]
PIEZOMETER NO. HP 1C93

FIELD ENG./GEO. W. [illegible] DATE 31 01 89
CHECKED BY R Gaibowski DATE 2/7/89
DATE OF INSTALLATION 01 31 89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT FLAT HEAD
DRILLING FLUID(S) USED:	CASING SIZE (S) USED:
FLUID H2O FROM 0.0 TO 21.5'	SIZE 10 in FROM 0 TO 21.5
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4 inch	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 inch I.D. 4 inch
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 feet
AVERAGE SIZE OF PERFORATIONS .010 inch	JOINING METHOD THREAD AND COUPLE
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 feet	(FLUSH JOINT THREADED)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Feet	OTHER PROTECTION LOCKABLE CAP
PROTECTIVE PIPE ~~Ø~~ D. 10 inch	AND LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0'			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5'			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP NA	BOTTOM NA	TOP	BOTTOM
BENTONITE	TOP 0.0'	BOTTOM 7.0'	TOP	BOTTOM
SAND	TOP 7.0'	BOTTOM 22.5'	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.0'	BOTTOM 19.0'	TOP	BOTTOM
PIEZOMETER TIP	21.5 feet			
BOTTOM OF BOREHOLE	22.5 feet			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐ 114
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS

WELL 1160

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.7	PROJECT NAME: FERNALD RI/FS
BORING NUMBER: 1160	COORDINATES:
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: C. Grube/M Skowski	Depth Date/Time
DRILLING METHODS: AUGER (HOLLOW STEM) 8 inch	

DATE: 4-4-89
DATE STARTED: 4-4-89
DATE COMPLETED: 4-4-89
PAGE 1 OF 14

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	16199 0823 04-04	2	13	Medium Stiff, dark yellowish brown (10YR 3/4); silty clay; trace sand; trace gravel (.25 in); organics; damp.	CL	1.0	HNU: 0 ppm α: 0 cpm Bγ: 40-90 cpm
	16200 0823 04-04	3 4		As Above			
2	16201 0825 04-04	6	10	Stiff, yellowish brown (10YR 5/4) silty clay, trace sand, trace gravel (.25 in), rootlets organics, slightly damp	CL	1.75	HNU: 0 ppm α: 0 cpm Bγ: 60-100 cpm
	16202 0825 04-04	11		As Above		1.75	
3	16203 0825 04-04	18		As Above		2.0	
4	16204 0830 04-04	6 11 18	11	Very Stiff, yellowish brown (10YR 5/4) silty clay, trace sand, trace gravel (.25 in), rootlets organics, damp	CL	2.75	HNU: 0 ppm α: 0 cpm Bγ: 50-90 cpm
5	16205 0835 04-04	28	12	Very Stiff, yellowish brown (10YR 5/4) silty clay, trace sand, organics, rootlets, damp	CL	2.5	HNU: 0 ppm α: 0 cpm Bγ: 70-90 cpm
	16206 0835 04-04	20		As Above		2.5	
6	16207 0835 04-04	21		Stiff, yellowish brown (10YR 5/4) silty clay, trace sand, organics, rootlets, damp		1.75	
7	16208 0848 04-04	3 4 6	10	Soft, yellowish brown (10YR 5/4) (.25-.5 in) gravelly clay, some sand, trace silt, organics, very damp	CL	.25	HNU: 0 ppm α: 0 cpm Bγ: 60-90 cpm

NOTES: CONTRACTOR: PENNDRILL
RIG: Model B
DRILLER: Craig Coulter
ASSISTANT: Chris Coulter

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION -
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU: 0 PPM
α: 0 CPM
Bγ: 40-100 CPM
LEL/O_2: LEL: 0 PPM
O_2: 20.6%

116

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1160	COORDINATES:	DATE: 4-4-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 4-4-89
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time	DATE COMPLETED: 4-4-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 24

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	16209	1	15	Soft, yellowish brown (10YR 5/4), sandy clay, trace silt, some gravel (.25 in) wet.	CL	.25	HNU = 0 ppm α = 0 cpm Bγ = 50-70 cpm
	0910	1		8.5			
9	04-04	6		Stiff, yellowish brown (10YR 5/4), silty clay; trace sand, damp. CB ~~Depth of Sampling Boring~~ 9.0 Depth of Boring 9.5 FT		1.5	
10							HNU = α = Bγ =
11							HNU = α = Bγ =
12							HNU = α = Bγ =
13							HNU = α = Bγ =
14							HNU = α = Bγ =

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1160	COORDINATES: NORTH 480,183.25 EAST 1,382,104.51	DATE: 04/04/89
GROUND ELEVATION: 582.12	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/04/89
ENGINEER/GEOLOGIST: C. GRUBE/M. SLUSA	Depth N/A Date/Time N/A	DATE COMPLETED: 04/04/89
DRILLING METHODS: AUGER (HOLLOW STEM) 8 INCH		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	16199	04/04/89 0823	2 3 4	13	MEDIUM STIFF, DARK YELLOWISH BROWN (10 YR 4/3) SILTY CLAY; TRACE SAND; TRACE GRAVEL (.25); ORGANICS; DAMP.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 40-90 cpm
1.5	16200	04/04/89 0823	2 3 4	13	MEDIUM STIFF, DARK YELLOWISH BROWN (10 YR 4/3) SILTY CLAY; TRACE SAND; TRACE GRAVEL (.25); ORGANICS; DAMP.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 40-90 cpm
2.0	16201	04/04/89 0825	6 11 18	10	STIFF, YELLOWISH BROWN (10 YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN), ROOTLETS ORGANICS, SLIGHTLY DAMP.	CL	1.75	Hnu= 0 ppm α = 0 cpm Bγ = 60-100 cpm
2.5	16202	04/04/89 0825	6 11 18	10	STIFF, YELLOWISH BROWN (10 YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN), ROOTLETS ORGANICS, SLIGHTLY DAMP.	CL	1.75	Hnu= 0 ppm α = 0 cpm Bγ = 60-100 cpm
3.0	16203	04/04/89 0825	6 11 18	10	STIFF, YELLOWISH BROWN (10 YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN), ROOTLETS ORGANICS, SLIGHTLY DAMP.	CL	1.75	Hnu= 0 ppm α = 0 cpm Bγ = 60-100 cpm
4.5	16204	04/04/89 0830	6 11 18	11	VERY STIFF, YELLOWISH BROWN (10 YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN), ROOTLETS ORGANICS, DAMP.	CL	2.75	Hnu= 0 ppm α = 0 cpm Bγ = 50-90 cpm
5.0	16205	04/04/89 0835	28 20 21	12	VERY STIFF, YELLOWISH BROWN, (10 YR 5/4) SILTY CLAY, TRACE SAND, ORGANICS, ROOTLETS, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm Bγ = 70-90 cpm
5.5	16206	04/04/89 0835	28 20 21	12	VERY STIFF, YELLOWISH BROWN, (10 YR 5/4) SILTY CLAY, TRACE SAND, ORGANICS, ROOTLETS, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm Bγ = 70-90 cpm
6.0	16207	04/04/89 0835	28 20 21	12	STIFF, YELLOWISH BROWN (10 YR 5/4), SILTY CLAY, TRACE SAND, ORGANICS, ROOTLETS, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm Bγ = 70-90 cpm
7.5	16208	04/04/89 0848	3 4 6	10	SOFT, YELLOWISH BROWN (10 YR 5/4), GRAVELLY CLAY (.25 - .5 IN), SOME SAND; TRACE SILT, ORGANICS, VERY DAMP.	CL	.25	Hnu= 0 ppm α = 0 cpm Bγ = 60-80 cpm
9.0	16209	04/04/89 0910	1 1 6	15	SOFT, YELLOWISH BROWN (10 YR 5/4), SANDY CLAY, TRACE SILT, SOME GRAVEL (.25 IN) WET. STIFF, YELLOWISH BROWN (10 YR 5/4), SILTY CLAY, TRACE SAND, DAMP.	CL CL	.25 .25	Hnu= 0 ppm α = 0 cpm Bγ = 50-70 cpm

BOTTOM OF BORING 9.5

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

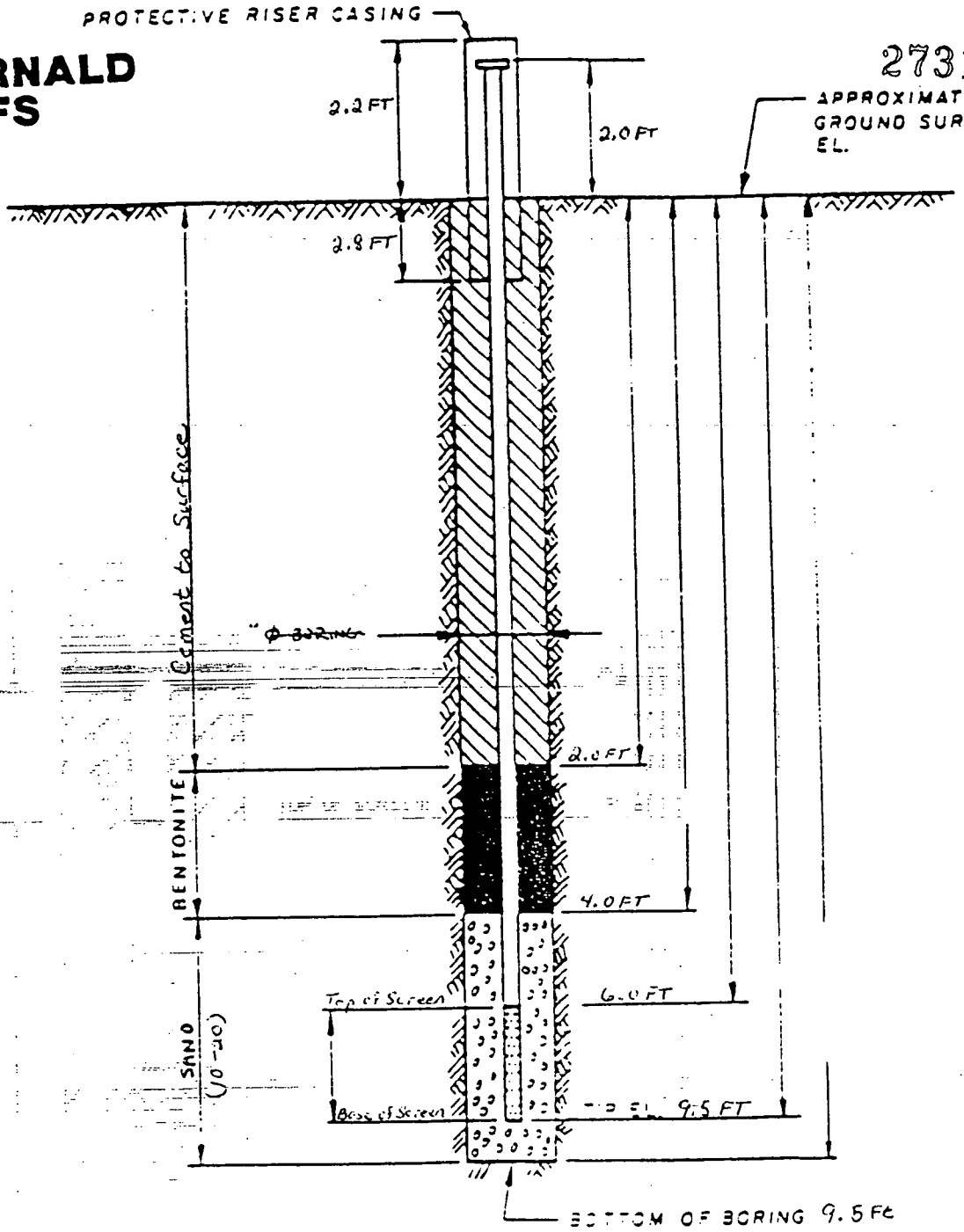
Field Copy

WAH 6-2-89

Boring # 1160

FERNALD RI/FS

2731



DRAWN BY	CHECKED BY / APPROVED BY		DRAWING NUMBER
CG		WAH	5-2-89

NOTES:

1. RISER PIPE IS 2 IN ID SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2.0 IN I.D PVC PIPE ~~CONTINUOUS~~ SLOT SCREEN (0.020 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL N/A
5. WATER LEVEL READING ON N/A

Materials used during well installation:

10-20 sand – 2 80 lb sacks

Bentonite Pellets 1 5 gal bucket

Cement: ½ sack (50#)

Water: 20 gal

INSTALLATION DETAILS
MONITORING WELL # 1160

PREPARED FOR
FMPC RI/FS

PVC Riser Pipe/Well screen = 1 – 3.5 FT Screen with bottom cap (cut to length)

1 – 8.0 FT Riser pipe (cut to length)

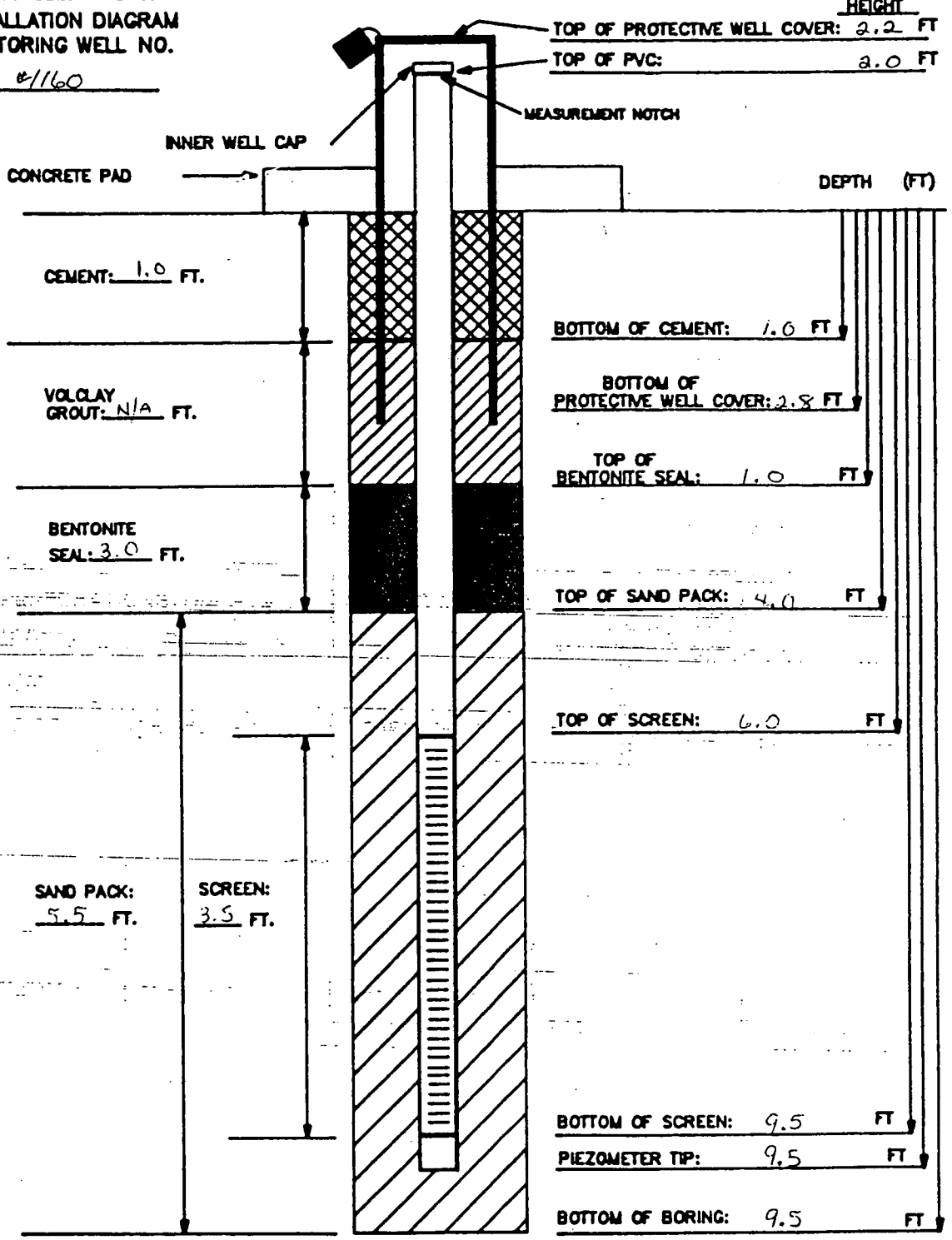
119

INSTALLATION DATE: 4-04-89

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
#1160

2731



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANITITY: 10/20 sand - 2 80 lb sacks
BENTONITE PELLETS (5-GALLON BUCKETS): 1 Bucket
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: 1/2 sack (50 lb)
AMOUNT OF WATER USED: ~20 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:

120

TASK: 602 3.7

GEOLOGIST/ENGINEER: C. Grube, M. Slusarski

FERNALD RI/FS

Key in		
1st Key in	DMT	10-15-89
2nd Key in	Jab	10-19-89
Hard Copy Verification		

PIEZOMETER INSTALLATION SHEET

2731

PROJECT NAME Fernald RI/FS
FIELD ENG./GEO. C. Grube
DATE 4/04/89
PROJECT NO. 602 3.7
CHECKED BY W.A. Hertel
DATE 5-5-89
BORING NO. 1160
PIEZOMETER NO. 1160
DATE OF INSTALLATION 4/04/89

BOREHOLE DRILLING

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

TYPE OF BIT Auger (Hollow Stem) 8.0 in.
CASING SIZE (S) USED:
SIZE ~~4 1/4 ID~~ N/A CH FROM ~~0.0 FT~~ N/A CH TO ~~9.5 FT~~ N/A CH.
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Piezometer
DIAMETER OF PERFORATED SECTION 2.0 in ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.20 in
TOTAL PERFORATED AREA 3.5 FT

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in ID
LENGTH OF PIPE SECTIONS ~~2.5 FT~~ CH, 8.0 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 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	2.8			
BOREHOLE FILL MATERIALS: Surface Cement Plug	TOP 0.0	BOTTOM 2.0		
GROUT/SLURRY	TOP —	BOTTOM —	TOP	BOTTOM
BENTONITE	TOP 2.0	BOTTOM 4.0	TOP	BOTTOM
SAND (10-20)	TOP 4.0	BOTTOM 9.5	TOP	BOTTOM
GRAVEL N/A	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 6.0	BOTTOM 9.5	TOP	BOTTOM
PIEZOMETER TIP	9.5 FT			
BOTTOM OF BOREHOLE	9.5 FT			
GWL AFTER INSTALLATION				

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

121

REMARKS Top of water bearing zone at 6.0 FT
Bottom of water bearing zone at 8.5 FT

4C9

MONITORING WELL INSTALLATION RECORD
11/21/91

:OJECT NAME: Fernald RI/FS FIELD ENG./GEO.: C. GRUBE DATE: 04/04/89
:OJECT NO. : 602.3.2 CHECKED BY : W. A. HERTEL DATE: 05/05/89
RING NO. : 1160 N,E COORDINATES: 480183.25, 1382104.5
LL NUMBER: 1160 DATE OF INSTAL.: 04/04/89

2731

LE DRILLING

LLING METHOD: AUGER
DRILLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: AUGER (HOLLOW STEM)
IS CASING TEMPORARY?: N/A
CASING TYPE : PIEZOMETER
CASING DIAM.: 2.0 In. ID
CASING SIZE(S) USED: (Units N/A)
SIZE: FROM: N/A TO: N/A
SIZE: N/A FROM: N/A TO: N/A

LL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: 0.020 (In.)
TOTAL PERFORATED AREA: 3.5 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: PVC
RISER PIPE DIAMETERS:
O.D.: 2 5/16 In. I.D.: 2.0 In.
LENGTH OF 1ST PIPE SECTION: 8.0 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINT THREADED

OTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 4 3/ In.
* HINGED LOCKING COVER WITH PADL

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		583.91	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.8 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	2.0	N/A	N/A
Bentonite Pellets	2.0	4.0	N/A	N/A
Sand	4.0	9.5	N/A	N/A
ORATED SECTION	6.0	9.5	N/A	N/A
LL TIP	9.5		N/A	
BOTTOM OF BOREHOLE	9.5		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MARKS : TOP OF WATER BEARING ZONE AT 6.0 FT. BOTTOM OF WATER BEARING ZONE AT 8.5 FT.
MMENTS:

WELL 1229

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

Date	4/5/89	4/8-15/89	4/21/89	
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1229	COORDINATES: N 480262.59 E 1374839.54	DATE: 5-1-89	
ELEVATION: 577.97	GWL: Depth 10.7 FT. Date/Time 05-01-89 @ 1530	DATE STARTED: 5-1-89	
ENGINEER/GEOLOGIST: E. TRULLINGER, C. GRUBE	Depth Date/Time	DATE COMPLETED: 5-1-89	
DRILLING METHODS: MOBILE DRILL HSA 8"		PAGE 1 OF 25	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	17607 1025 5-1	9	8	Natural Gravel Fill, medium size, wet from surface water	GP	N/A	HNU = 0 ppm α = 0 cpm βγ = 100-110 cpm
	17608 1025 5-1	19					
	17609 1025 5-1	27					
2	17610 1030 5-1	19	9	Medium Dense, yellowish brown (10YR 4/4) to gray (10YR 4/2) sandy gravel, wet from surface water	GW	N/A	HNU = 0 ppm α = 0 cpm βγ = 100-110 cpm
	17611 1030 5-1	12					
3	17612 1030 5-1	12		Stiff, gray (10YR 4/1) clay, trace of fine gravel, medium plastic, wet from surface water	CL	1.75	
	17613 1035 5-1	6	10	Very Stiff, gray (5Y 4/2), clay, trace fine gravel, medium plastic, moist	CL	2.75	HNU = 0 ppm α = 0 cpm βγ = 100-120 cpm
4	17614 1035 5-1	7		Stiff, olive gray (5Y 4/3), clay, medium plastic, moist		1.75	
	17615 1035 5-1	14					
5	17616 1043 5-1	13	10	Stiff, yellowish brown (10YR 5/6), clay, trace sand, medium plastic, moist	CL	1.75	HNU = 0 ppm α = 0 cpm βγ = 80-100 cpm
	17617 1043 5-1	17					
6	17618 1043 5-1	06					
7	17619 1340 5-1	6	16	Very Stiff, light olive brown (5Y 5/4), clay, low to medium plastic, moist	CL	3.5	HNU = 0 ppm α = 0 cpm βγ = 80-110 cpm
	17620 1340 5-1	12					
	17621 1340 5-1	19					

NOTES: DRILLING CO.:
DRILLER: DAVE NEUMAN
HELPER: BILL ANDERSON

MATERIALS USED:
3½ BAGS 10/20 SAND.
2½ 5 gal. BUCKETS BENTONITE
½ BAG. CEMENT
5 GAL. 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 = 60-80 cpm
LEL = 0.0 ppm
O_2 = 20.6 %

124

FERNALD RI/FS

2731

	Initial	Date
1st Key In	[illegible]	8-15-89
2nd Key In	[illegible]	8-2-91
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1229	COORDINATES:	DATE: 5-1-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5-1-89
ENGINEER/GEOLOGIST: E. Trollinger/C. Grube	Depth Date/Time	DATE COMPLETED: 5-1-89
DRILLING METHODS: MOBILE DRILL HSA		PAGE 2 OF 2 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	17622 1345 5-1	14	7	Stiff, yellowish brown (10YR 5/6), silty clay, low plastic, moist	CL	1.5	HNU = 0 ppm α = 0 cpm βγ = 100-120 cpm
	17623 1345 5-1	16					
9	17624 1345 5-1	22					
	17625 1415 5-1	18	NR	Attempted samples at this interval 3 times with catchers in spoon.	—	—	HNU = N/A α = N/A βγ = N/A
10	17626 1415 5-1	20					
	17627 1415 5-1	32					
11	17628 1430 5-1	8	18	Stiff, yellowish brown (10YR 5/6), silty clay, trace sand, trace medium gravel, low plasticity, moist	CL	1.0	HNU = 0 ppm α = 0 cpm βγ = 80-100 cpm * Note: Used 15 in long, 3 in. in diameter split spoon from 10.5 FT to 12.0 FT after 1st attempt at recovery of a sample failed
	50627 1430 5-1	6		Medium Dense, clayey silts, Yellowish brown (10YR 5/6), wet	ML	N/A	
12	50628 1430 5-1	10		Medium Stiff, gray (5y 5/1) clay, trace coarse sand, trace medium gravel, wet GRAY-BROWN (10YR 5/2) CLAY IN END OF SPOON.	CL	0.75	
13				BOTTOM OF BORING @ 12.0 FT. SAMPLING ENDING @ 12.0 FT.			
14							

NOTES:

DRILLER: DAVE NEWMAN
HELPER: BILL ANDERSON

INSTRUMENT BACKGROUND
HNU = 0.2 ppm
α = 0 cpm
βγ = 60-80 cpm

125

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1229	COORDINATES: NORTH 480,262.59 EAST 1,379,834.54	DATE: 05/01/89
GROUND ELEVATION: 578.37	GWL: Depth N/A Date/Time N/A	DATE STARTED: 05/01/89
ENGINEER/GEOLOGIST: E. TROLLINGER, C.	Depth N/A Date/Time N/A	DATE COMPLETED: 05/01/89
DRILLING METHODS: MOBILE DRILL HSA 8"		PAGE OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	17607	05/01/89	1025	9 19 27	8	NATURAL GRAVEL FILL, MEDIUM SIZE, WET FROM SURFACE WATER.	GP	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
1.0	17608	05/01/89	1025	9 19 27	8	NATURAL GRAVEL FILL, MEDIUM SIZE, WET FROM SURFACE WATER.	GP	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
1.5	17609	05/01/89	1025	9 19 27	8	NATURAL GRAVEL FILL, MEDIUM SIZE, WET FROM SURFACE WATER.	GP	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
2.0	17610	05/01/89	1030	19 12 12	9	MEDIUM DENSE, YELLOWISH BROWN (10 YR 4/4) TO GRAY (10 YR 4/2) SANDY GRAVEL, WET FROM SURFACE WATER.	GW	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
2.5	17611	05/01/89	1030	19 12 12	9	MEDIUM DENSE, YELLOWISH BROWN (10 YR 4/4) TO GRAY (10 YR 4/2) SANDY GRAVEL, WET FROM SURFACE WATER.	GW	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
3.0	17612	05/01/89	1030	19 12 12	9	STIFF, GRAY (10 YR 4/1) CLAY, TRACE OF FINE GRAVEL, MEDIUM PLASTIC, WET FROM SURFACE WATER.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 100-110cpm
3.5	17613	05/01/89	1035	6 7 14	10	STIFF, GRAY (10 YR 4/1) CLAY, TRACE OF FINE GRAVEL, MEDIUM PLASTIC, WET FROM SURFACE WATER. VERY STIFF, GRAY (5 Y 4/2), CLAY, TRACE FINE GRAVEL, MEDIUM PLASTIC, MOIST.	CL	2.75 2.75	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
4.0	17614	05/01/89	1035	6 7 14	10	STIFF, OLIVE GRAY (5 Y 4/3), CLAY, MEDIUM PLASTIC, MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
4.5	17615	05/01/89	1035	6 7 14	10	STIFF, OLIVE GRAY (5 Y 4/3), CLAY, MEDIUM PLASTIC, MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
5.0	17616	05/01/89	1043	13 17 26	10	STIFF, YELLOWISH BROWN (10 YR 5/6), CLAY, TRACE SAND, MEDIUM PLASTIC, MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm
5.5	17617	05/01/89	1043	13 17 26	10	STIFF, YELLOWISH BROWN (10 YR 5/6), CLAY, TRACE SAND, MEDIUM PLASTIC, MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm
6.0	17618	05/01/89	1043	13 17 26	10	STIFF, YELLOWISH BROWN (10 YR 5/6), CLAY, TRACE SAND, MEDIUM PLASTIC, MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm
6.5	17619	05/01/89	1340	6 12 19	16	VERY STIFF, LIGHT OLIVE BROWN (5 Y 5/4), CLAY, LOW TO MEDIUM PLASTIC, MOIST.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 80-110 cpm
7.0	17620	05/01/89	1340	6 12 19	16	VERY STIFF, LIGHT OLIVE BROWN (5 Y 5/4), CLAY, LOW TO MEDIUM PLASTIC, MOIST.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 80-110 cpm
7.5	17621	05/01/89	1340	6 12 19	16	VERY STIFF, LIGHT OLIVE BROWN (5 Y 5/4), CLAY, LOW TO MEDIUM PLASTIC, MOIST.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 80-110 cpm
8.0	17622	05/01/89	1345	14 16 22	7	STIFF, YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, LOW PLASTIC, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm

NOTES:
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.
SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1229	COORDINATES: NORTH 480,262.59 EAST 1,379,834.54	DATE: 05/01/89
GROUND ELEVATION: 578.37	GWL: Depth N/A Date/Time N/A	DATE STARTED: 05/01/89
ENGINEER/GEOLOGIST: E. TROLLINGER, C.	Depth N/A Date/Time N/A	DATE COMPLETED: 05/01/89
DRILLING METHODS: MOBILE DRILL HSA 8"		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	17623	05/01/89 1345	14 16 22	7	STIFF, YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, LOW PLASTIC, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
9.0	17624	05/01/89 1345	14 16 22	7	STIFF, YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, LOW PLASTIC, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
9.5	17625	05/01/89 1415	18 20 32		NO RECOVERY.			
10.0	17626	05/01/89 1415	18 20 32		NO RECOVERY.			
10.5	17627	05/01/89 1415	18 20 32		NO RECOVERY.			
11.0	17628	05/01/89 1430	8 6 10	18	STIFF, YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, TRACE SAND MEDIUM GRAVEL, LOW PLASTICITY, MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm
11.5	50627	05/01/89 1430	8 6 10	18	MEDIUM DENSE, CLAYEY SILTS, YELLOWISH BROWN (10 YR 5/6), WET.	ML	NA	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm
12.0	50628	05/01/89 1430	8 6 10	18	MEDIUM STIFF, GRAY (5 Y 5/1) CLAY, TRACE COARSE SAND, TRACE MEDIUM GRAVEL, WET. GRAY-BROWN (10 YR 5/2) CLAY IN END OF SPOON.	CL	0.75 0.75	Hnu= 0 ppm α = 0 cpm βΓ = 80-100 cpm

BOTTOM OF BORING 12.0

NOTES:
USED 15 IN. LONG, 3 IN. IN DIAMETER SPLIT SPOON FROM 10.5 FT. TO 12.0 FT. AFTER 1ST ATTEMPT AT RECOVERY OF A SAMPLE FAILED. 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. SAMPLING IN ACCORDANCE WITH ASTM STANDARDS, DESCRIPTION OF SOIL COLOR BY MUNSELL COLOR CHART.

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald FMPC RI/FS
FIELD ENG./GEO. E. Trollinger/C. Grube DATE 05-01-89
PROJECT NO. 602 3.7
CHECKED BY W.A. Hertel DATE 05-02-89
BORING NO. 1229
PIEZOMETER NO. 1229
DATE OF INSTALLATION 05-01-89

BOREHOLE 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 8 in. Hollow Stem Auger
CASING SIZE (S) USED:
SIZE N/A FROM — TO —
SIZE N/A 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 5/16 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 cover with installed padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0		580.35	
GROUND SURFACE	0.0		578.35	
BOTTOM OF PROTECTIVE PIPE	2.5		575.85	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ Cement	TOP 0.0 FT	BOTTOM 1.0 FT	TOP 578.35	BOTTOM 577.35
BENTONITE	TOP 1.0 FT	BOTTOM 4.7 FT	TOP 577.35	BOTTOM 573.65
SAND	TOP 4.7 FT	BOTTOM 12.0 FT	TOP 573.65	BOTTOM 566.35
~~GRAVEL~~ N/A	TOP —	BOTTOM —	TOP —	BOTTOM —
PERFORATED SECTION	TOP 7.0 FT	BOTTOM 12.0 FT	TOP 571.35	BOTTOM 566.35
PIEZOMETER TIP	12.0 FT		566.35	
BOTTOM OF BOREHOLE	12.0 FT		566.35	
GWL AFTER INSTALLATION	—		—	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 128
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS WATER BEARING ZONE ENCOUNTERED FROM 10.7 FT TO 11.9 FT AS NOTED ON BORING LOG.

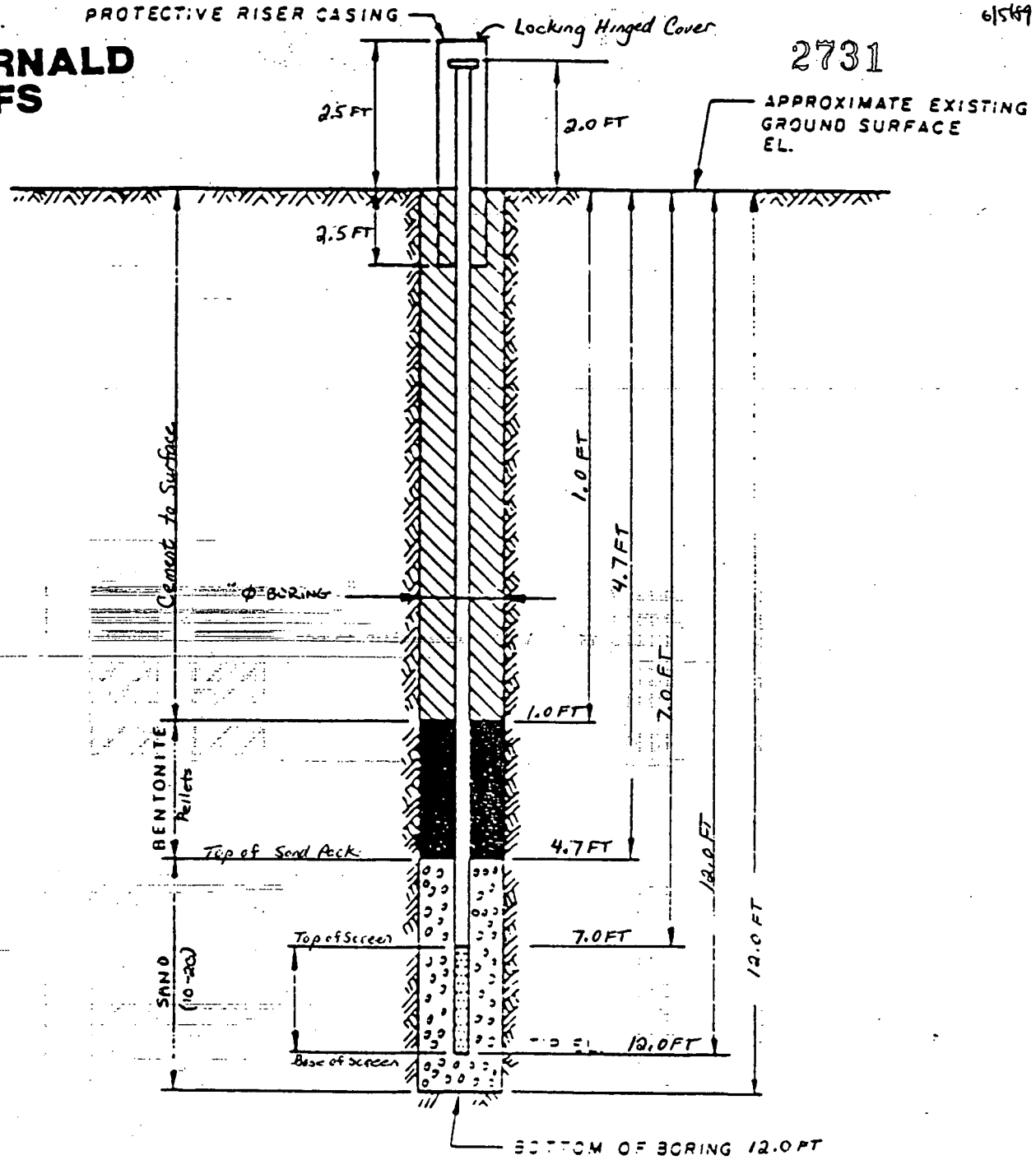
NOTE: Sample Zone 9 to 10.5 had no recovery - Possible Wet Sand bearing zone.
6/5/89

429-1 96

4/4 of 5
BQ
6/5/89

FERNALD RI/FS

2731



DRAWING NUMBER MW-1229
CHECKED BY
APPROVED BY
CG
DRAWN BY

NOTES:

1. RISER PIPE IS 2 IN ID SCHEDULE 40 PVC PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 2.0 IN I.D. SCH 40 PVC PIPE CONTINUOUS SLOT SCREEN (0.020 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

Materials used in well installation:
10-20 sand — 3 ½ 80 lb. sacks
Bentonite Pellets — 2 ½ 5 gal. Buckets
Cement — ½ 50 lb. bag
WATER — 5 gals.

INSTALLATION DETAILS
MONITORING WELL # 1229

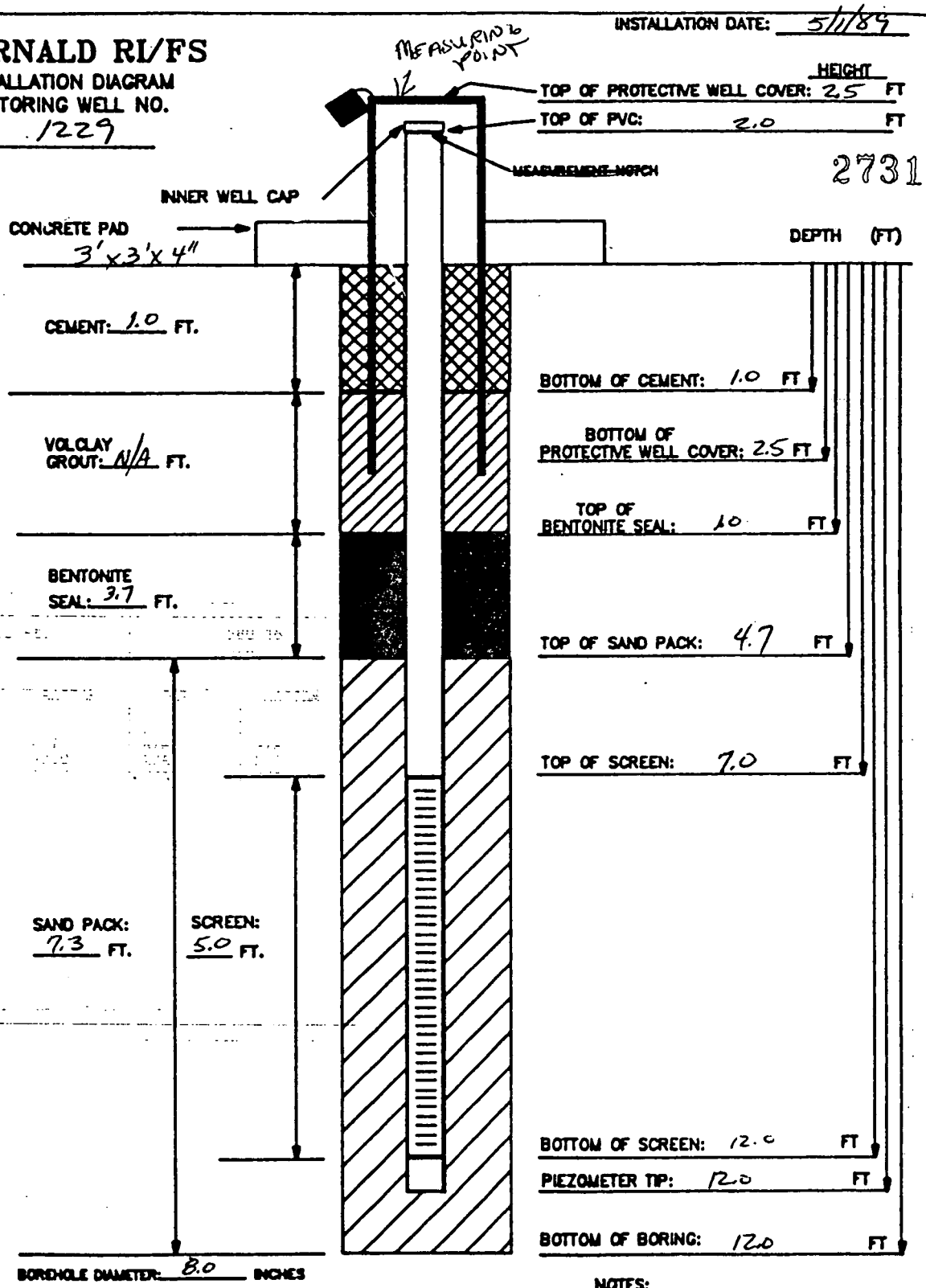
PREPARED FOR FMPC RI/FS
Boring # 1229

PVC well screen and riser pipes: 129
1 — 5 FT screen section
1 — 9 FT Riser section (cut to Length)

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1229

INSTALLATION DATE: 5/1/89



MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20 3 1/2 SACKS
BENTONITE PELLETS (5-GALLON BUCKETS): 2 1/2
BAGS OF VOLCLAY GROUT: NONE
AMOUNT OF CEMENT: 1/2 50 lb. sack
AMOUNT OF WATER USED: 5 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:

130

TASK: 3.7

GEOLOGIST/ENGINEER: E. Trollinger / C. Gruber

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS FIELD ENG./GEO.: E. TROLLINGER/C. GRUBEDATE: 05/01/89
PROJECT NO. : 602.3.2 CHECKED BY : W.A. HERTEL DATE: 05/02/89
BORING NO. : 1229 N,E COORDINATES: 480262.59, 1379834.5
WELL NUMBER: 1229 DATE OF INSTAL.: 05/01/89

2731

LE DRILLING

LLING METHOD: AUGER	TYPE OF BIT: 8 IN. HOLLOW STEM AU
DRILLING FLUID(S) USED: NONE NOTED	IS CASING TEMPORARY?: No
NOTES COMMENTS:	CASING TYPE : MONITORING PIEZOMETE
	CASING DIAM.: 2.0 In. ID
	CASING SIZE(S) USED: (Units N/A)
	SIZE: N/A FROM: N/A TO: N/A
	SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL	RISER PIPE MATERIAL: SCHEDULE 40 PVC
DIAMETER OF PERFORATED SECTION:	RISER PIPE DIAMETERS:
PERFORATION TYPE: Slots	O.D.: 2 5/16 In. I.D.: 2.0 In.
AVG. SIZE OF PERFORATIONS: 0.020 (In.)	LENGTH OF 1ST PIPE SECTION: 9.0 Ft.
TOTAL PERFORATED AREA: 5.0 Ft.	2ND PIPE SECTION: Not Noted
NOTES/COMMENTS:	3RD PIPE SECTION: Not Noted
	COMMENTS
RISER JOINING METHOD: SCREW TYPE, FLUSH JOINT THREADED	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.	OTHER PROTECTION (* NOTED BELOW)
PROTECTIVE PIPE O.D.: 4 3/ In.	
* HINGED COVER WITH INSTALLED PA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		580.16	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	1.0	N/A	N/A
Bentonite Pellets	1.0	4.7	N/A	N/A
nd	4.7	12.0	N/A	N/A
DRATED SECTION	7.0	12.0	N/A	N/A
LL TIP	12.0		N/A	
BOTTOM OF BOREHOLE	12.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : WATER BEARING ZONE ENCOUNTERED FROM 10.7 TO 11.9 FT. AS NOTED ON BORING LOG. NOTE: SAMPLE ZONE 9 TO 10.5 HAD NO RECOVERY - POSSIBLE WET SAND BEARING ZONE?

COMMENTS:

WELL 1260

FERNALD RI/FS

original Dentul subpoena (SUP)

VISUAL CLASSIFICATION OF SOILS

Field Check	BW	7/2/89			
1st Key In	JAB	8-16-89			2nd Key In
2nd Key In	JAB	1-8-91			1st Key In
Hard Copy Verification					Field Check

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS
BORING NUMBER: 1260	COORDINATES: N471755.59 E1379915.71
ELEVATION: 578.43	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: C. Grube	Depth Date/Time
DRILLING METHODS: AUGER (HOLLOW STEM)	

DATE: 6/15/89
DATE STARTED: 6/15/89
DATE COMPLETED: 6/15/89
PAGE 1 OF 4

2731

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	18284 920 6/15	NA	6	Med. stiff (10YR 5/3) brown gravelly clay some sand low plasticity, moist.	CL	1.0	HNU = 0 ppm 1ST foot α = 0 cpm hand dig era Bγ = 500 cpm
1	18290 930 6/15	NA	6	Stiff (10YR 5/4) yellowish brown sandy clay, some gravel, low plasticity, moist.	CL	1.5	HNU = 0 ppm α = 0 cpm Bγ = 180-220 cpm
	18291 0950 6/15	2	6	Stiff (10YR 5/3) brown sandy clay, some gravel, low plasticity, moist.	CL	1.0	HNU = 0 ppm α = 0 cpm Bγ = 240-260 cpm
2	18292 0950 6/15	1	4	SAA	CL	1.0	HNU = 0 ppm α = 0 cpm
	18293 0950 6/15	2	10	Soft (2.5Y 5/4) light olive brown sandy clay, some gravel, med. plasticity, very moist	CL	0.5	Bγ = ~~180-220~~ 240-260 cpm
	18294 0950 6-15	3	3	Med stiff SAA	CL	0.75	HNU = 0 ppm α = 0 cpm Bγ = 180-200 cpm
Water bearing 3.0 ft	18295 10:00 6/15	2	6	Loose (10YR 5/6) yellowish brown clayey sand trace of fine gravel wet	SC	NA	HNU = 0 ppm α = 0 cpm Bγ = 250-270 cpm
4	18296 1000 6/15	2	6	Soft (10YR 5/4) yellowish brown sandy clay trace of gravel, medium plasticity, very moist	CL	0.25	
	18297 1000 6/15	4	1	Soft (10YR 5/6) yellowish brown + (5Y 6/1) gray mottled silty clay trace of sand low plasticity, moist	CL	0.25	
5	18298 1003 6/15	4	6	Med. dense (10YR 5/4) yellowish brown clayey sand trace of gravel, wet.	SC	NA	HNU = 0 ppm α = 0 cpm Bγ = 240-260 cpm
	18299 1003 6/15	6	6	Very stiff (10YR 3/4) yellowish brown, silty clay trace of sand, low plasticity, moist	CL	2.75	
				Stiff (5Y 4/1) dark gray silty clay, some sand, low plasticity, moist	CL	1.25	
6	18300 1003 6/15	7	4	SAA	CL	1.25	
	18301 1006 6/15	7	6	Med dense (2.5Y 5/4) light olive brown clayey sand trace of fine gravel, wet.	SC	NA	HNU = 0 ppm α = 0 cpm Bγ = 220-230 cpm
7	18302 1006 6/15	8	6	Stiff (5Y 3/1) very dark gray silty clay trace of sand, low plasticity, moist.	CL	1.5	
	18303 1006 6/15	10	6	Stiff (5Y 4/2) olive gray silty clay some sand, low plasticity, moist.	CL	1.5	

NOTES:
CONTRACTOR: PENNDRILL
RIG: Model 80
DRILLER: Craig Coulter
ASSISTANT: Bill Anderson
Geo Assistant: Theresa Sartorelli
SAA = Same As Above
NR = No Recovery

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
Bγ = 160-200 CPM

133

LEL/O2: LEL = 0% ~~PPM~~ 6/15/89
O2 = 20.6 %

HNU400221

ERNALD
RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1260	COORDINATES:	DATE: 6/15/89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/15/89
ENGINEER/GEOLOGIST: C Grube	Depth Date/Time	DATE COMPLETED: 6/15/89
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	18204 1010 6/15	7	6	Dense (2.5Y 5/4) light olive brown clayey sand, wet.	SC	NA	HNU = 0ppm α = 0cpm Bγ = 210-230cpm
8.3PM	18305 1010 6/15	8	6	Dense (2.5Y 5/4) light olive brown clayey sand some gravel, wet	SC	NA	
				Stiff (2.5Y 4/4) olive brown sandy clay low plasticity moist.	CL	1.25	
9	18306 1000 6/15	20	6	SAA	CL	1.25	
			*	Bottom of Boring & sampling at 9.0 feet			HNU = α = Bγ =
10							
11							HNU = α = Bγ =
12							HNU = α = Bγ =
13							
14							HNU = α = Bγ =

NOTES:

SAA = Same As Above
NR = No Recovery

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS 2731	
BORING NUMBER: 1260	COORDINATES: NORTH 479,755.59 EAST 1,379,915.71	DATE: 06/15/89
GROUND ELEVATION: 578.83	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/15/89
ENGINEER/GEOLOGIST: C. GRUBE	Depth N/A Date/Time N/A	DATE COMPLETED: 06/15/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	18289	06/15/89 0920		6	MED. STIFF (10 YR 5/3) BROWN GRAVELLY CLAY SOME SAND LOW PLASTICITY, MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 500 cpm
1.0	18290	06/15/89 0930		6	STIFF (10 YR 5/4) YELLOWISH BROWN SANDY CLAY, SOME GRAVEL, LOW PLASTICITY, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 180-220cpm
1.5	18291	06/15/89 0950	2	6	STIFF (10 YR 5/3) BROWN SANDY CLAY, SOME GRAVEL, LOW PLASTICITY, MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 240-260cpm
2.0	18292	06/15/89 0950	1	4	STIFF (10 YR 5/3) BROWN SANDY CLAY, SOME GRAVEL, LOW PLASTICITY, MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm Bγ = 240-260cpm
2.5	18293	06/15/89 0950	2	6	SOFT (2.5 Y 5/4) LIGHT OLIVE BROWN SANDY CLAY, SOME GRAVEL, MED. PLASTICITY, VERY MOIST.	CL	0.5	Hnu= 0 ppm α = 0 cpm Bγ = 180-200cpm
3.0	18294	06/15/89 0950	3	3	MED STIFF, (2.5 Y 5/4) LIGHT OLIVE BROWN SANDY CLAY, SOME GRAVEL, MED. PLASTICITY, VERY MOIST.	CL	0.75	Hnu= 0 ppm α = 0 cpm Bγ = 180-200cpm
3.5	18295	06/15/89 1000	2	6	LOOSE (10 YR 5/6) YELLOWISH BROWN CLAYEY SAND TRACE OF FINE GRAVEL, WET.	SC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 250-270cpm
4.0	18296	06/15/89 1000	2	6	SOFT (10 YR 5/4) YELLOWISH BROWN SANDY CLAY TRACE OF GRAVEL, MEDIUM PLASTICITY, VERY MOIST.	CL	0.25	Hnu= 0 ppm α = 0 cpm Bγ = 250-270cpm
4.5	18297	06/15/89 1000	4	1	SOFT (10 YR 5/6) YELLOWISH BROWN AND (5 Y 6/1) GRAY MOTTLED SILTY CLAY TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	0.25	Hnu= 0 ppm α = 0 cpm Bγ = 250-270cpm
5.0	18298	06/15/89 1003	4	6	MED. DENSE (10 YR 5/4) YELLOWISH BROWN CLAYEY SAND TRACE OF GRAVEL, WET.	SC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 240-260cpm
5.5	18299	06/15/89 1003	6	6	VERY STIFF (10 YR 5/4) YELLOWISH BROWN, SILTY CLAY TRACE OF SAND, LOW PLASTICITY, MOIST. STIFF (5 Y 4/1) DARK GRAY SILTY CLAY, SOME SAND, LOW PLASTICITY, MOIST.	CL CL	2.75 2.75	Hnu= 0 ppm α = 0 cpm Bγ = 240-260cpm
6.0	18300	06/15/89 1003	7	4	STIFF (5 Y 4/1) DARK GRAY SILTY CLAY, SOME SAND, LOW PLASTICITY, MOIST.	CL	1.25	Hnu= 0 ppm α = 0 cpm Bγ = 240-260cpm
6.5	18301	06/15/89 1006	7	6	MED DENSE (2.5 Y 5/4) LIGHT OLIVE BROWN CLAYEY SAND TRACE OF FINE GRAVEL, WET.	SC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 220-230cpm
7.0	18302	06/15/89 1006	8	6	STIFF (5 Y 3/1) VERY DARK GRAY SILTY CLAY TRACE OF SAND, LOW PLASTICITY, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 220-230cpm
7.5	18303	06/15/89 1006	10	6	STIFF (5 Y 4/2) OLIVE GRAY SILTY CLAY SOME SAND, LOW PLASTICITY, MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 220-230cpm
8.0	18304	06/15/89 1010	7	6	DENSE (2.5 Y 5/4) LIGHT OLIVE BROWN CLAYEY SAND, WET.	SC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 210-230cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1260	COORDINATES: NORTH 479,755.59 EAST 1,379,915.71	DATE: 06/15/89
GROUND ELEVATION: 578.83	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/15/89
ENGINEER/GEOLOGIST: C. GRUBE	Depth N/A Date/Time N/A	DATE COMPLETED: 06/15/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	18305	06/15/89 1010	8		6	DENSE (2.5 Y 5/4) LIGHT OLIVE BROWN CLAYEY SAND SOME GRAVEL, WET. STIFF (2.5 Y 4/4) OLIVE BROWN SANDY CLAY LOW PLASTICITY, MOIST.	SC CL	NA NA	Hnu= 0 ppm α = 0 cpm βΓ = 210-230cpm
9.0	18306	06/15/89 1010	20		6	STIFF (2.5 Y 4/4) OLIVE BROWN SANDY CLAY LOW PLASTICITY , MOIST.	CL	1.25	Hnu= 0 ppm α = 0 cpm βΓ = 210-230cpm

BOTTOM OF BORING 9.0

NOTES:
* BOTTOM OF BORING & SAMPLING AT 9.0 FEET.
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

RNALD
RI/FS

2731

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. C. Grube DATE 6/15/89
PROJECT NO. 602 3.7 CHECKED BY [illegible] DATE 7/2/89
BORING NO. 1260
PIEZOMETER NO. 1260 DATE OF INSTALLATION 6/15/89

BOREHOLE DRILLING

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

TYPE OF BIT 8.0 in Hollow Auger
CASING SIZE (S) USED:
SIZE N/A FROM — TO —
SIZE N/A 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 feet

RISER PIPE MATERIAL Schedule 40 PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in
LENGTH OF PIPE SECTIONS
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 ft		580.30	
GROUND SURFACE	0.0		578.30	
BOTTOM OF PROTECTIVE PIPE	2.6 ft		575.70	
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 9.0	TOP	BOTTOM
GRAVEL - N/A	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 4.0	BOTTOM 9.0	TOP	BOTTOM
PIEZOMETER TIP	9.0			
BOTTOM OF BOREHOLE	9.0			
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 ☒

137

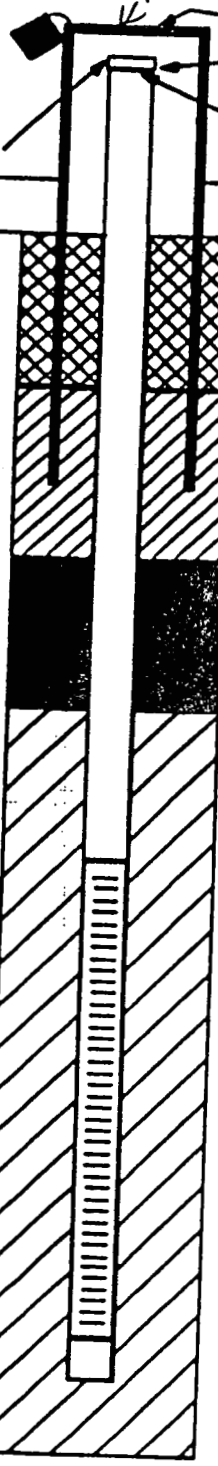
REMARKS Top of water bearing zone at 3.0 ft
Bottom of water bearing zone at 8.3 ft

Elevation put in 6-20-90 BA

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1260

INSTALLATION DATE: 6/15/89



	HEIGHT
TOP OF PROTECTIVE WELL COVER:	2.4 FT
TOP OF PVC:	2.0 FT

2731

DEPTH (FT)

CEMENT: 1.0 FT.

VOLCLAY GROUT: Ø FT.

BENTONITE SEAL: 1.5 FT.

SAND PACK: 6.5 FT.

SCREEN: 5.0 FT.

BOREHOLE DIAMETER: 8.0 INCHES

BOTTOM OF CEMENT:	1.0 FT
BOTTOM OF PROTECTIVE WELL COVER:	2.6 FT
TOP OF BENTONITE SEAL:	1.0 FT
TOP OF SAND PACK:	2.5 FT
TOP OF SCREEN:	4.0 FT
BOTTOM OF SCREEN:	9.0 FT
PIEZOMETER TIP:	9.0 FT
BOTTOM OF BORING:	9.0 FT

MATERIALS USED:

SAND TYPE AND QUANTITY: 10/20 sand - 2 80lb. sacks
BENTONITE PELLETS (5-GALLON BUCKETS): 3/4 5 gal Bucket
BAGS OF VOLCLAY GROUT: Ø
AMOUNT OF CEMENT: 1/2 94lb sack
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:

138

TASK: 602 3.7

GEOLOGIST/ENGINEER: C. Grube

MONITORING WELL INSTALLATION RECORD
11/21/91

ROJECT NAME: Fernald RI/FS
ROJECT NO. : 602.3.2
ORING NO. : 1260
ELL NUMBER: 1260

FIELD ENG./GEO.: C. GRUBE
CHECKED BY : BD
N,E COORDINATES: 479755.59, 1379915.7
DATE OF INSTAL.: 06/15/89

DATE: 06/15/89
DATE: 07/02/89

2731

LE DRILLING

ING METHOD: AUGER
LLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: 8 IN. HOLLOW AUGER
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING PIEZOMETE
CASING DIAM.: 2.0 In. ID
CASING SIZE(S) USED: (Units N/A)
SIZE: N/A FROM: N/A TO: N/A
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: 0.020 (In.)
TOTAL PERFORATED AREA: 5.0 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: SCHEDULE 40 PVC
RISER PIPE DIAMETERS:
O.D.: 2 5/16 In. I.D.: 2.0 In.
LENGTH OF 1ST PIPE SECTION:
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW TYPE - FLUSH JOINT THREADED

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 4 3/ In.
• HINGED PROTECTIVE COVER WITH I

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		580.40	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.6 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	1.0	N/A	N/A
Bentonite Pellets	1.0	2.5	N/A	N/A
Sand	2.5	9.0	N/A	N/A
ORATED SECTION	4.0	9.0	N/A	N/A
TIP	9.0		N/A	
BOTTOM OF BOREHOLE	9.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

AS THE WELL FLUSHED AFTER INSTALLATION? : No
AS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

EMARKS : TOP OF WATER BEARING ZONE AT 3.0 FT. BOTTOM OF WATER BEARING ZONE AT 8.3 FT.

OMMENTS:

WELL 1276

FERNALD RI/FS

COPY

2731

	Date	Initial	Field Engr.	1st Key In.	2nd Key In.	Hard Copy Verification
	7/2/89					

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1276	COORDINATES: N482052.32 E1381885.01	DATE: 06-28-89
ELEVATION: 590.31 JRW 3/1/91	GWL: Depth Not measured Date/Time 6.28.89	DATE STARTED: 06-28-89
ENGINEER/GEOLOGIST: M. SLUFARSKI	Depth Not measured Date/Time 6.28.89	DATE COMPLETED: 06-28-89
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	18641* 1010 06-28	16	12	VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, SOME GRAVEL (.25-1.0 IN) TRACE ORGANIC MATERIAL, DRY	CL	4.0	HNU: 0 PPM α: 0 CPM Bγ: 60-80 CPM
	18642 1010 06-28	13		VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DRY	CL	4.0	
	18643 1010 06-28	18	—	NO RECOVERY 1.0-1.5 FT.	—	—	
2	18644 1015 06-28	11	6	VERY STIFF, BROWN (10YR 5/3) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25-.50 IN) DAMP	CL	3.0	HNU: 0 PPM α: 0 CPM Bγ: 60-80 CPM
	18645 1015 06-28	11	—		—	—	
3	18646 1015 06-28	12	—		—	—	
4	18647* 1018 06-28	11	18	STIFF, BROWN (10YR 5/3) SILTY CLAY TRACE SAND, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU: 0 PPM α: 0 CPM Bγ: 100-120 CPM
	18648 1018 06-28	13		A.A.	CL	2.0	
	18649 1018 06-28	13		STIFF, BROWN (10YR 5/3) SILTY CLAY TRACE SAND, TRACE GRAVEL (.25-1.0 IN) DAMP	CL	2.0	
5	18650 1020 06-28	16	18	STIFF, YELLOW-BROWN (10YR 4/6) SILTY CLAY, TRACE GRAVEL (.25-.50 IN) DAMP	CL	2.0	HNU: 0 PPM α: 0 CPM Bγ: 100 CPM
	18651* 1020 06-28	19		A.A.	CL	2.0	
6	18652 1020 06-28	20		A.A.	CL	2.0	
	18653 1104 06-28	11		A.A.	CL	2.0	HNU: 0 α: 0 Bγ: 100
7	18654 1104 06-28	10	18	A.A.	CL	2.0	
	18655 1104 06-28	12		STIFF, GREY-BROWN (10YR 3/2) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) MOIST	CL	2.0	

NOTES: CONTRACTOR: PENNDRILL
RIG: MOBILE RIG 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: 100-120 CPM
LEL/O_2: LEL: 0 PPM
O_2: 20.6%

141

A.A.: AS ABOVE

REVIEWED BY: [illegible] DATE 3-19-91

FERNALD RI/FS

2731

	Initial	Date
1st Key In		8-18-89
2nd Key In		3-19-91
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1276	COORDINATES: See p.1	DATE: 06-28-89
ELEVATION: See p.1	GWL: Depth p.1 Date/Time p.1	DATE STARTED: 06-28-89
ENGINEER/GEOLOGIST: See p.1	Depth p.1 Date/Time p.1	DATE COMPLETED: 06-28-89
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	18656 1107 06-28	9		STIFF, GREY (5Y 4/1) SILTY CLAY TRACE GRAVEL (25-50 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM Bβ = 100 CPM
	18657 1107 06-28	10	18	A.A	CL	2.0	
	18658 1107 06-28	13		A.A	CL	2.0	
9	18659 1110 06-28	10		A.A	CL	2.0	HNU = 0 PPM α = 0 CPM Bβ = 100 CPM
	18660 1110 06-28	11	18	A.A	CL	2.0	
10	18661 1110 06-28	15		A.A	CL	2.0	
	18662 1117 06-28	4		A.A	CL	2.0	HNU = 0 PPM α = 0 CPM Bβ = 100 CPM
11	53215 1117 06-28	6	18	A.A	CL	2.0	
	53216 1117 06-28	6		A.A	CL	2.0	
12	53217 1351 06-28	44	6	A.A	CL	2.5	HNU = 0 PPM α = 0 CPM Bβ = 100-120 CPM
	53218 1351 06-28	47	—	NO RECOVERY 12.5-13.0 FT.	—	—	
13	53219 1351 06-28	7	—	NO RECOVERY 13.0-13.5 FT	—	—	
	53220 06-28	8		STIFF, GREY (5Y 4/1) SILTY CLAY TRACE GRAVEL (25-75 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM Bβ = 100-120 CPM
14	53221 06-28	16	14	A.A	CL	2.0	
	53222 06-28	12		A.A	CL	2.0	

NOTES:

142

REVIEWED BY QA [signature] DATE 3-19-91

AA = AS ABOVE

FERNALD RI/FS

2731

	Initial	Date
1st Key In		8-18-89
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1276	COORDINATES: See p.2	DATE: 06-28-89
ELEVATION: See p.1	GWL: Depth p.1 Date/Time p.1	DATE STARTED: 06-28-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth p.1 Date/Time p.1	DATE COMPLETED: 06-28-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF ~~4~~ 5

8/24/89

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S3223 1413 06-28	4		STIFF, GREY (5Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM Bγ = 100 CPM
16	S3224 1413 06-28	6	18	A.A	CL	2.0	
	S3225 1413 06-28	7		A.A	CL	2.0	
17	S3226 1433 06-28	7		A.A	CL	2.0	HNU = 0 PPM α = 0 CPM Bγ = 100 CPM
	S3227 1433 06-28	12	18	A.A	CL	2.0	
	S3228 1433 06-28	15		STIFF, GREY (5Y 4/1) SANDY CLAY SOME GRAVEL (.25 IN) MOIST	CL	2.5	
18	S3229 1505 06-28	4		A.A	CL	2.5	HNU = 0 PPM α = 0 CPM Bγ = 100 CPM
	S3230 1505 06-28	15		MEDIUM DENSE, GREY (5Y 4/1) CLAYEY GRAVEL, GRAVEL SAND - CLAY MIXTURE, WET	GC	N/A	
19	S3231 1505 06-28	15		A.A	GC	N/A	
	S3232 1505 06-28	16		A.A 20.5	GC	N/A	HNU = 0 PPM α = 0 CPM Bγ = 100 CPM
20				BOTTOM OF BORING 20.0 FT			

NOTES: BORING 1276 COMPLETED AS PIEZOMETER ON 06-28-89.

143

REVIEWED BY QA MB DATE 3-19-91

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1276	COORDINATES: NORTH 482,052.32 EAST 1,381,885.01	DATE: 06/28/89
GROUND ELEVATION: 590.51	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/28/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 06/28/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	18641	06/28/89 1010	16		VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, SOME GRAVEL (.25 - 1.0 IN) TRACE ORGANIC MATERIAL, DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm Bγ = 60-80 cpm
1.0	18642	06/28/89 1010	13	12	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DRY.	CL	4.0	Hnu= 0 ppm α = 0 cpm Bγ = 60-80 cpm
1.5	18643	06/28/89 1010	15		NO RECOVERY.			
2.0	18644	06/28/89 1015	11	6	VERY STIFF, BROWN (10 YR 5/3) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	3.0	Hnu= 0 ppm α = 0 cpm Bγ = 60-80 cpm
2.5	18645	06/28/89 1015	11		NO RECOVERY.			
3.0	18646	06/28/89 1015	12		NO RECOVERY.			
3.5	18647	06/28/89 1018	11		STIFF, BROWN (10 YR 5/2) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100-120cpm
4.0	18648	06/28/89 1018	13	18	STIFF, BROWN (10 YR 5/2) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100-120cpm
4.5	18649	06/28/89 1018	13		STIFF, BROWN (10 YR 5/3) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 - 1.0 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100-120cpm
5.0	18650	06/28/89 1020	16		STIFF, YELLOW-BROWN (10 YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
5.5	18651	06/28/89 1020	19	18	STIFF, YELLOW-BROWN (10 YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
6.0	18652	06/28/89 1020	20		STIFF, YELLOW-BROWN (10 YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
6.5	18653	06/28/89 1104	11		STIFF, YELLOW-BROWN (10 YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
7.0	18654	06/28/89 1104	10	18	STIFF, YELLOW-BROWN (10 YR 4/6) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
7.5	18655	06/28/89 1104	12		STIFF, GREY-BROWN (10 YR 3/2) SILTY CLAY. TRACE SAND, TRACE GRAVEL (.25 IN), MOIST.	CL	2.0 2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
8.0	18656	06/28/89 1107	9		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1276	COORDINATES: NORTH 482,052.32 EAST 1,381,885.01	DATE: 06/28/89
GROUND ELEVATION: 590.51	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/28/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 06/28/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	18657	06/28/89 1107	10	18	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
9.0	18658	06/28/89 1107	13		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
9.5	18659	06/28/89 1110	10		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
10.0	18660	06/28/89 1110	11	18	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
10.5	18661	06/28/89 1110	15		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
11.0	18662	06/28/89 1117	4		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
11.5	53215	06/28/89 1117	6	18	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
12.0	53216	06/28/89 1117	6		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
12.5	53217	06/28/89 1351	44	6	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
13.0	53218	06/28/89 1351	47		NO RECOVERY.			
13.5	53219	06/28/89 1351	7		NO RECOVERY.			
14.0	53220	06/28/89 1359	8		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .75 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
14.5	53221	06/28/89 1359	16	14	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .75 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
15.0	53222	06/28/89 1359	12		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 - .75 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-120cpm
15.5	53223	06/28/89 1413	4		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1276	COORDINATES: NORTH 482,052.32 EAST 1,381,885.01	DATE: 06/28/89
GROUND ELEVATION: 590.51	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/28/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 06/28/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.0	53224	06/28/89	1413	6	18	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
16.5	53225	06/28/89	1413	7		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
17.0	53226	06/28/89	1433	7		STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
17.5	53227	06/28/89	1433	12	18	STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
18.0	53228	06/28/89	1433	15		STIFF, GREY (5 Y 4/1) SANDY CLAY SOME GRAVEL (.25 IN) MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
18.5	53229	06/28/89	1505	4		STIFF, GREY (5 Y 4/1) SANDY CLAY SOME GRAVEL (.25 IN) MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
19.0	53230	06/28/89	1505	15		MEDIUM DENSE, GREY (5 Y 4/1) CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE, WET.	GC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
19.5	53231	06/28/89	1505	15		MEDIUM DENSE, GREY (5 Y 4/1) CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE, WET.	GC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm
20.0	53232	06/28/89	1505	16		MEDIUM DENSE, GREY (5 Y 4/1) CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE, WET.	GC	NA	Hnu= 0 ppm α = 0 cpm Bγ = 100 cpm

BOTTOM OF BORING 20.0

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

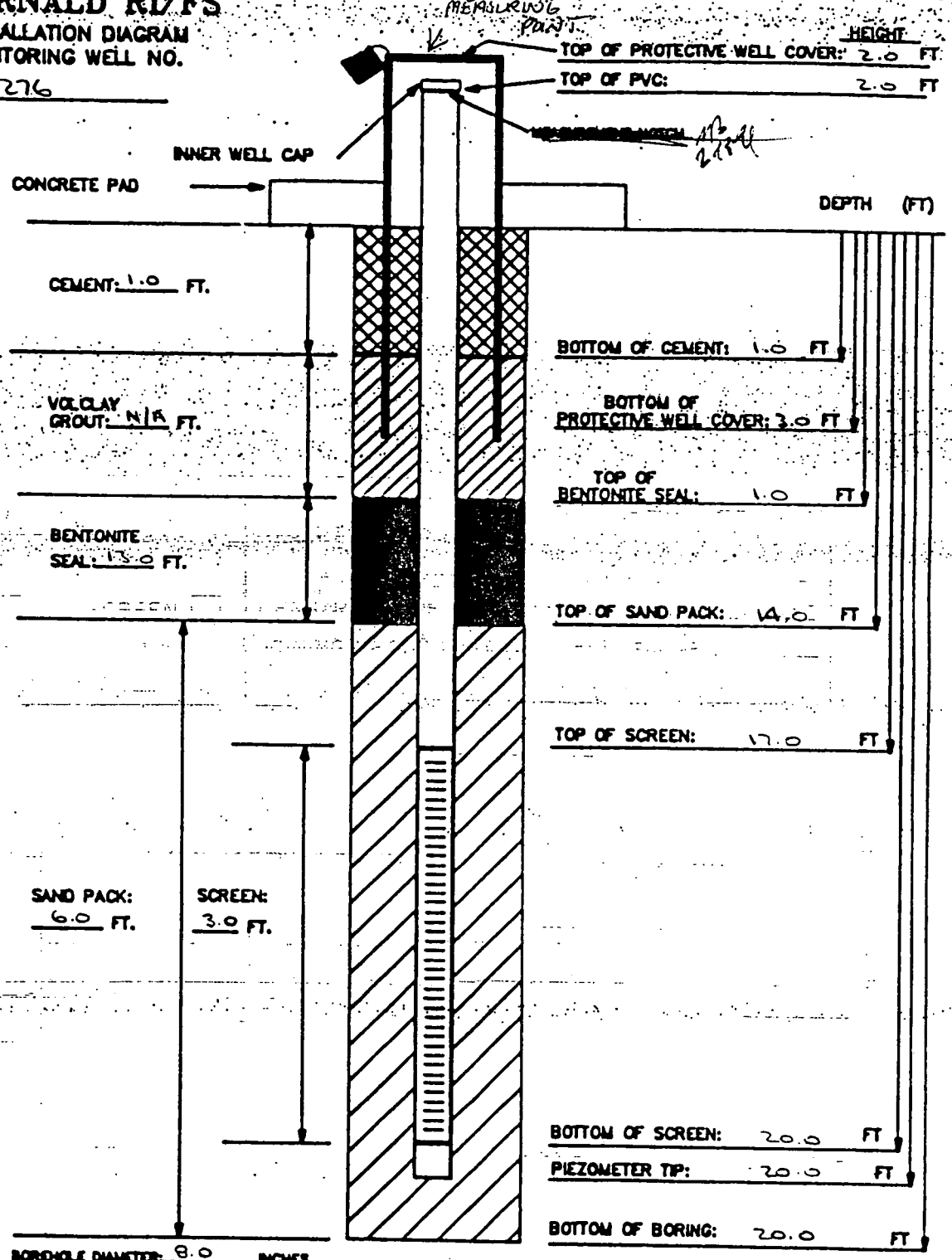
4/5

2731

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1276

INSTALLATION DATE: 06-28-89



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10-20 : 2.5 @ 80 LB SACKS
BENTONITE PELLETS (5-GALLON BUCKETS): 7.5 : 5-GAL 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:

147

TASK: 602 3.7.1

GEOLOGIST/ENGINEER: M. SLUSARSKI

REVIEWED BY QA MB DATE 3-1-91

5/5

2731

Initial	Date
1st Key	
2nd Key	
Hard Copy Verification	

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. M. Slusarski DATE 06-28-89
PROJECT NO. 602 3.7.1 CHECKED BY BJ. DATE 7/2/89
BORING NO. 1276
PIEZOMETER NO. 1276 DATE OF INSTALLATION 06-28-89

BOREHOLE DRILLING

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

TYPE OF BIT 8.0 in. Hollow Stem Auger
CASING SIZE (S) USED:
SIZE 4.25 in ID FROM 0.0 TO 20.0
SIZE N/A FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Piezometer
DIAMETER OF PERFORATED SECTION 2.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020
TOTAL PERFORATED AREA 4.8 FT

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS:
O.D. 2 5/16 in I.D. 2.0 in
LENGTH OF PIPE SECTIONS 3.0 FT, 9.0 FT, 10.0 FT
JOINING METHOD Screw Type Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.
PROTECTIVE PIPE O.D. 4 5/8 in.

OTHER PROTECTION Hinged Locking Cover w/ Padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION (FT)	
TOP OF RISER PIPE	2.0		~~592.15~~ 592.31	
GROUND SURFACE	0.0		590.31	
BOTTOM OF PROTECTIVE PIPE	3.0		587.31	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (Cement)	TOP 0.0	BOTTOM 1.0	TOP 590.31	BOTTOM 589.31
BENTONITE	TOP 1.0	BOTTOM 14.0	TOP 589.31	BOTTOM 576.31
SAND (10-20)	TOP 14.0	BOTTOM 20.0	TOP 576.31	BOTTOM 570.31
GRAVEL N/A	TOP —	BOTTOM —	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 17.0	BOTTOM 20.0	TOP 573.31	BOTTOM 570.31
PIEZOMETER TIP	20.0		570.31	
BOTTOM OF BOREHOLE	20.0		570.31	
GWL AFTER INSTALLATION				

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

148

REMARKS

REVIEWED BY QA [illegible] DATE 3-19-91

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 1276
WELL NUMBER: 1276

FIELD ENG./GEO.: M. SLUSARSKI DATE: 06/28/89
CHECKED BY : BD DATE: 07/02/89
N,E COORDINATES: 482052.32, 1381885.0
DATE OF INSTAL.: 06/28/89

2731

BOREHOLE DRILLING

DRILLING METHOD: AUGER
DRILLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: 8.0 IN. HOLLOW STEM
IS CASING TEMPORARY?: No
CASING TYPE : PIEZOMETER
CASING DIAM.: 2.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 4.2 FROM: 0.0 TO: 20.0
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .020 (In.)
TOTAL PERFORATED AREA: 4.8 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: PVC
RISER PIPE DIAMETERS:
O.D.: 2 5/16 In. I.D.: 2.0 In.
LENGTH OF 1ST PIPE SECTION: 3.0 Ft.
2ND PIPE SECTION: 9.0 Ft.
3RD PIPE SECTION: 10.0 Ft.
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 4 5/ In.
• HINGED LOCKING COVER W/PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	592.11
GROUND SURFACE	0.0	N/A
BOTTOM OF PROTECTIVE PIPE	3.0 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	1.0	N/A	N/A
Bentonite Pellets	1.0	14.0	N/A	N/A
Sand	14.0	20.0	N/A	N/A
PERFORATED SECTION	17.0	20.0	N/A	N/A
TIP	20.0		N/A	
BOTTOM OF BOREHOLE	20.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

COMMENTS:

WELL 1332

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 37.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1332	COORDINATES:	DATE: 07-30-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-30-89
ENGINEER/GEOLOGIST: M. SLOWARSKI	Depth Date/Time	DATE COMPLETED: 7-30-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	19873 1340 07-30	10	6	VERY STIFF, BROWN (10YR 5/3) SILTY CLAY, SOME GRAVEL (.25-1.0 IN) DAMP	CL	3.5	HNU = 0 PPM α = 0 CPM BG = 180-200 CPM
	19874 1340 07-30	11	6	A.A	CL	3.5	
	19875 1340 07-30	8	—	NO RECOVERY 1.0-1.5 FT	—	—	
2	19876 1341 07-30	8	—	NO RECOVERY 1.5-2.0 FT	—	—	HNU = 0 PPM α = 0 CPM BG = 180-200 CPM
	19877 1341 07-30	8	—	NO RECOVERY 2.0-2.5 FT	—	—	
3	19878 1341 07-30	5	—	NO RECOVERY 2.5-3.0 FT.	—	—	
4	19879 1346 07-30	8	6	STIFF, BROWN (10YR 5/3) SILTY CLAY SOME GRAVEL (.25-.50 IN) DAMP MOTTLED, DK GREY (5Y 4/1)	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 200-290 CPM
	19880 1346 07-30	10	—	NO RECOVERY 3.5-4.0 FT	—	—	
	19881 1346 07-30	10	—	NO RECOVERY 4.0-4.5 FT	—	—	
5	19882 1350 07-30	9	6	STIFF, OLIVE GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP 4.7	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-180 CPM
	19883 1350 07-30	10	6	STIFF, YELLOW-BROWN (10YR 5/3) SILTY CLAY SOME GRAVEL (.25-1.0 IN) DRY 5.0 STIFF, OLIVE-GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN), TRACE ORGANIC MATERIAL, DAMP	CL	2.0	
6	19884 1350 07-30	13	—	NO RECOVERY 5.5-6.0 FT	—	—	
7	19885 1416 07-30	2	6	STIFF, OLIVE GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 100-200 CPM
	19886 1416 07-30	4	6	A.A	CL	2.0	
	19887 1416 07-30	6	6	A.A	CL	2.0	

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

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION T
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BG = 500-700 CPM
LEL = 0 PPM
O_2 = 20.6 %

151

LELO2:

A.A. = AS ABOVE

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1332	COORDINATES:	DATE: 07-30-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-30-89
ENGINEER/GEOLOGIST: M SCHUMACH	Depth Date/Time	DATE COMPLETED: 7-30-89
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	19888 1420 07-30	6	6	STIFF, OLIVE GREY (5Y 4/1) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25-.10) DAMP	CL	2.0	HNU = 0 PPM
	19889 1420 07-30	7	6	A.A	CL	2.0	α = 0 CPM BG: 100-200 CPM
	19890 1420 07-30	7	—	NO RECOVERY - 8.5 - 9.0 FT.	—	—	
9	19891 1422 07-30	6	6	STIFF, OLIVE-GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25-.10) DAMP	CL	2.0	HNU = 0 PPM
	19892 1422 07-30	4	6	A.A	CL	2.0	α = 0 CPM BG: 100-200 CPM
10	19893 1422 07-30	4	—	NO RECOVERY 10.0 - 10.5	—	—	
11	19894 1430 07-30	2	6	STIFF YELLOW-BROWN (10YR 5/1), OLIVE-GREY (5Y 4/1) MOTTLED, SILTY CLAY, TR (.25-.10) GRAVEL, DAMP	CL	2.0	HNU = 0 PPM
	54335 1430 07-30	3	—	NO RECOVERY 11.0 - 11.5	—	—	α = 0 CPM BG: 100-180 CPM
12	54336 1430 07-30	6	—	NO RECOVERY 11.5 - 12.0	—	—	
	54337 1432 07-30	6	6	STIFF, LIGHT BROWN (2.5Y 5/2) SILTY CLAY, DAMP	CL	2.0	HNU = 0 PPM
13	54338 1432 07-30	7	6	A.A	CL	2.0	α = 0 CPM BG: 100-150 CPM
	54339 1432 07-30	7	6	A.A	CL	2.0	
14	54340 1437 07-30	15	6	VERY STIFF, OLIVE GREY (5Y 4/1) SILTY CLAY, DAMP	CL	2.5	HNU = 0 PPM
	54341 1437 07-30	19	6	A.A	CL	2.5	α = 0 CPM BG: 100-200 CPM
	54342 1437 07-30	14	6	A.A	CL	2.5	

NOTES:

A.A.

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1732	COORDINATES:	DATE: 07-30-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-30-89
ENGINEER/GEOLOGIST: M. SLUTARSKI	Depth Date/Time	DATE COMPLETED: 7-30-89
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
	S9343 1446 07-30	4	6	STIFF, OLIVE GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP	CL	2.0	HNU: 0 PPM α: 0 CPM BG: 100-200 CPM
16	S9344 1446 07-30	6	6	A.A.	CL	2.0	
	S9345 1446 07-30	16	6	16.3			
				MEDIUM DENSE, OLIVE-GRAY (5Y 4/1) SILT SAND MIXTURE, WET	SM	N/A	
17	S9346 1452 07-30	11	6	AA	SM	N/A	HNU: 0 PPM α: 0 CPM BG: 100-180 CPM
	S9347 1452 07-30	14	6	MEDIUM DENSE, OLIVE-GREY (5Y 4/1) SILT SAND MIXTURE, TR GRAVEL (.25 IN) WET	SM	N/A	
	S9348 1452 07-30	15	6	MEDIUM DENSE, OLIVE-GRAY (5Y 4/1) SOME SILT, SAND-CLAY MIXTURE, WET	SC	N/A	
18	S9349 1458 07-30	6	6	MEDIUM DENSE OLIVE-GREY (5Y 4/1) POORLY GRADED FINE SAND, WET	SP	N/A	HNU: 0 PPM α: 0 CPM BG: 100-180 CPM
	S9350 1458 07-30	6	6	A.A.	SP	N/A	
19	S9351 1458 07-30	7	6	STIFF, OLIVE-GREY (5Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) DAMP	CL	2.0	
	S9352 1458 07-30	8	6	A.A. 20.0	CL	2.0	HNU: 0 PPM α: 0 CPM BG: 100-180 CPM
20				BOTTOM OF BORING @ 20 FT.			

NOTES: COMPLETED AS PIEZOMETER

153

A.A. = AS ABOVE

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1332	COORDINATES: NORTH 482,077.01 EAST 1,380,737.53	DATE: 07/30/89
GROUND ELEVATION: 590.57	GWL: Depth N/A Date/Time N/A	DATE STARTED: 07/30/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 07/30/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	19873	07/30/89 1340	10	6	VERY STIFF, BROWN (10 YR 5/2) SILTY CLAY, SOME GRAVEL (.25 - 1.0 IN) DAMP.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 180-200cpm
1.0	19874	07/30/89 1340	11	6	VERY STIFF, BROWN (10 YR 5/2) SILTY CLAY, SOME GRAVEL (.25 - 1.0 IN) DAMP.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 180-200cpm
1.5	19875	07/30/89 1340	8		NO RECOVERY.			
2.0	19876	07/30/89 1343	8		NO RECOVERY.			
2.5	19877	07/30/89 1343	8		NO RECOVERY.			
3.0	19878	07/30/89 1343	5		NO RECOVERY.			
3.5	19879	07/30/89 1346	8	6	STIFF, BROWN (10 YR 5/1) SILTY CLAY SOME GRAVEL (.25 - .50 IN) DAMP. MOTTLED DK GREY (5 Y 4/1).	CL	2.0 2.0	Hnu= 0 ppm α = 0 cpm βΓ = 200-240cpm
4.0	19880	07/30/89 1346	10		NO RECOVERY.			
4.5	19881	07/30/89 1346	10		NO RECOVERY.			
5.0	19882	07/30/89 1350	9	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP. STIFF, YELLOW-BROWN (10 YR 5/3) SILTY CLAY SOME GRAVEL (.25 - 1.0 IN) DRY.	CL	2.0 2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
5.5	19883	07/30/89 1350	10	6	STIFF OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN), TRACE ORGANIC MATERIAL, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
6.0	19884	07/30/89 1350	13		NO RECOVERY.			
6.5	19885	07/30/89 1416	3	6	STIFF, OLIVE GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
7.0	19886	07/30/89 1416	4	6	STIFF, OLIVE GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
7.5	19887	07/30/89 1416	6	6	STIFF, OLIVE GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
8.0	19888	07/30/89 1420	6	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1332	COORDINATES: NORTH 482,077.01 EAST 1,380,737.53	DATE: 07/30/89
GROUND ELEVATION: 590.57	GWL: Depth N/A Date/Time N/A	DATE STARTED: 07/30/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 07/30/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	19889	07/30/89 1420	7	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE SAND, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
9.0	19890	07/30/89 1420	7		NO RECOVERY.			
9.5	19891	07/30/89 1422	6	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
10.0	19892	07/30/89 1422	4	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
10.5	19893	07/30/89 1422	4		NO RECOVERY.			
11.0	19894	07/30/89 1430	2	6	STIFF YELLOW-BROWN (10 YR 5/3), OLIVE-GREY (5 Y 4/1) MOTTLED, SILTY CLAY, TR (.25 - .50) GRAVEL, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
11.5	54335	07/30/89 1430	3		NO RECOVERY.			
12.0	54336	07/30/89 1430	6		NO RECOVERY.			
12.5	54337	07/30/89 1432	6	6	STIFF, LIGHT BROWN (2.5 Y 5/2) SILTY CLAY, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
13.0	54338	07/30/89 1432	7	6	STIFF, LIGHT BROWN (2.5 Y 5/2) SILTY CLAY, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
13.5	54339	07/30/89 1432	7	6	STIFF, LIGHT BROWN (2.5 Y 5/2) SILTY CLAY, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
14.0	54340	07/30/89 1437	15	6	VERY STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
14.5	54341	07/30/89 1437	14	6	VERY STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
15.0	54342	07/30/89 1437	14	6	VERY STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
15.5	54343	07/30/89 1446	4	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1332	COORDINATES: NORTH 482,077.01 EAST 1,380,737.53	DATE: 07/30/89
GROUND ELEVATION: 590.57	GWL: Depth N/A Date/Time N/A	DATE STARTED: 07/30/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 07/30/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.0	54344	07/30/89 1446	6	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
16.5	54345	07/30/89 1446	16	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP. MEDIUM DENSE, OLIVE-GRAY (5 Y 4/1) SILT-SAND MIXTURE, WET.	CL SM	2.0 2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-200cpm
17.0	54346	07/30/89 1452	11	6	MEDIUM DENSE, OLIVE-GRAY (5 Y 4/1) SILT-SAND MIXTURE, WET.	SM	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
17.5	54347	07/30/89 1452	14	6	MEDIUM DENSE, OLIVE-GREY (5 Y 4/1) SILT SAND MIXTURE, TR GRAVEL (.25 IN) WET.	SM	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
18.0	54348	07/30/89 1452	15	6	MEDIUM DENSE, OLIVE-GRAY (5 Y 4/1) SOME SAND, SAND-CLAY MIXTURE, WET.	SC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
18.5	54349	07/30/89 1458	6	6	MEDIUM DENSE, OLIVE-GREY (5 Y 4/1) POORLY GRADED FINE SAND, WET.	SP	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
19.0	54350	07/30/89 1458	6	6	MEDIUM DENSE, OLIVE-GREY (5 Y 4/1) POORLY GRADED FINE SAND, WET.	SP	NA	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
19.5	54351	07/30/89 1458	7	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm
20.0	54352	07/30/89 1458	8	6	STIFF, OLIVE-GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 100-180cpm

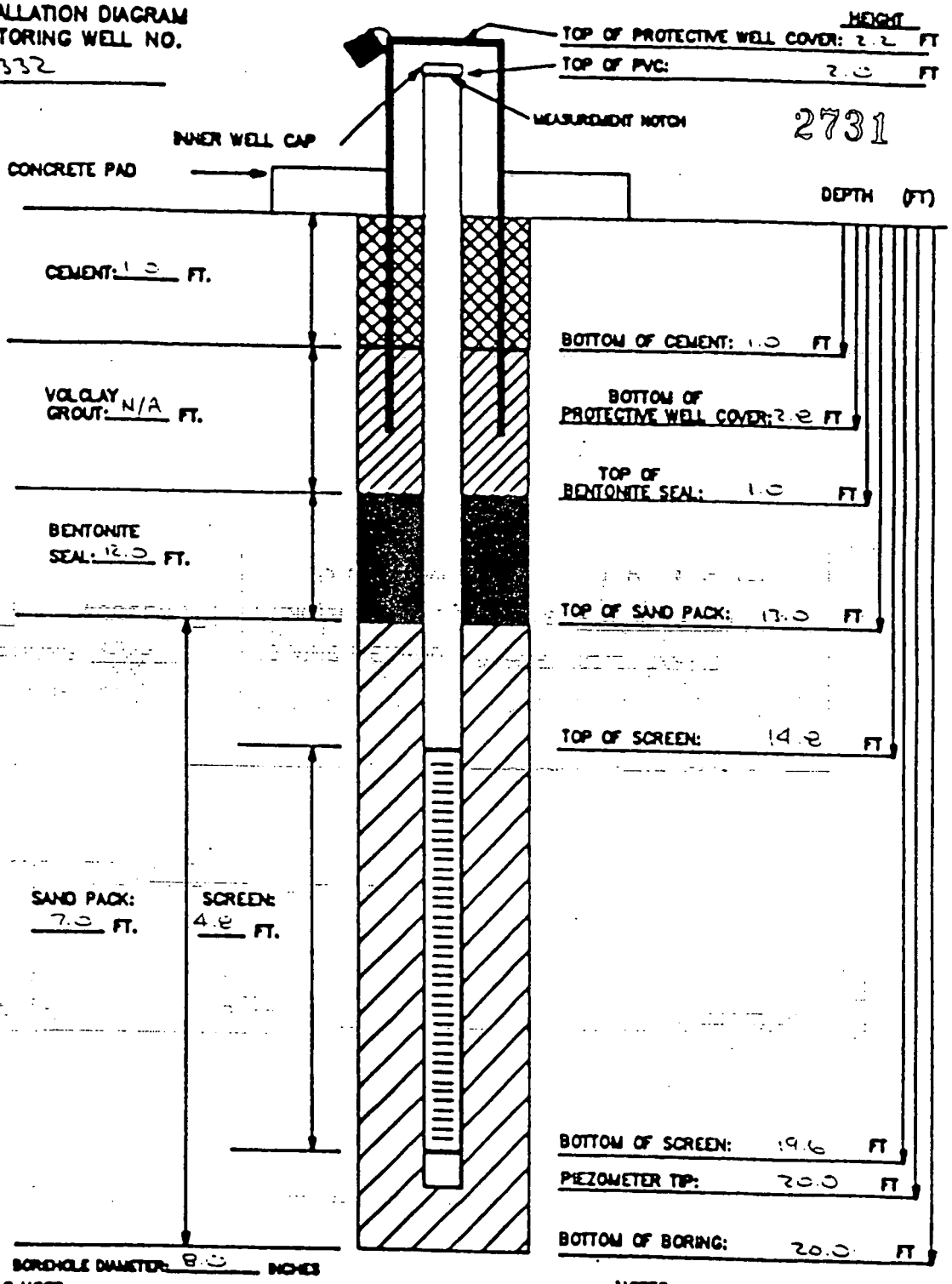
BOTTOM OF BORING 20.0

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1332

INSTALLATION DATE: 07 22 87



MATERIALS USED:
SAND TYPE AND QUANTITY: 2-80 LB BAGS 10-20 SAND
BENTONITE PELLETS (5-GALLON BUCKETS): 7.5 GAL BUCKETS
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: 12-94 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 37.1

GEOLOGIST/ENGINEER: M. SLUSARSKI

FERNALD RI/FS

2731 Page 4 of 5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. H. SWINSKI DATE 07-30-89
PROJECT NO. 6022371 CHECKED BY _____ DATE _____
BORING NO. 1332
PIEZOMETER NO. 1332 DATE OF INSTALLATION 07-30-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT 8.25 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 20.0
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 9/16 IN. I.D. 2.0 IN
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 4 FT, 4.2 FT, 10.0 FT, 6.0 FT
AVERAGE SIZE OF PERFORATIONS .020	JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 4.2 FT	JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT	OTHER PROTECTION HINGED LOCKING COVER
PROTECTIVE PIPE O.D. 4 7/8 IN.	w/ PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )
TOP OF RISER PIPE	2.2		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	2.8		
BOREHOLE FILL MATERIALS:			
~~GROUT~~/~~SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP
BENTONITE	TOP 1.0	BOTTOM 13.0	TOP
SAND (10-20)	TOP 13.0	BOTTOM 20.0	TOP
GRAVEL N/A	TOP N/A	BOTTOM N/A	TOP
PERFORATED SECTION	TOP 14.8	BOTTOM 19.6	TOP
PIEZOMETER TIP	20.0		
BOTTOM OF BOREHOLE	20.0		
GWL AFTER INSTALLATION			

N 1820771.01
E 1380737.53

158

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

REMARKS USED 2 - 80LB BAGS OF 10-20 SAND FROM 13.0 FT TO 20.0 FT
USED 7 - 5 GAL BUCKETS OF BENTONITE PELLETS FROM 1.0 FT TO 13.0 FT
USED 1/2 - 94 LB BAG CEMENT FROM 0.0 FT TO 1.0 FT

MONITORING WELL INSTALLATION RECORD
11/21/91

OJECT NAME: Fernald RI/FS
OJECT NO. : 602.3.2
RING NO. : 1332
LL NUMBER: 1332

FIELD ENG./GEO.: M. SLUSARSKI DATE: 07/30/89
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 482077.01, 1380737.5
DATE OF INSTAL.: 07/30/89

2731

OLE DRILLING

LING METHOD: AUGER
LLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: 8.0 IN HOLLOW STEM A
IS CASING TEMPORARY?: No
CASING TYPE : PIEZOMETER
CASING DIAM.: 2.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 4.2 FROM: 0.0 TO: 20.0
SIZE: N/A FROM: N/A TO: N/A

LL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .020 (In.)
TOTAL PERFORATED AREA: 4.8 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: PVC
RISER PIPE DIAMETERS:
O.D.: 2 5/16 In. I.D.: 2.0 In.
LENGTH OF 1ST PIPE SECTION: .4 Ft.
2ND PIPE SECTION: 4.8 Ft.
3RD PIPE SECTION: 10.0 Ft.
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINT THREADED

OTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 4 5/ In.
* HINGED LOCKING COVER W/PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.2 Ft.		592.10	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.8 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	1.0	N/A	N/A
Bentonite Pellets	1.0	13.0	N/A	N/A
Sand	13.0	20.0	N/A	N/A
FORATED SECTION	14.8	19.6	N/A	N/A
TIP	20.0		N/A	
OTTOM OF BOREHOLE	20.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MARKS : USED 2 - 80 LB BAGS OF 10-20 SAND FROM 13.0 FT. TO 20.0 FT. USED 7 - 5 GAL BUCKETS OF BENTONITE PELLETS FROM 1.0 FT. TO 13.0 FT. USED 1/2 - 94 LB. BAG CEMENT FROM 0.0 FT. TO 1.0 FT.

MMENTS:

WELL 1337

FERNALD RI/FS

	Date	Initial
Field Check	8/17/89	BS
1st Key In	8-21-89	[illegible]
2nd Key In	10-2-89	[illegible]
Hard Copy Verification		

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1337	COORDINATES: N48/637.29 E/380009.42	DATE: 08-10-89
ELEVATION: 555.67	GWL: Depth Date/Time	DATE STARTED: 08-10-89
ENGINEER/GEOLOGIST: M. SINGASKI	Depth Date/Time	DATE COMPLETED: 08-10-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 2 4

BS 8/17/89

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	19983 0955 08-10	4	6	HARD, BROWN (10YR 5/4) SILTY CLAY, TRACE GRAVEL (.25-.50 IN) DRY TRACE ROOTLETS	CL	4.0+	HNU = 0 PPM
	19984 0955 08-10	16	6	A.A	CL	4.0+	α = 0 CPM
1	19985 0955 08-10	22	—	NO RECOVERY 1.0-1.5 FT	—	—	BG = 60-100 CPM
	19986 1000 08-10	48	6	HARD BROWN (10YR 5/4) SILTY CLAY, TRACE COARSE GRAVEL (1.0-2.0 IN) DRY	CL	4.0+	HNU = 0 PPM
2	19987 1000 08-10	51	—	NO RECOVERY 2.0-2.5 FT	—	—	α = 0 CPM
	19988 1000 08-10	18	—	NO RECOVERY 2.5-3.0 FT	—	—	BG = 80-120 CPM
3	19989 1004 08-10	8	6	HARD, REDDISH BROWN (10YR 4/6) SILTY CLAY, TRACE SAND, DAMP	CL	4.0+	HNU = 0 PPM
	19990 1004 08-10	9	2	A.A	CL	4.0+	α = 0 CPM
4	19991 1004 08-10	12	—	NO RECOVERY 4.0-4.5 FT	—	—	BG = 80-140 CPM
	19992 1007 08-10	17	6	HARD, BROWN (10YR 4/6) SILTY CLAY, TRACE SAND, DAMP	CL	4.0+	HNU = 0 PPM
5	19993 1007 08-10	12	6	A.A	CL	4.0+	α = 0 CPM
	19994 1007 08-10	12	—	NO RECOVERY 5.5-6.0 FT	—	—	BG = 80-140 CPM
6	19995 1012 08-10	3	4	STIFF BROWN (10YR 4/4) SILTY CLAY, TRACE GRAVEL (.25-.75 IN) DAMP	CL	1.5	HNU = 0
	19996 1012 08-10	3	6	A.A	CL	1.5	α = 0
7	19997 1012 08-10	3	—	NO RECOVERY 7.0-7.5 FT	—	—	BG = 80-120

NOTES: CONTRACTOR: PENN DRILL
RIG: MOBIL B 53
DRILLER: J. SKECHAN
ASSISTANT: W. FELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BG = 100-140 CPM
LEL = 0 PPM
O_2 = 20.6 %

LELO2:

A.A: AS ABOVE

161

FERNALD RI/FS

2731

	Date
1st Key In	8-21-89
2nd Key In	11-7-90
Hard Copy Verification	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1337	COORDINATES:	DATE: 08-10-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-10-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 08-10-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	19998 1033 08-10	4	6	STIFF, BROWN (10YR 4/1) SILTY CLAY TRACE GRAVEL (.25-.50 IN) DAMP	CL	1.5	HNU = 0 PPM α = 0 CPM Bβ = 80 120 CPM
	19999 1033 08-10	4	6	STIFF, BROWN (10YR 5/3) SILTY CLAY TRACE GRAVEL (.25 IN) MOIST	CL	1.5	
9	20000 1033 08-10	5	6	MEDIUM DENSE, BROWN (10YR 5/3) CLAYEY SAND, TRACE GRAVEL (.25-.75 IN) WET	SC	N/A	
	20001 1035 08-10	7	6	A.A.	SC	N/A	HNU = 0 PPM α = 0 CPM Bβ = 80 120 CPM
10	20002 1035 08-10	9	6	VERY STIFF, BROWN (10YR 5/3) GRAVELLY CLAY, GRAVEL RANGING FROM (.75-.25 IN) MOIST	CL	2.0	
	20003 1035 08-10	9	6	VERY STIFF, BROWN (10YR 5/3) SILTY CLAY, TRACE GRAVEL (.25-.50 IN) DAMP	CL	2.0	
11	20004 08-10			BOTTOM OF BORING @ 10.5 FT PIEZOMETER INSTALLED			HNU = α = Bβ =
	20035 08-10						
12	20036 08-10						
	20037 08-10						HNU = α = Bβ =
13	20038 08-10						
	20039 08-10						
14	20040 08-10						HNU = α = Bβ =
	20041 08-10						
	20042 08-10						

NOTES:

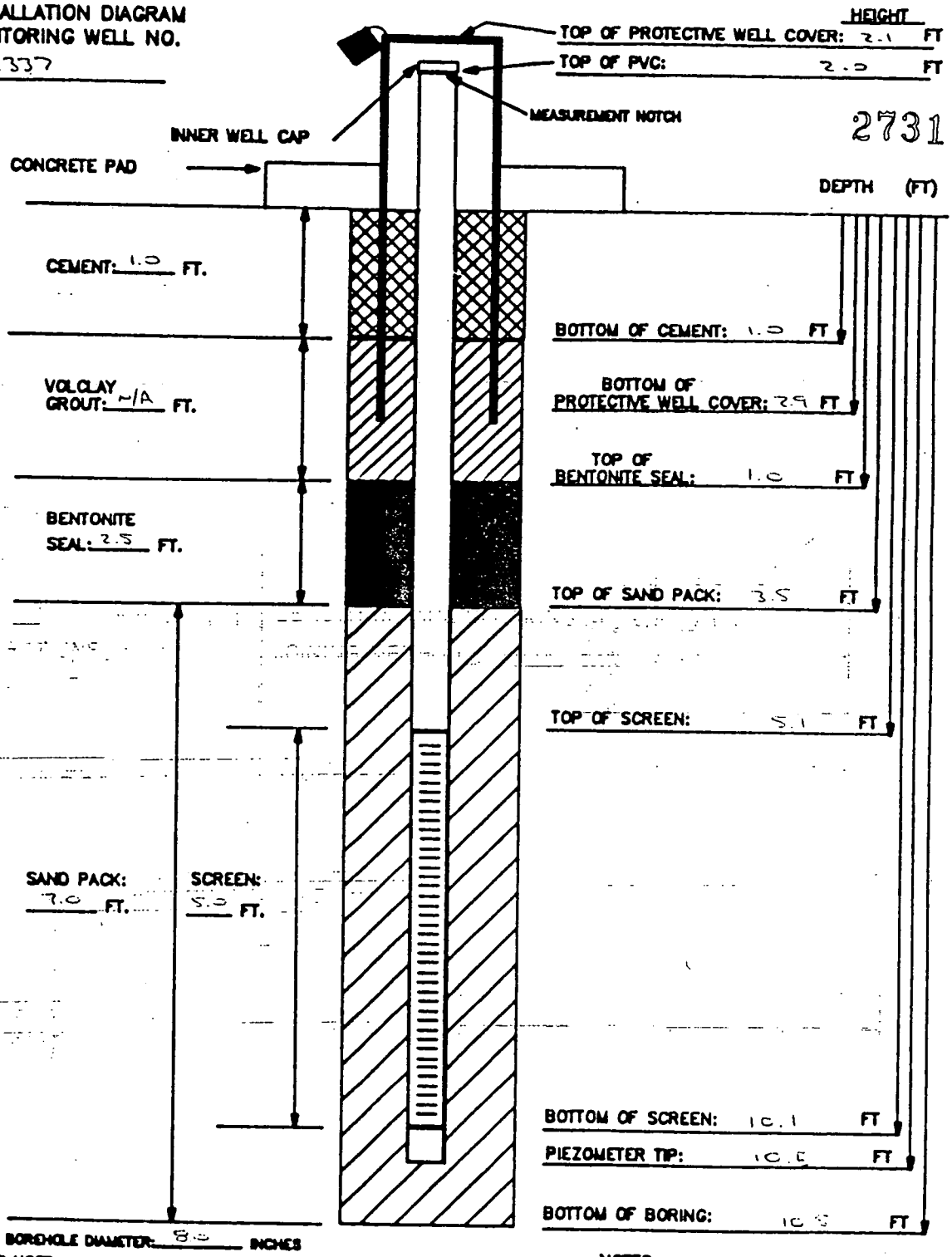
A.A. = As Above

162

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1337

INSTALLATION DATE: 08-10-89



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: 10-20 : 3.5 - 80LB SACKS
BENTONITE PELLETS (5-GALLON BUCKETS): 1.5 : 5-GAL BUCKETS
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: .5 - 94 LB SAC
AMOUNT OF WATER USED: 40 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: 6037.1

GEOLOGIST/ENGINEER: H. S[illegible]

FERNALD RI/FS

2731

9/4

12-6-89

5-16-90

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
FIELD ENG./GEO. M. SLUSARSKI
DATE 08-10-87
PROJECT NO. 602 3.7.1
CHECKED BY B. Manning
DATE 8/17/89
BORING NO. 1337
PIEZOMETER NO. 1337
DATE OF INSTALLATION 08-10-87

BOREHOLE DRILLING

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

PIEZOMETER DESCRIPTION

TYPE PIEZOMETER
DIAMETER OF PERFORATED SECTION 2.0 IN ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .020
TOTAL PERFORATED AREA 5.0 FT
RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS:
O.D. 2 9/16 IN I.D. 2.0 IN
LENGTH OF PIPE SECTIONS .4, 5.0, 7.1 FT
JOINING METHOD SCREW TYPE FLUSH JOINT THREADS

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0
PROTECTIVE PIPE O.D. 4 5/8 IN
OTHER PROTECTION HINGED COVER W/LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.9			
BOREHOLE FILL MATERIALS:				
~~GROUT~~/~~SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 3.5	TOP	BOTTOM
SAND (10-20)	TOP 3.5	BOTTOM 10.5	TOP	BOTTOM
GRAVEL N/A	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 5.1	BOTTOM 10.1	TOP	BOTTOM
PIEZOMETER TIP	10.5			
BOTTOM OF BOREHOLE	10.5			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 164
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

409-11-86

WELL 1347

FERNALD RI/FS

2731

	Date	Initial
Field Check	8/17/89	
1st Key In	8-22-89	
2nd Key In	15-SEP	
Hard Copy		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: M47	COORDINATES: N481151.60 E1379994.63	DATE: 08-09-89
ELEVATION: 585.07	GWL: Depth Date/Time	DATE STARTED: 08-09-89
ENGINEER/GEOLOGIST: M. SCHUSSLER	Depth Date/Time	DATE COMPLETED: 08-09-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	S0203 0954 08-09	3	6	VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, TRACE GRAVEL (<1%-<5%) TRACE ROOTLETS/ORGANIC MATERIAL, DRY	CL	2.5	HNU = 0 PPM
1	S0204 0954 08-09	4	2	A.A	CL	2.5	α = 0 CPM BΓ = 900 CPM
	S0205 0954 08-09	6	—	NO RECOVERY 1.0-1.5'	—	—	
1	S0206 0958 08-09	6	6	VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, TRACE GRAVEL (<1%-<5%) DAMP	CL	2.5	HNU = 0 PPM
2	S0207 0958 08-09	6	6	A.A	CL	2.5	α = 0 CPM BΓ = 400 CPM
	S0208 0958 08-09	8	—	NO RECOVERY 2.5-3.0 FT	-	-	
3	S0209 1000 08-09	10	6	VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, TRACE GRAVEL (<1%-<5%) DAMP	CL	2.0	HNU = 0 PPM
	S0210 1000 08-09	10	6	A.A	CL	2.0	α = 0 CPM BΓ = 400 CPM
4	S0211 1000 08-09	10	—	NO RECOVERY 4.0-4.5 FT	—	—	
	S0212 1001 08-09	10	6	VERY STIFF, BROWN (10YR 5/4) SILTY CLAY, TRACE GRAVEL (<1%-<5%) DAMP	CL	2.0	HNU = 0 PPM
5	S0213 1001 08-09	9	6	A.A	CL	2.0	α = 0 CPM BΓ = 400 CPM
6	S0214 1001 08-09	7	—	NO RECOVERY 5.5-6.0 FT	—	—	
	S0215 1029 08-09	3	—	NO RECOVERY 6.0-6.5 FT	—	-	HNU =
7	S0216 1029 08-09	4	—	NO RECOVERY 6.5-7.0 FT	—	-	α = . BΓ = -
	S0217 1029 08-09	5	—	NO RECOVERY 7.0-7.5 FT			

166

NOTES: CONTRACTOR: PENN DRILL
RIG: MOBIL B-53
DRILLER: J. SALCANI
ASSISTANT: W. FELTY

SAMPLES COLLECTED PER ASTM STANDARD PENETRATION T
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 PPM
α = 0 CPM
BΓ = 1000 CPM

LELO2: LEL = 0 PPM
O_2 = 20.6 %

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1347	COORDINATES:	DATE: 08-09-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-09-89
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED: 08-09-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 75

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	S0218 1031 08-09	9	6	VERY STIFF, BROWN (2.5Y 4/4) SILTY CLAY, TRACE GRAVEL (25 mm) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG: 400 CPM
	S0219 1031 08-09	10	—	NO RECOVERY 8.5 - 9.5 FT	—	—	
9	S0220 1031 08-09	12	—	NO RECOVERY 9.5 - 9.0 FT	—	—	
	S0221 1033 08-09	13	6	VERY STIFF, BROWN (2.5Y 4/4) SILTY CLAY, TRACE GRAVEL (25 mm) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG: 400 CPM
10	S0222 1033 08-09	13	4	A.A	CL	2.0	
	S0223 1033 08-09	10	—	NO RECOVERY 10.0 - 10.5 FT	—	—	
11	S0224 1042 08-09	8	6	VERY STIFF, BROWN (2.5Y 4/4) SILTY CLAY, TRACE GRAVEL (25 - 50 mm) DAMP	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 400 CPM
	S4639 1042 08-09	8	6	A A	CL	2.0	
12	S4640 1042 08-09	6	6	A A 11.8	CL	2.0	
	S4637 1050 08-09	5	6	VERY STIFF, GREY (5Y 4/1) SILTY CLAY TRACE GRAVEL (25 mm) DAMP A A	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 400 CPM
13	S4638 1050 08-09	5	6	A A	CL	2.0	
	S4639 1050 08-09	6	—	NO RECOVERY 12.5 - 13.5 FT	—	—	
14	S4640 1054 08-09	2	6	VERY STIFF, GREY (5Y 4/1), SILTY CLAY TRACE GRAVEL (25 mm) MOIST	CL	2.0	HNU = 0 PPM α = 0 CPM BG = 400 CPM
	S4641 1054 08-09	4	6	A A	CL	2.0	* MUCH WATER FLOWED TO SAMPLE INTERVAL DUE DAMP TO MOIST
	S4642 1054 08-09	4	—	NO RECOVERY 14.5 - 15.0	—	—	

NOTES:

A. A = AS ABOVE

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1347	COORDINATES:	DATE: 08-09-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-07-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth Date/Time	DATE COMPLETED: 08-09-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 3 OF 7-5

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	SACAJ 1349 08-09	3	6	VERY STIFF, GREY (5Y 4/1) SILTY CLAY, TRACE GRAVEL (20%) DRY	CL	2.0	HNU = 0 PPM α = 0 CPM Bβ = 400 CPM
16	SACAK 1349 08-09	2	6	A A	CL	2.0	
	SACAS 1349 08-09	5	—	NO RECOVERY 16.0 - 16.5	—		
17	SACAL 1355 08-09	4	6	VERY STIFF, GREY (5Y 4/1), SANDY CLAY - SILT MIXTURE, WET	SC	2.0	HNU = 0 PPM α = 0 CPM Bβ = 400 CPM
	SACAT 1355 08-09	3	6	A A	SC	2.0	
18	SACAU 1355 08-09	5	6	VERY STIFF, GREY (5Y 4/1) CLAYEY SILT, WET	ML	2.0	
	SACAI 1402 08-09	10	6	A A	ML	2.0	HNU = 0 PPM α = 0 CPM Bβ = 400 CPM
19	SACAJ 1402 08-09	6	6	VERY STIFF, GREY (5Y 4/1) SANDY CLAY MIXTURE, WET	SC	2.0	
	SACAK 1402 08-09	6	6	A A	SC	2.0	
20	SACAL 1402 08-09	14	6	A A 20.0	SC	2.0	HNU = 0 PPM α = 0 CPM Bβ = 400 CPM
				BOTTOM OF BOREHOLE 20.0 PIEZOMETER INSTALLED			

168

NOTES:

TOP OF WATER PRODUCING ZONE: 16.5 FT

BASE OF WATER PRODUCING ZONE: 20.0 FT (STILL IN WATER PRODUCING ZONE AT TIME THAT BOTTOM OF BORING WAS REACHED)

A A = AS ABOVE

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1347	COORDINATES: NORTH 481,151.60 EAST 1,379,994.63	DATE: 08/09/89
GROUND ELEVATION: 585.47	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/09/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 08/09/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	50203 08/09/89 0954	3	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) TRACE ROOTLETS/ORGANIC MATERIAL, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 900 cpm
1.0	50204 08/09/89 0954	4	2	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) TRACE ROOTLETS/ORGANIC MATERIAL, DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 900 cpm
1.5	50205 08/09/89 0954	6		NO RECOVERY.			
2.0	50206 08/09/89 0958	6	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 - .75 IN) DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
2.5	50207 08/09/89 0958	6	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 - .75 IN) DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
3.0	50208 08/09/89 0958	8		NO RECOVERY.			
3.5	50209 08/09/89 1000	10	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
4.0	50210 08/09/89 1000	10	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
4.5	50211 08/09/89 1000	10		NO RECOVERY.			
5.0	50212 08/09/89 1003	10	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
5.5	50213 08/09/89 1003	9	6	VERY STIFF, BROWN (10 YR 5/4) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
6.0	50214 08/09/89 1003	7		NO RECOVERY.			
6.5	50215 08/09/89 1029	3		NO RECOVERY.			
7.0	50216 08/09/89 1029	4		NO RECOVERY.			
7.5	50217 08/09/89 1029	5		NO RECOVERY.			
8.0	50218 08/09/89 1031	9	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 1347	COORDINATES: NORTH 481,151.60 EAST 1,379,994.63	DATE: 08/09/89
GROUND ELEVATION: 585.47	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/09/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 08/09/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	50219	08/09/89 1031	10		NO RECOVERY.			
9.0	50220	08/09/89 1031	12		NO RECOVERY.			
9.5	50221	08/09/89 1033	13	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRAVE GRAVEL (.25 - .75 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
10.0	50222	08/09/89 1033	13	4	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRAVE GRAVEL (.25 - .75 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
10.5	50223	08/09/89 1033	10		NO RECOVERY.			
11.0	50224	08/09/89 1043	8	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
11.5	54635	08/09/89 1043	8	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
12.0	54636	08/09/89 1043	6	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
12.5	54637	08/09/89 1050	5	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP. VERY STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) DAMP.	CL	2.0 2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
13.0	54638	08/09/89 1050	5	6	VERY STIFF, BROWN (2.5 Y 4/4) SILTY CLAY, TRACE GRAVEL (.25 - .50 IN) DAMP. VERY STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) DAMP.	CL	2.0 2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
13.5	54639	08/09/89 1050	6		NO RECOVERY.			
14.0	54640	08/09/89 1054	3	6	VERY STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
14.5	54641	08/09/89 1054	4	6	VERY STIFF, GREY (5 Y 4/1) SILTY CLAY TRACE GRAVEL (.25 IN) MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
15.0	54642	08/09/89 1054	4		NO RECOVERY.			
15.5	54643	08/09/89 1349	3	6	VERY STIFF, GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1347	COORDINATES: NORTH 481,151.60 EAST 1,379,994.63	DATE: 08/09/89
GROUND ELEVATION: 585.47	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/09/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 08/09/89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE OF

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.0	54644 08/09/89 1349	2	6	VERY STIFF, GREY (5 Y 4/1) SILTY CLAY, TRACE GRAVEL (.25 IN) DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
16.5	54645 08/09/89 1349	3		NO RECOVERY.			
17.0	54646 08/09/89 1355	4	6	VERY STIFF, GREY (5 Y 4/1) SAND CLAY-SILT MIXTURE WET.	SC	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
17.5	54647 08/09/89 1355	3	6	VERY STIFF, GREY (5 Y 4/1) SAND CLAY-SILT MIXTURE WET.	SC	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
18.0	54648 08/09/89 1355	5	6	VERY STIFF, GREY (5 Y 4/1) CLAYEY SILT, WET.	ML	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
18.5	54649 08/09/89 1402	10	6	VERY STIFF, GREY (5 Y 4/1) CLAYEY SILT, WET.	ML	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
19.0	54650 08/09/89 1402	6	6	VERY STIFF, GREY (5 Y 4/1) SAND-CLAY MIXTURE, WET.	SC	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
19.5	54651 08/09/89 1402	6	6	VERY STIFF, GREY (5 Y 4/1) SAND-CLAY MIXTURE, WET.	SC	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
20.0	54652 08/09/89 1402	14	6	VERY STIFF, GREY (5 Y 4/1) SAND-CLAY MIXTURE, WET.	SC	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm

BOTTOM OF BORING 20.0

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		11-7-90
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7.1	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 1337	COORDINATES:	DATE: 08-10-89
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 08-10-89
ENGINEER/GEOLOGIST: M. SLUPARSKI	Depth Date/Time	DATE COMPLETED: 08-10-89
DRILLING METHODS: AUGER (HOLLOW STEM)		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	19998 1033 08-10	4	6	STIFF, BROWN (10YR 4/1) SILTY CLAY TRACE GRAVEL (.25-.50 IN) DAMP	CL	1.5	HNU = 0 PPM α = 0 CPM Bβ = 80 120 CPM
	19999 1033 08-10	4	6	STIFF, BROWN (10YR 5/1) SILTY CLAY TRACE GRAVEL (.25 IN) MOIST.	CL	1.5	
9	20000 1033 08-10	5	6	MEDIUM DENSE, BROWN (10YR 5/1) CLAYEY SAND, TRACE GRAVEL (.25-.75 IN) WET	SC	N/A	
	20001 1035 08-10	7	6	[illegible]	SC	N/A	HNU = 0 PPM α = 0 CPM Bβ = 80 120 CPM
10	20002 1035 08-10	9	6	VERY STIFF, BROWN (10YR 5/1) SILTY CLAY, GRAVEL RANGING FROM (.25-.75 IN) MOIST	CL	2.0	
	20003 1035 08-10	9	6	VERY STIFF, BROWN (10YR 5/1) SILTY CLAY, TRACE GRAVEL (.25-.50 IN) DAMP	CL	2.0	
11	20004 08-10			BOTTOM OF BORING (@ 10.5 FT) PIEZOMETER INSTALLED			HNU = α = Bβ =
	20035 08-10						
12	20036 08-10						
	20037 08-10						HNU = α = Bβ =
13	20038 08-10						
	20039 08-10						
14	20040 08-10						HNU = α = Bβ =
	20041 08-10						
	20042 08-10						

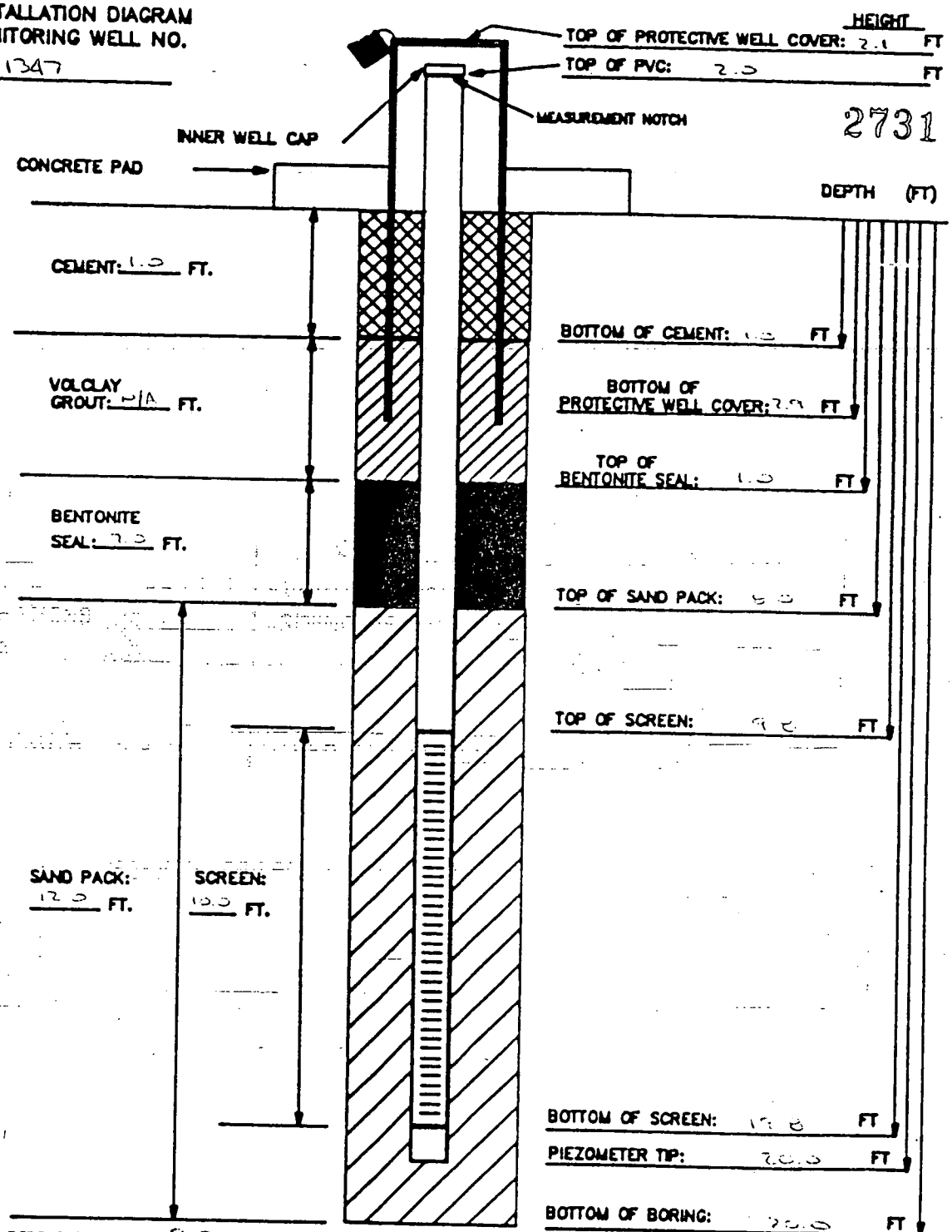
NOTES:

A.A. - As above

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 1347

INSTALLATION DATE: 08-09-89



2731

MATERIALS USED:
SAND TYPE AND QUANTITY: 10-20 - 3-50 LB BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 2 - 5 GAL BUCKETS
BAGS OF VOLCLAY GROUT: N/A
AMOUNT OF CEMENT: .5 - 94 LB SACK
AMOUNT OF WATER USED: 40 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:

173

TASK: 60.7.7

GEOLOGIST/ENGINEER: H. [illegible]

ERNALD
RI/FS

2731

5/5
12-6-89
5-16-9

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
PROJECT NO. 602 3.7.1
BORING NO. 1347
PIEZOMETER NO. 1347

FIELD ENG./GEO. A. SLUSARSKI DATE 08-09-89
CHECKED BY B. Dunning DATE 8/17/89
DATE OF INSTALLATION 08-09-89

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT 8 3/4 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 20.0 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 9/16 IN I.D. 2.0 IN.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 FT 2 FT 1.8 FT
AVERAGE SIZE OF PERFORATIONS .020	JOINING METHOD SCREW TYPE FLUSH
TOTAL PERFORATED AREA 10.0 FT.	JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT.	OTHER PROTECTION MINERS 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	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 8.0	TOP	BOTTOM
SAND (10-20)	TOP 8.0	BOTTOM 20.0	TOP	BOTTOM
GRAVEL N/A	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 9.8	BOTTOM 19.8	TOP	BOTTOM
PIEZOMETER TIP	20.0			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION				

AS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 174
AS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS MATERIALS USED 10-20 SAND: 3.5 - 85 LB BAGS
BENTONITE PELLETS: 2 - 5 LB BUCKETS
CEMENT: 1/2 - 94 LB BAG
WATER: 40 GAL

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 1347
WELL NUMBER: 1347

FIELD ENG./GEO.: M. SLUSARSKI DATE: 08/09/89
CHECKED BY : B. DUNNING DATE: 08/17/89
N,E COORDINATES: 481151.60, 1379994.6
DATE OF INSTAL.: 08/09/89

2731

BOREHOLE DRILLING

DRILLING METHOD: AUGER
DRILLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: 8.0 IN. HOLLOW STEM
IS CASING TEMPORARY?: No
CASING TYPE : PIEZOMETER
CASING DIAM.: 2.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 4.2 FROM: 0.0 TO: 20.0
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .020 (In.)
TOTAL PERFORATED AREA: 10. Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: PVC
RISER PIPE DIAMETERS:
O.D.: 2 5/16 In. I.D.: 2.0 In.
LENGTH OF 1ST PIPE SECTION: 10.0 Ft.
2ND PIPE SECTION: .2 Ft.
3RD PIPE SECTION: 1.8 Ft.
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 4 5/ In.
* HINGED LOCKING COVER W/ PADLOC

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		587.11	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.9 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0.0	1.0	N/A	N/A
Bentonite Pellets	1.0	8.0	N/A	N/A
Sand	8.0	20.0	N/A	N/A
PERFORATED SECTION	9.8	19.8	N/A	N/A
TIP	20.0		N/A	
BOTTOM OF BOREHOLE	20.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : MATERIALS USED: 10-20 SAND: 3.5 - 8.0 LB. SACKS, BENTONITE PELLETS: 3 - 5 GAL. BUCKETS, CEMENT: 1/2 - 94 LB. BAG, WATER: 40 GAL.

COMMENTS:

WELL 1523

FERNALD RI/FS

2731

Date	7/3/90	10-5-90	
Initial	E.T.		
	Field Check	1st Key In	2nd Key In

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 1523	COORDINATES: N.479,406.88, E.1,379,945.37	DATE	6-26-90
ELEVATION: 574.34 FT GROUND	GWL: Depth Date/Time	DATE STARTED:	6-26-90
ENGINEER/GEOLOGIST: J. MASON	Depth Date/Time	DATE COMPLETED:	6-27-9
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	UNCONFINED 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
	55500 6-26-90 1628	10	0	NR			βγ = 440 cpm
3	55501 6-26-90 1630	5	6	very stiff (10yr 3/2) very dark grayish brown clayey gravel	GC	NA	Hnu = 0
4	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

177

NOTES: CONTRACTOR: PENNDRILL
RIG: CME45
DRILLER: BOB YOST
ASSISTANT: BRIAN STRAPAZZON
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

2731

	1st Key In	2nd Key In	Hard Copy Verification
Date	6-30-90	7-5-90	
Initial	[illegible]	[illegible]	

VISUAL CLASSIFICATION OF SOILS

PROJECT NAME: FERNALD RI/FS

PROJECT NUMBER: 602 37

BORING NUMBER: 1523

ELEVATION:

ENGINEER/GEOLOGIST: J MASON

DRILLING METHODS: AUGER (HOLLOW STEM) CME 45

COORDINATES:

GWL: Depth Date/Time

Depth Date/Time

DATE: 6-26-90 / 6-27/90

DATE STARTED: 6-26-90

DATE COMPLETED: 6-27-90

PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	55510 6-26-90 1646	1	0	NR	NA	NA	HNU = 0 α = 0 Bβ = 400 cpm
8	55511 6-26-90 1646	2	0				
	55512 6-26-90 1646	2	0				
9	55513 6-26-90 1718	3	6	medium dense, 10yr 5/6, yellowish brown silty clay (some gravel), WET	~~GM~~ CL	2.0	HNU = 0 α = 0 Bβ = 460 cpm
	55514 6-26-90 1718	8	0	NR			
10	55515 6-26-90 1718	4	0	NR			
	55516 6-26-90 1723	4	6	stiff (10yr 5/6) yellowish brown silty clay, WET	~~GM~~ CL	2.0	HNU = 0 α = 0 Bβ = 460 cpm
11	55517 6-26-90 1723	4	0	NR			
	55518 6-26-90 1723	4	0	NR			
12	55519 6-27-90 0820	4	6	Loose, 10yr 5/2 grayish brown clayey silt, WET	~~CL~~ ML	NA	HNU = 0 α = 0 Bβ = 350 cpm
	55520 6-27-90 0820	3	2	SAA			
13	55521 6-27-90 0820	2	0	NR			
	55522 6-27-90 0845	3	6	MEDIUM DENSE (10yr 5/3) Brown clayey silt, wet.	~~CL~~ ML	NA	HNU = 0 α = 0 Bβ = 400 cpm
14	55523 6-27-90 0845	5	6	SAA	ML	NA	
	~~55524~~ 6-27-90 0845	9	0	NR			

178

NOTES: CONTRACTOR: PENDRILL
RIG:
DRILLER: BOB YUST
ASSISTANT: BRIAN STRAPAZZON
α METER: ASI # 9
Bβ METER: ASI # 11
HNU METER: B 221

SAMPLES COLLECTED PER ASTM STANDARD PENETR
COLORS IDENTIFIED USING MUNSELL COLOR CHART

BACKGROUND LEVELS HNU: 0 ppm
α: 0 cpm
Bβ: 400 cpm
LEL: N/A

FERNALD
RI/FS

2731

Date	10-3-90		
Initial			
	1st Key In	2nd Key In	Hard Copy Verification

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 3

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			
	55523 6-27 0900	8	6	Medium dense 10yr 5/2 grayish brown sand, poorly graded, wet some silt, some gravel	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 PENETRATION
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS HNU: 0
α: 0
Bγ: 375 cpm
LEL: } NA
O_2: }

179

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1523	COORDINATES: NORTH 479,406.88 EAST 1,379,945.37	DATE: 06/26/90
GROUND ELEVATION: 574.67	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/26/90
ENGINEER/GEOLOGIST: J. MASON	Depth N/A Date/Time N/A	DATE COMPLETED: 06/27/90
DRILLING METHODS: CME 45 AUGER RIG		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
0.5	55495	06/26/90 1625	8		5	MEDIUM DENSE (10 YR 4/4) DARK YELLOWISH BROWN CLAYEY GRAVEL.	GC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 500 cpm
1.0	55496	06/26/90 1625	12		0	NO RECOVERY.			
1.5	55497	06/26/90 1625	12		0	NO RECOVERY.			
2.0	55498	06/26/90 1628	10		6	VERY STIFF (10 YR 4/4) DARK YELLOWISH BROWN CLAYEY GRAVEL.	GC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 410 cpm
2.5	55499	06/26/90 1628	8		6	VERY STIFF (10 YR 4/4) DARK YELLOWISH BROWN CLAYEY GRAVEL.	GC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 410 cpm
3.0	55500	06/26/90 1628	10		0	NO RECOVERY.			
3.5	55501	06/26/90 1630	5		6	VERY STIFF (10 YR 3/2) VERY DARK GRAYISH BROWN CLAYEY GRAVEL.	GC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 510 cpm
4.0	55502	06/26/90 1630	9		6	VERY STIFF (10YR 3/2) VERY DARK GRAYISH BROWN CLAYEY GRAVEL.	GC	NA	Hnu= 0 ppm α = 0 cpm βΓ = 510 cpm
4.5	55503	06/26/90 1630	10		0	NO RECOVERY.			
5.0	55504	06/26/90 1635	5		6	MEDIUM STIFF, (10 YR 5/3), BROWN CLAY, SOME GRAVEL (SMALL AND BROKEN UP).	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 400 cpm
5.5	55505	06/26/90 1635	6		0	NO RECOVERY.			
6.0	55506	06/26/90 1635	4		0	NO RECOVERY.			
6.5	55507	06/26/90 1639	6		6	VERY SOFT, (10 YR 3/6) DARK YELLOWISH BROWN CLAY (SILTY).	CL	<.25	Hnu= 0 ppm α = 0 cpm βΓ = 340 cpm
7.0	55508	06/26/90 1639	2		2	VERY SOFT, (10 YR 3/6) DARK YELLOWISH BROWN CLAY (SILTY).	CL	<.25	Hnu= 0 ppm α = 0 cpm βΓ = 340 cpm
7.5	55509	06/26/90 1639	3		0	NO RECOVERY.			
8.0	55510	06/26/90 1646	1		0	NO RECOVERY.			

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1523	COORDINATES: NORTH 479,406.88 EAST 1,379,945.37	DATE: 06/26/90
GROUND ELEVATION: 574.67	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/26/90
ENGINEER/GEOLOGIST: J. MASON	Depth N/A Date/Time N/A	DATE COMPLETED: 06/27/90
DRILLING METHODS: CME 45 AUGER RIG		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
8.5	55511	06/26/90 1646	2	0	NO RECOVERY.			
9.0	55512	06/26/90 1646	2	0	NO RECOVERY.			
9.5	55513	06/26/90 1718	3	6	STIFF, 10 YR 5/6, YELLOWISH BROWN SILTY CLAY (SOME GRAVEL), WET.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 460 cpm
10.0	55514	06/26/90 1718	8	0	NO RECOVERY.			
9.5								
10.0	55514	06/26/90 1718	8	0	NO RECOVERY.			
10.5	55515	06/26/90 1718	4	0	NO RECOVERY.			
11.0	55516	06/26/90 1723	4	6	STIFF (10 YR 5/6) YELLOWISH BROWN SILTY CLAY, WET.	CL	2.0	Hnu= 0 ppm α = 0 cpm Bγ = 460 cpm
11.5	55517	06/26/90 1723	4	0	NO RECOVERY.			
12.0	55518	06/26/90 1723	4	0	NO RECOVERY.			
12.5	55519	06/27/90 0820	4	6	LOOSE, 10 YR 5/2 GRAYISH BROWN CLAYEY SILT, WET.	ML	NA	Hnu= 0 ppm α = 0 cpm Bγ = 350 cpm
13.0	55520	06/27/90 0820	3	2	LOOSE, 10 YR 5/2 GRAYISH BROWN CLAYEY SILT, WET.	ML	NA	Hnu= 0 ppm α = 0 cpm Bγ = 350 cpm
13.5	55521	06/27/90 0820	2	0	NO RECOVERY.			
14.0	55522	06/27/90 0845	3	6	MEDIUM DENSE (10 YR 5/3) BROWN CLAYEY SILT, WET.	ML	NA	Hnu= 0 ppm α = 0 cpm Bγ = 400 cpm
14.5	55523	06/27/90 0845	5	6	MEDIUM DENSE (10 YR 5/3) BROWN CLAYEY SILT, WET.	ML	NA	Hnu= 0 ppm α = 0 cpm Bγ = 400 cpm
15.0	55524	06/27/90 0845	9	0	NO RECOVERY.			
15.5	55525	06/27/90 0850	4	4	LOOSE 10 YR 5/2 GRAYISH BROWN CLAYEY SILT, SOME GRAVEL, WET.	ML	NA	Hnu= 0 ppm α = 0 cpm Bγ = 350 cpm

NOTES:
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.7	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1523	COORDINATES: NORTH 479,406.88 EAST 1,379,945.37	DATE: 06/26/90
GROUND ELEVATION: 574.67	GWL: Depth N/A Date/Time N/A	DATE STARTED: 06/26/90
ENGINEER/GEOLOGIST: J. MASON	Depth N/A Date/Time N/A	DATE COMPLETED: 06/27/90
DRILLING METHODS: CME 45 AUGER RIG		PAGE OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.0	55526	06/27/90 0850	4	0	NO RECOVERY.			
16.5	55527	06/27/90 0850	8	0	NO RECOVERY.			
17.0	55528	06/27/90 0900	8	6	MEDIUM DENSE 10 YR 5/2 GRAYISH BROWN SAND, POORLY GRADED, WET, SOME SILT, SOME CLAY.	SP	NA	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
17.5	55529	06/27/90 0900	10	6	MEDIUM DENSE 10 YR 5/2 GRAYISH BROWN SAND, POORLY GRADED, WET, SOME SILT, SOME CLAY.	SP	NA	Hnu= 0 ppm α = 0 cpm BΓ = 400 cpm
18.0	55530	06/27/90 0900	11	0	NO RECOVERY.			
18.5	55531	06/27/90 0905	7	5	LOOSE 10 YR 5/2 GRAYISH BROWN SANDY SILT, SOME GRAVEL.	ML	NA	Hnu= 0 ppm α = 0 cpm BΓ = 380 cpm
19.0	55532	06/27/90 0905	5	0	NO RECOVERY.			
19.5	55533	06/27/90 0905	7	0	NO RECOVERY.			
20.0	55534	06/27/90 0905	5	0	NO RECOVERY.			

BOTTOM OF BORING 20.0

NOTES:
BOTTOM OF BORING AT 20.0 FT. SAMPLING ENDED AT 20.0 FT.
SAMPLES COLLECTED PER ASTM STANDARD PENETRATION. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

ERNALD
RI/FS

2731

	Initial	Date
1st Key In	[illegible]	7-6-90
2nd Key In	[illegible]	10-3-90
Hard Copy Verification		

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
PROTECTIVE PIPE O.D. 4 5/8 in. with padlock

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~~ ~~2.2~~ 2.8		571.6	
BOREHOLE FILL MATERIALS:				
~~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 ☑ 183
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS PIEZOMETER WAS SET IN THIS LOCATION ON DAVE GUNDERSON'S DIRECTION, THIS WILL BE THE ONLY ONE SET FOR THESE BORINGS 1519-1523.

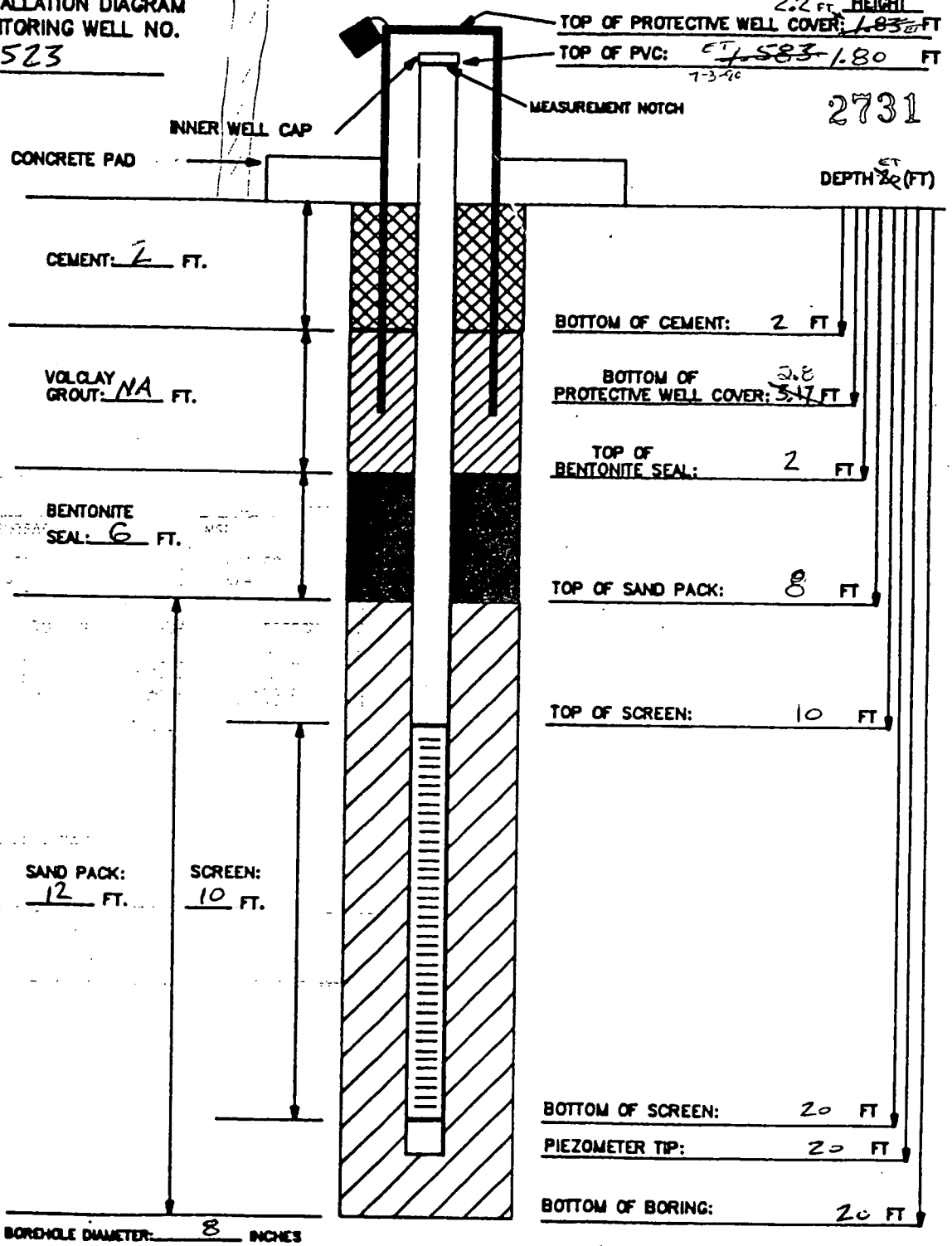
* NOTE (4) 4 in DIAMETER GUARD POSTS INSTALLED AROUND THIS LOCATION BECAUSE OF PARKING LOT LOCATION. 2 FT STICKUP.

5/5

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

184

TASK: 3.7.1

GEOLOGIST/ENGINEER: J. MASON

MONITORING WELL INSTALLATION RECORD
11/21/91

OJECT NAME: Fernald RI/FS
OJECT NO. : 602.3.2
RING NO. : 1523
LL NUMBER: 1523

FIELD ENG./GEO.: J. MASON DATE: 06/27/90
CHECKED BY : E. TROLLINGER DATE: 07/03/90
N,E COORDINATES: 479406.88, 1379945.3
DATE OF INSTAL.: 06/27/90

2731

LE DRILLING

ING METHOD: AUGER
LLING FLUID(S) USED: NONE NOTED
NOTES COMMENTS:

TYPE OF BIT: AUGER
IS CASING TEMPORARY?: No
CASING TYPE : PIEZOMETER
CASING DIAM.: 2 In. ID
CASING SIZE(S) USED: (Units N/A)
SIZE: N/A FROM: N/A TO: N/A
SIZE: N/A FROM: N/A TO: N/A

LL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .020 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: SCH. 40 PVC
RISER PIPE DIAMETERS:
O.D.: 2 3/8 In. I.D.: 2 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: 2 Ft.
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINTED

DTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 4 5/ In.
• LOCKING, HINGED LID WITH PADLO

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	1.8 Ft.		576.90	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.8 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
	0.0	2.0	574.4	572.4
Bentonite Pellets	2.0	8.0	572.4	566.4
Sand	8.0	20.0	566.4	554.4
vel	N/A	N/A	N/A	N/A
RATED SECTION	10.0	20.0	564.4	N/A
ELL TIP	20.0		554.4	
BOTTOM OF BOREHOLE	20.0		554.4	
GWL AFTER INSTALLATION	N/A		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MARKS : PIEZOMETER WAS SET IN THIS LOCATION ON BOB GALBRAITH'S DIRECTION, THIS WILL BE THE ONLY ON SET FOR THESE BORINGS 1519-1523.
MMENTS:

185

WELL 1645

FERNALD
RI/FS

K-65 Pit 4 2731

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 One Time 18-Aug 0400	DATE STARTED 9-11-90	
ENGINEER/GEOLOGIST M. SWANSON	Depth One Time	DATE COMPLETED 9-12-90	
DRILLING METHODS CABLE TOOLS		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE AND NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSTITUENT (PPM)	REMARKS
0–1	33063 0912 9-11-90	3 5 8	12	SOFT, YELLOWISH BROWN (10YR 5/4) SAND-CLAY-SILT MIXTURE, SOME GRAVELS AND COBBLES SLIGHTLY MOIST	SM	.25	Hnu = 0.0 ppm α = 0 cpm βγ = 200-300 cpm
2–3	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
4	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
5–6	33066 0926 9-11	6 9 13	18	5.0 — 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
7	33067 0937 9-11	5 5 5	18	↓			Hnu = 0.0 ppm α = 0 cpm βγ = 150-200 cpm
8–9	33068 0946 9-11	4 3 3	18	7.7 — 7.7 VERY SOFT, DARK YELLOWISH BROWN (10YR 3/6) CLAYEY SILT, TRACE OF SAND, SLIGHT PLASTICITY, WET	ML	1.25	Hnu = 0.0 ppm α = 0 cpm βγ = 200-270 cpm
10	33069 0953 9-11	2 5 10	18	9.4 — 9.4 ↓ HARD, MOTTLED YELLOWISH BROWN (10YR 5/6), SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.0	Hnu = 0.0 ppm α = 0 cpm βγ = 150-250 cpm
11–12	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
13	33071 1411 9-11	18 22 23	18	IRON STAINING IN TRANSITION ZONE 3 — 12.1 — 12.1 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 = 150-220 cpm
14–15	33072 1512 9-11	11 12 12	18	↓			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 FOR 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

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	602 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	VISUAL BY/MOUS	MEASURED COMPRESSIVE STRENGTH (TSF)	REMARKS
15	33073	18		HARD, DARK GRAY (2.5Y 4/0), SILTY CLAY, SOME PEBBLES, TRACE OF GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST			
16	1519	20	18	16.5	CL	3.5	Hnu = 0.0 ppm α = 0 cpm βγ = 200-280 cpm
	9-11	21					
17	33074	10		FIRM, GRAY (2.5Y 5/0), SAND-SILT-CLAY MIXTURE, SOME PEBBLES, VERY SLIGHT PLASTICITY, WET			
	1541	9	18		ML	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 80-150 cpm
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			
19	1544	13	9		ML	0.50	Hnu = 0.0 ppm α = 0 cpm βγ = 100-150 cpm
	9-11	15					
20	33111	5		FIRM, GRAY (2.5Y 5/0), SILTY CLAY, SOME SAND, TRACE OF PEBBLES, LOW PLASTICITY, MOIST			
	1343	7 8	12		CL	1.0	Hnu = 0.0 ppm α = 0 cpm βγ = 120-180 cpm
21	9-12 90						
	33112	15		FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, SOME PEBBLES AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST			
22	1349	18	16		CL	1.5	Hnu = 0.0 ppm α = 0 cpm βγ = 120-150 cpm
	9-12	20					
23	33113	21		HARD, GRAY (5Y 5/1), SILTY CLAY, SOME PEBBLES, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST			
	1352	23	18		CL	2.0	Hnu = 0.0 ppm α = 0 cpm βγ = 100-150 cpm
24	9-12	19					
	33114	16		HARD, GRAY (5Y 5/1), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST,			
25	1356	19	17		CL	3.0	Hnu = 0.0 ppm α = 0 cpm βγ = 120-160 cpm
	9-12	24					
				BOTTOM OF BORING = 25.5 FT. DRILLED, SAMPLED TO 25.5 FT. TCLP SAMPLE => 33060 TOTAL U WINCO => 33062 TOTAL U IT 33061			

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 = 100-300 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1645	COORDINATES: NORTH 481,583.25 EAST 1,379,060.26	DATE: 09/11/90
GROUND ELEVATION: 582.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/11/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/12/90
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	33063	09/11/90 0912	3 5 8	12	SOFT, YELLOWISH BROWN (10 YR 5/4), SAND-CLAY-SILT MIXTURE, SOME GRAVEL AND COBBLES, SLIGHTLY MOIST.	SM	.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 200-300cpm
3.0	33064	09/11/90 0915	7 10 13	18	FIRM, VERY DARK GRAY (10 YR 3/1), CLAYEY SILT, SOME GRAVEL AND COBBLES, SLIGHT PLASTICITY, TRACE OF SAND, DRY.	ML	.75	Hnu= 0.0 ppm α = 0 cpm βΓ = 200-250cpm
4.5	33065	09/11/90 0918	5 8 11	18	FIRM, MOTTLED DARK YELLOWISH BROWN (10 YR 4/6) SILTY CLAY, SOME GRAVEL, LOW PLASTICITY, DRY TO SLIGHTLY MOIST.	CL	1.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 150-250cpm
6.0	33066	09/11/90 0926	6 9 13	18	FIRM, MOTTLED DARK YELLOWISH BROWN (10 YR 4/6) SILTY CLAY, SOME GRAVEL, LOW PLASTICITY, DRY TO SLIGHTLY MOIST. SOFT, YELLOWISH BROWN (10 YR 5/6), SILT-CLAY MIXTURE, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST.	CL CL	1.0 .50	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-225cpm
7.5	33067	09/11/90 0937	5 5 5	18	SOFT, YELLOWISH BROWN (10 YR 5/6), SILT-CLAY MIXTURE, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST.	CL	.50	Hnu= 0.0 ppm α = 0 cpm βΓ = 150-200cpm
9.0	33068	09/11/90 0946	4 3 3	18	SOFT, YELLOWISH BROWN (10 YR 5/6), SILT-CLAY MIXTURE, TRACE OF SAND, LOW TO MEDIUM PLASTICITY, MOIST. VERY SOFT, DARK YELLOWISH BROWN (D10 YR 4/6) CLAYEY SILT, TRACE OF SAND, SLIGHT PLASTCITY, WET.	CL ML	.50 <.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 200-270cpm
10.5	33069	09/11/90 0953	2 5 10	18	VERY SOFT, DARK YELLOWISH BROWN (10 YR 4/6) CLAYEY SILT, TRACE OF SAND, SLIGHT PLASTICITY, WET. HARD, MOTTLED YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST.	ML CL	<.25 3.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 150-250cpm
12.0	33070	09/11/90 1408	10 11 13	18	HARD, MOTTLED YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST.	CL	2.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 150-200cpm
13.5	33071	09/11/90 1411	18 22 23	18	HARD, MOTTLED YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST. IRON STAINING IN TRANSITION ZONE AT 12.7 FT. H	CL CL	2.25 3.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 150-220cpm
15.0	33072	09/11/90 1512	11 12 12	18	HARD, DARK GRAY (2.5 Y 4/0) SILTY CLAY, SOME GRAVEL AND PEBBLES, LOW PLASTICITY, MOIST.	CL	3.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-200cpm

NOTES:
ALL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SAMPLE COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 1645	COORDINATES: NORTH 481,583.25 EAST 1,379,060.26	DATE: 09/11/90
GROUND ELEVATION: 582.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/11/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/12/90
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	33073	09/11/90 1519	18 20 21	18	HARD, DARK GRAY (2.5 Y 4/0) SILTY CLAY, SOME PEBBLES, TRACE OF GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST.	CL	3.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 200-280cpm
18.0	33074	09/11/90 1541	10 9 8	18	FIRM, GRAY (2.5 Y 5/0) SAND-SILT-CLAY MIXTURE, SOME PEBBLES, VERY SLIGHT PLASTICITY, WET.	ML	1.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-150 cpm
19.5	33110	09/11/90 1544	12 13 15	9	FIRM, GRAY (2.5 Y 5/0), SANDY CLAYEY SILT, SOME PEBBLES, LIMESTONE COBBLE, LOW TO MEDIUM PLASTICITY, MOIST TO WET.	ML	0.50	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-150cpm
21.0	33111	09/12/90 1343	5 7 8	12	FIRM, GRAY (2.5 Y 5/0), SILTY CLAY, SOME SAND, TRACE OF PEBBLES, LOW PLASTICITY, MOIST.	CL	1.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-180cpm
22.5	33112	09/12/90 1349	15 18 20	16	FIRM, OLIVE GRAY (5 Y 5/2), SILTY CLAY, SOME PEBBLES AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-150cpm
24.0	33113	09/12/90 1352	21 23 19	18	HARD, GRAY (5 Y 5/1), SILTY CLAY, SOME PEBBLES, TRACE OF SAND, LOW PLASTICITY, SLIGHTLY MOIST.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-150cpm
25.5	33114	09/12/90 1356	16 19 24	17	HARD, GRAY (5 Y 5/1), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST.	CL	3.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-160cpm

BOTTOM OF BORING 25.5

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 3.2.1
BORING NO. 1645
PIEZOMETER NO. 1645

FIELD ENG./GEO. M. SWANSON DATE 9-12-90
CHECKED BY E. Trollinger DATE 9-20-9
DATE OF INSTALLATION 9-12-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOLS
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 FT TO 25.5 FT
FLUID – FROM – TO –

TYPE OF BIT HAMMER
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.

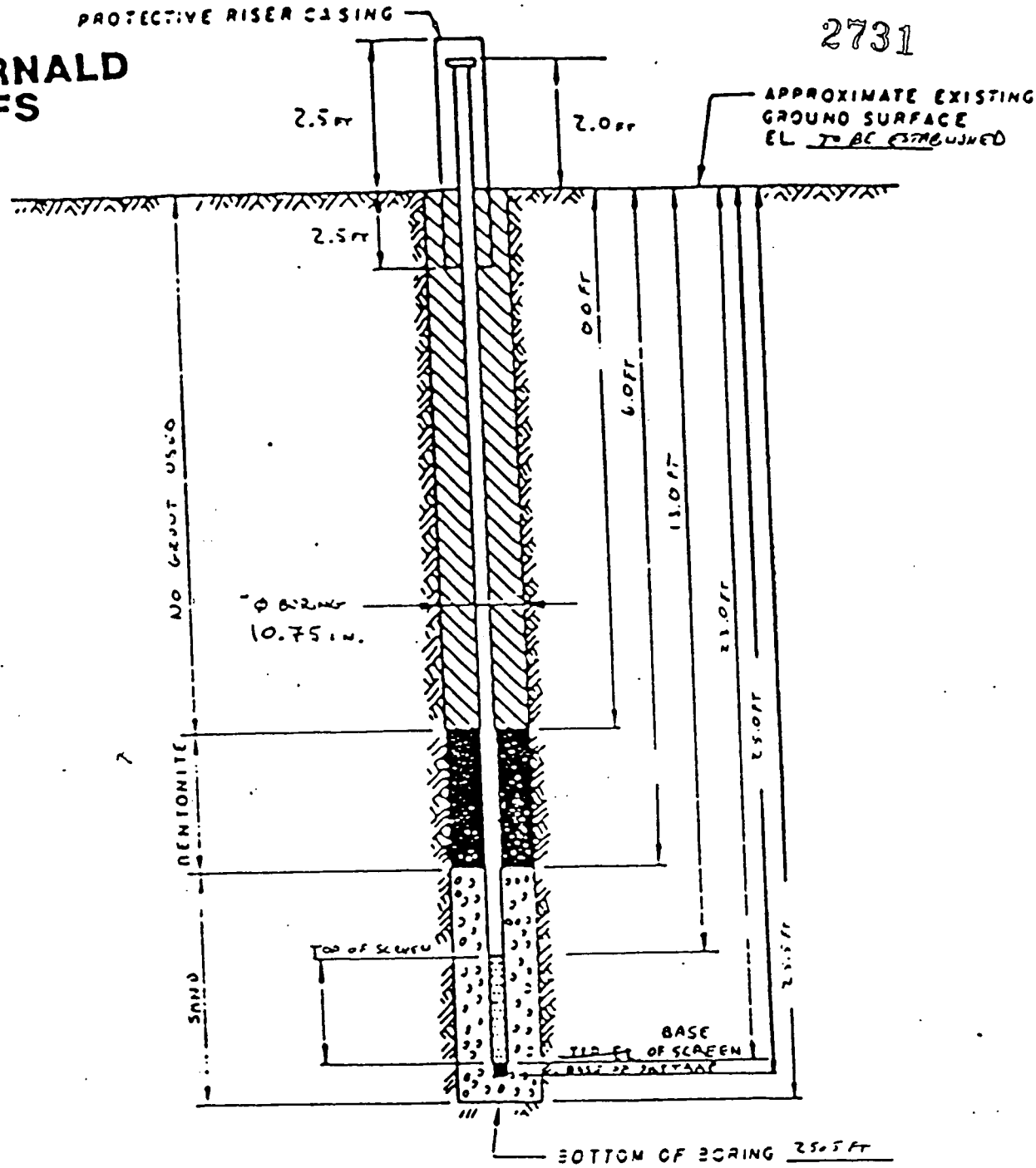
OTHER PROTECTION HINGED LOCKING LID COVER WITH PADLOCK

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 MADE AROUND PROTECTIVE CASING.

2731

FERNALD RI/FS



DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DRAWN BY	JMM 7-16-90

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 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
6 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

192

APPENDIX B

APPENDIX B

WELL CONSTRUCTION INFORMATION FOR THE 2000-SERIES MONITORING NETWORK

WELL 2008

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI FS T 3.2	
BORING NUMBER: 208	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 03/20/88
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 1 OF 5

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	0 8 2 4 1	2 2 4	12"	STIFF yellowish Brown silty clay (10YR 5/6) dry	CL	1.5	Hnu = 3 α = 0 δB = 260 1516
2 3	0 8 2 4 2	6 7 11	9"	Very STIFF Dark Yellowish Brown silty clay (10YR 4/6) dry. 3.0ft	CL		Hnu = 1.5 α = 0 δB = 270 1520
4	0 8 2 4 3	5 8 9	6"	Med. STIFF yellowish Brown clayey silt (10YR 5/4) Dry 4.5ft	ML	0.5	Hnu = 2.0 α = 0 δB = 250 1524
5 6	0 8 2 4 4	3 4 4	11"	STIFF dark yellowish Brown sandy clay (10YR 5/4) moist 6.0ft	CL	1.25	Hnu = 1.25 α = 0 δB = 240 1540
7	0 8 8 0 5	N/A	18"	SHELBY Tube 7.5ft	N/A	N/A	1645
8 9	0 8 8 0 6	4 8 8	10"	Loose Yellowish Brown sand (10YR 5/8) wet Trace silt	SP	<1	Hnu = 0 α = 0 δB = 200 1430 03/21/88
10	0 8 8 0 7	6 9 10	14"	Loose Yellowish Brown sand (10YR 5/8 wet. Trace silt 10.5	SP	<1	Hnu = 0 α = 0 δB = 200 1435
11 12	0 8 8 0 8	7 9 10	14"	STIFF Dark grey clay (5Y4/1) w/ sand. ~~wet~~ and silt. 12ft	CL	1.5	Hnu = 0 α = 0 δB = 200 1440
13	0 8 8 0 9	10 10 9	14"	STIFF Dark grey silt (5Y4/1) w/sand trace clay. wet 13.5ft	ML	1.5	Hnu = 0 α = 0 δB = 200 1445
14 15	0 8 8 1 0	2 3 4	16"	Medium STIFF Dark gray clay (5Y4/1) Trace silt moist	CL	<1	Hnu 0 α = 0 δB = 200 1500

NOTES:
1) Pennsylvania Drilling co.
Driller: Tim Harris
Helper: Craig Coulter
2) Background measurements
a) HNU = b) α = c) δB =

III Water used = 195

IV Colors via Munsell color chart.

402-11-85

NALD
I/FS

2731

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T32		
BORING NUMBER: 208	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 03/20/88	
ENGINEER/GEOLOGIST: M Goldberg	Depth Date/Time	DATE COMPLETED:	
DRILLING METHODS: Cable Too		PAGE 2 OF 5	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	08 8 11	5 7 6	18"	Medium STIFF Dark gray silty clay (5Y4/1) Trace sand and silt Wet	ML	1.5	Hnu = 0 α = 0 δB = 200 1510
17 18	08 8 12	6 7 10	18"	Medium STIFF Dark gray silty clay (5Y4/1) Trace sand & gravel Wet	ML	1.5	Hnu = 0 α = 0 δB = 210 1535
19	08 8 13	N/A	12"	S Helby Tube	N/A	N/A	1650
20	08 8 14	13 13 15	12"	STIFF Dark gray silty clay (5Y4/1) trace gravel. moist 20.5	CL	2.0	Hnu = 0 α = 0 δB = 210 3/22/88 0855
21 22	08 8 15	7 7 9	10"	STIFF Dark gray clay (5Y 4/1) trace gravel. DRY	CL	2.0	Hnu = 0 α = 0 δB = 210 0900
23	08 8 16	5 6 9	12"	Very STIFF Dark gray clay (5Y4/1) trace gravel. moist	CL	2.5	Hnu = 0 α = 0 δB = 210 0925
24 25	08 8 17	4 6 10	12"	Very STIFF Dark gray clay (5Y4/1) trace gravel moist	CL	2.0	Hnu = 0 α = 0 δB = 180 0940
26	08 8 18	4 5 7	8"	Very STIFF Dark gray clay (5Y4/1) trace gravel. DRY	CL	2.0	Hnu = 0 α = 0 ~~δB = 190~~ δB = 180 0950
27 28	08 8 19	2 4 3	12"	STIFF Dark gray clay (5Y 4/1) trace gravel. DRY	CL	1.0	Hnu = 0 α = 0 1030
29	08 8 20	5 7 50/4	14"	STIFF Dark gray clay (5Y 4/1) trace gravel. DRY.	CL	1.0	Hnu = 0 α = 0 δB = 190 1335
30		33					

NOTES:

402-11-86

NALD
I/FS

2731

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3-2		
ORING NUMBER: ~~180~~ 208	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 03/20/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED:	
DRILLING METHODS: Cable Tool		PAGE 3 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (FT)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	1	50 50	18"	Very Hard olive gray clay (5Y4/2) Trace Gravel. DRY.	CL	>4.0	Hnu=0 α=0 δB=190 1400
32	2	14 34 50	18"	Very Hard Dark gray clay (5Y4/1) Trace gravel DRY	CL	>4.0	Hnu=0 α=0 δB=190 1415
33	3	14 24 35	18	Very Hard Dark gray clay (5Y4/1) trace gravel 33.5ft	CL	>4.0	Hnu=0 α=0 δB=180 Thin lense of Yellowish Brown clay at contact. (10YR5/6) 1445
34				Dense Yellowish Brown sand (10YR5/6) DRY	SW	<1	
35							
37							
38							
39	4	14 47 50	18"	Very Dense Yellowish Brown sand (10YR5/6) DRY.	SW	<1	Hnu=0 α=0 δB=190 1545
40							
41							
42							
43							
44							
45							

NOTES:

197

402-11-66

NAL
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T32		
BORING NUMBER: 208	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 03/20/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED:	
DRILLING METHODS: Cable Tool		PAGE 4 OF 5	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							03/23/88
46	8 8 2 5	40 50 ~~50/3~~	16"	Very dense yellowish Brown sand (10YR 5/6) Trace gravel. DRY	SW	<1	Hnu=0 α=0 γB=190 0835
47							
48							
49				49 FT			
50	8 8 2 6	15 20 25	18"	Dense Yellowish Brown sand (10YR 5/6) DRY	SP	<1	Hnu=0 α=0 γB=120 0900
51							
52							
53							
54				54 ft			
55	8 8 2 7	7 14 22	18"	Dense Dark gray sand (2.5Y 4/1) moist.	SP	<1	Hnu=0 α=0 γB=120 0925
56							
57							
58							
59							
60							

NOTES:

198

402-11-86

NALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS T3.2		
BORING NUMBER: 208	COORDINATES:	DATE:	
ELEVATION:	GWL: Depth 59.53 Date/Time 03/28/88 1630	DATE STARTED: 03/20/88	
ENGINEER/GEOLOGIST: M. Goldberg	Depth Date/Time	DATE COMPLETED: 03/28/88	
DRILLING METHODS: Cable Tool		PAGE 5 OF 5	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	08 8 28	5 7 11	14"	Medium Dense yellowish Brown sand (10YR5/6). WET.	SW	<1	Hnu=0 α=0 γB=120 1030
62							
63							
64							
65							~~1030~~
66	08 8 29	12 10 16	18"	Medium Dense yellowish Brown sand (10YR5/6) WET Trace gravel	SW	<1	Hnu=0 α=0 γB=120 1310
67							
68							
69							
70							
71	08 8 30	11 12 21	18"	Medium Dense yellowish Brown sand (10YR 5/6) w/Gravel. Wet	SW	<1	Hnu=0 α=0 γB=110 14 1655
72							
73							
74				Bottom of Boring 73'ft			
75							

NOTES:

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 2008	COORDINATES: NORTH 480,661.42 EAST 1,378,918.03	DATE: 03/20/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/20/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08241	03/20/88 1516	2 2 4	12	STIFF YELLOWISH BROWN SILTY CLAY (10YR, 5/6), DRY.	CL	1.5	Hnu= 3 ppm α = 0 cpm βΓ = 260 cpm
3.0	08242	03/20/88 1520	6 7 11	9	VERY STIFF DARK YELLOWISH BROWN SILTY CLAY (10YR, 4/6), DRY.	CL		Hnu= 2 ppm α = 0 cpm βΓ = 270 cpm
4.5	08243	03/20/88 1524	5 8 9	6	MEDIUM STIFF YELLOWISH BROWN CLAYEY SILT (10YR, 5/4), DRY.	ML	0.5	Hnu= 2 ppm α = 0 cpm βΓ = 250 cpm
6.0	08244	03/20/88 1540	3 4 4	11	STIFF DARK YELLOWISH BROWN SANDY CLAY (10YR, 5/4), MOIST.	CL	1.25	Hnu= 1 ppm α = 0 cpm βΓ = 240 cpm
7.5	08805	03/20/88 1645		18	SHELBY TUBE.			
9.0	08806	03/21/88 1430	4 8 8	10	LOOSE YELLOWISH BROWN SAND (10YR, 5/8), WET, TRACE SILT.	SP	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
10.5	08807	03/21/88 1435	6 9 10	14	LOOSE YELLOWISH BROWN SAND (10YR, 5/8), WET, TRACE SILT.	SP	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
12.0	08808	03/21/88 1440	7 9 10	14	STIFF DARK GRAY CLAY (5Y, 4/1) WITH SAND AND SILT.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
13.5	08809	03/21/88 1445	10 10 9	14	STIFF DARK GRAY SILT (5Y, 4/1) WITH SAND, TRACE CLAY, WET.	ML	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
15.0	08810	03/21/88 1500	2 3 4	16	MEDIUM STIFF DARK GRAY CLAY (5Y, 4/1), TRACE SILT, MOIST.	CL	<1	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm

NOTES:
PENNSYLVANIA DRILLING CO., DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. BACKGROUND MEASUREMENTS. WATER USED = 600 GALLONS. COLORS VIA MUNCELL COLOR CHART.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2008	COORDINATES: NORTH 480,661.42 EAST 1,378,918.03	DATE: 03/20/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/20/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08811	03/21/88 1510	5 7 6	18	MEDIUM STIFF DARK GRAY SILTY CLAY (5Y, 4/1), TRACE SAND AND SILT, WET.	ML	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 200 cpm
18.0	08812	03/21/88 1535	6 7 10	18	MEDIUM STIFF DARK GRAY SILTY CLAY (5Y, 4/1), TRACE SAND AND GRAVEL, WET.	ML	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
19.0	08813	03/21/88 1650		12	SHELBY TUBE.			
20.5	08814	03/22/88 0855	13 13 15	12	STIFF DARK GRAY SILTY CLAY (5Y, 4/1), TRACE GRAVEL, MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
22.0	08815	03/22/88 0900	7 7 9	10	STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, DRY.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
23.5	08816	03/22/88 0925	5 6 9	12	VERY STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 210 cpm
25.0	08817	03/22/88 0940	4 6 10	12	VERY STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, MOIST.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
26.5	08818	03/22/88 0950	4 5 7	8	VERY STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, DRY.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
28.0	08819	03/22/88 1030	2 4 3	12	STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, DRY.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 180 cpm
29.5	08820	03/22/88 1335	5 7 50	14	STIFF DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, DRY.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 190 cpm
31.0	08821	03/22/88 1400	50 50	18	VERY HARD OLIVE GRAY CLAY (5Y, 4/2), TRACE GRAVEL, DRY.	CL	>4.0	Hnu= 0 ppm α = 0 cpm βΓ = 190 cpm
32.5	08822	03/22/88 1415	14 34 50	18	VERY HARD DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL, DRY.	CL	>4.0	Hnu= 0 ppm α = 0 cpm βΓ = 190 cpm
	08823	03/22/88	14 24	18	VERY HARD DARK GRAY CLAY (5Y, 4/1), TRACE GRAVEL. DENSE YELLOWISH BROWN SAND (10YR, 5/6), DRY. 201	CL SW	>4.0 <1	Hnu= 0 ppm α = 0 cpm

34.0	1445	35					βΓ = 180 cpm
39.0					2731		
40.5	08824 03/22/88 1545	14 47 50	18	VERY DENSE YELLOWISH BROWN SAND (10YR, 5/6), DRY.	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 190 cpm
45.0							

NOTES:
PENNSYLVANIA DRILLLING CO., DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. BACKGROUND MEASUREMENTS. WATER USED = 600 GALLONS. COLORS VIA MUNCELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2008	COORDINATES: NORTH 480,661.42 EAST 1,378,918.03	DATE: 03/20/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/20/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	08825	03/23/88	0835	40 50 50	16	VERY DENSE YELLOWISH BROWN SAND (10YR, 5/6), TRACE GRAVEL, DRY	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 190 cpm
50.0									
51.5	08826	03/23/88	0900	15 20 25	18	DENSE YELLOWISH BROWN SAND (10YR, 5/6), DRY.	SP	<1	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
55.0									
56.5	08827	03/23/88	0925	7 14 22	18	DENSE DARK GRAY SAND (2.5Y, 4/1), MOIST.	SP	<1	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
60.0									

NOTES:
PENNSYLVANIA DRILLING CO., DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. BACKGROUND MEASUREMENTS. WATER USED = 600 GALLONS. COLORS VIA MUNCELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2008	COORDINATES: NORTH 480,661.42 EAST 1,378,918.03	DATE: 03/20/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 03/20/88
ENGINEER/GEOLOGIST: M. GOLDBERG	Depth N/A Date/Time N/A	DATE COMPLETED: 03/28/88
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	08828	03/23/88 1030	5 7 11	14	MEDIUM DENSE YELLOWISH BROWN SAND (10YR, 5/6), WET.	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
65.0								
66.5	08829	03/23/88 1310	12 10 16	18	MEDIUM DENSE YELLOWISH BROWN SAND (10YR, 5/6), WET, TRACE GRAVEL.	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
70.0								
71.5	08830	03/23/88 1455	11 12 21	18	MEDIUM DENSE YELLOWISH BROWN SAND (10YR, 5/6), WITH GRAVEL, WET.	SW	<1	Hnu= 0 ppm α = 0 cpm βΓ = 110 cpm

BOTTOM OF BORING 72.8

NOTES:
PENNSYLVANIA DRILLING CO., DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. BACKGROUND MEASUREMENTS. WATER USED = 600 GALLONS. COLORS VIA MUNCELL COLOR CHART.

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. Goldberg DATE 03/28/88
PROJECT NO. 6027T3.2 CHECKED BY _____ DATE _____
BORING NO. 208
PIEZOMETER NO. N/A DATE OF INSTALLATION 03/28/88

BOREHOLE DRILLING

DRILLING METHOD Water	TYPE OF BIT Flat Head
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID _____ FROM 0 TO 73ft	SIZE 10" FROM 0 TO 73ft
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10ft
AVERAGE SIZE OF PERFORATIONS .010" inches	JOINING METHOD Thread and couple
TOTAL PERFORATED AREA 10ft	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5ft	OTHER PROTECTION Lockable cap
PROTECTIVE PIPE O.D. 10"	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0 ft	BOTTOM 46ft	TOP	BOTTOM
BENTONITE	TOP 46ft	BOTTOM 50ft	TOP	BOTTOM
~~SAND~~	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP 50	BOTTOM 72.8ft	TOP	BOTTOM
PERFORATED SECTION	TOP 55.8ft	BOTTOM 70.8	TOP	BOTTOM
PIEZOMETER TIP	72.8ft			
BOTTOM OF BOREHOLE	72.8ft			
GWL AFTER INSTALLATION	57.53ft ~~N/A~~			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 205
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS _____

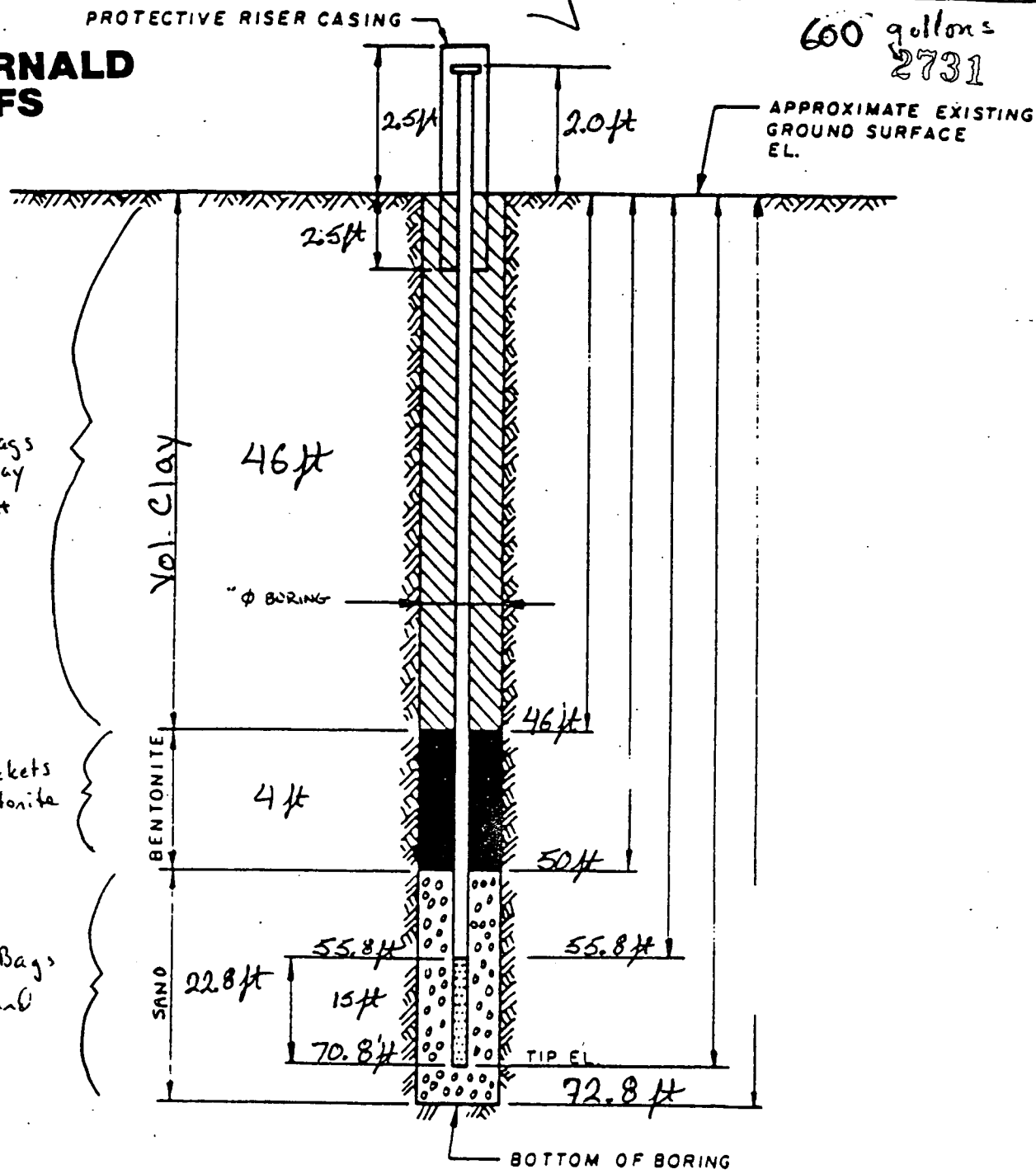
409-11-86

Monitoring Well 208

50

600 gallons
2731

FERNALD RI/FS



NOTES:

1. RISER PIPE IS IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS IN I.D PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR

FMPC RI/FS

206

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

MONITORING WELL INSTALLATION RECORD
11/21/91

ROJECT NAME: Fernald RI/FS
ROJECT NO. : 602.3.2
ORING NO. : 2008
ELL NUMBER: 2008

FIELD ENG./GEO.: M. GOLDBERG DATE: 03/28/88
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 480661.42, 1378918.0
DATE OF INSTAL.: 03/28/88

2731

OREHOLE DRILLING

LING METHOD: Cable Tool
LING FLUID(S) USED: (in Feet)
ID: WATER FROM: 0 TO: 73
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING
CASING DIAM.: 4 In.
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 73
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: .010 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: THREAD AND COUPLE

OTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10 In.
* LOCKABLE CAP

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0		578.87	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	46	N/A	N/A
Bentonite Pellets	46	50	N/A	N/A
Gravel	50	72.8	N/A	N/A
PERFORATED SECTION	55.8	70.8	N/A	N/A
TIP	72.8		N/A	
OM OF BOREHOLE	72.8		N/A	
AFTER INSTALLATION	57.53		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MMENTS:

207

WELL 2024

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2024	COORDINATES: NORTH 482,487.51 EAST 1,378,880.72	DATE: 10/17/87
GROUND ELEVATION: 580.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/17/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/29/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.0									
17.3	07248 10/17/87 1730					SHELBY TUBE.			

BOTTOM OF BORING 70.1

NOTES:

ERNALD
RI/FS

2731

PIEZOMETER INSTALLATION SHEET

ECT NAME FERNALD RI/FS FIELD ENG./GEO. Will Kegley DATE 10 29 87
RCJECT NC. 602 CHECKED BY DATE
ORING NO. 224
IEZOMETER NO. 224 DATE OF INSTALLATION 10-29-87 thru 10 30 87

OREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT HAMMER (FLAT HEAD)
DRILLING FLUID (S) USED:	CASING SIZE (S) USED: (TEMPORARY)
FLUID WATER FROM 0 TO 70.1 ft	SIZE 10" FROM 0 TO 73ft
FLUID — FROM — TO —	SIZE FROM TO

IEZOMETER DESCRIPTION

TYPE STAINLESS STEEL (316)	RISER PIPE MATERIAL 316 STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. I.D. 4.0
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS (2) 5ft (6) 2ft (4) 10ft
AVERAGE SIZE OF PERFORATIONS 0.010 in	JOINING METHOD FLUSH JOINT THREADED
TOTAL PERFORATED AREA 15 ft	

ROTECTION SYSTEM

ISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Locking top
PROTECTIVE PIPE O.D. 10 inch	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.1	BOTTOM 34.5	TOP	BOTTOM
BENTONITE	TOP 34.5	BOTTOM 40.4	TOP	BOTTOM
SAND	TOP 40.4	BOTTOM 70.1	TOP	BOTTOM
o GRAVEL USED	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 53.5	BOTTOM 68.5	TOP	BOTTOM
PIEZOMETER TIP	69			
BOTTOM OF BOREHOLE	70.1			
GWL AFTER INSTALLATION				

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

210

S

MONITORING WELL INSTALLATION RECORD

2731

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 2024
WELL NUMBER: 2024

FIELD ENG./GEO.: WILL KEGLEY
CHECKED BY : Not Noted
N,E COORDINATES: 482487.51, 1378880.7
DATE OF INSTAL.: 10/29/87

DATE: 10/29/87
DATE: N/A

BOREHOLE DRILLING

DRILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 70.1
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: Yes
CASING TYPE : Stainless Steel
CASING DIAM.: 4.0 In.
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 73
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.010 (In.)
TOTAL PERFORATED AREA: 15 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: I.D.: 4.0
LENGTH OF 1ST PIPE SECTION: 5 Ft.
2ND PIPE SECTION: 2 Ft.
3RD PIPE SECTION: 10 Ft.
COMMENTS

RISER JOINING METHOD: FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 10 In.
* LOCKING TOP WITH LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	1.9 Ft.		582.22	
GROUND SURFACE	0.0		580.4	
BOTTOM OF PROTECTIVE PIPE	2.8 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	2.1	34.5	N/A	N/A
Bentonite Pellets	34.5	40.4	N/A	N/A
Sand	40.4	70.1	N/A	N/A
PERFORATED SECTION	53.5	68.5	N/A	N/A
WELL TIP	69.0		N/A	
BOTTOM OF BOREHOLE	70.1		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

FERNALD RI/FS

PAC

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:		DATE: 9-14-87
ELEVATION: 519.9	GWL: Depth	Date/Time	DATE STARTED: 9-14-87 @ 1330
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 10/3/87
DRILLING METHODS: Cable Tool - Split Spoon Samples			PAGE 1 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5 1.0'	S 07089	5 11 10	12"	Medium stiff, yellowish-brown clay with some sand, moist	CL		Background Gas $\gamma\beta$ = 40-60 α = 0 hnu = 0 Sample Caught (1345)
2' 3'	S 07090	12 17 19	24"	Stiff, dark yellowish-brown silty sand with some fine gravel moist	SM		Background Levels (1400)
4'	S 07091	12 25 32	18	Medium dense dark yellowish-brown silty sand with some gravel moist; 4.3' Coarse Gravel - brownish-brown	SP / GW		Background Levels (1440)
5' 6'	S 07092	22 12 15	14"	Medium dense dark yellowish-brown silty sandy gravel, moist. 5.5' Stiff yellowish-brown silty clay, moist	GC / CL		Background Levels (1445)
7'	S 07093	10 21 23	16"	Dense yellowish-brown silty gravel grading downward to a: 7' Hard dark gray clay with a trace of coarse sand and gravel moist 7'	GC / CL	4.5	Background Levels (1545)
8' 9'	S 07095	16 19 23	12"	Very stiff gray clay with a trace of fine gravel (slightly damp) moist.	CL	4.0	Background Levels End of Day 9-14-87 (1625)
10'	S 07096	6 11 15	6"	Medium dense, grayish-brown gravel moist.	GC		Start of Day 9-15-87 gravel is actually very loosely consolidated Background (0830)
11' 12'	S 07097	4 5 8	12"	Medium stiff olive-gray clay with a trace of fine gravel, moist.	CL	1.0	Background Lost entire first sample and had to use spring retriever (0935)
13	S 07098	6 11 17	18"	13.2' Loose gray, fine sand, moist. 13.2.	CL / SM	.75	Background (0942)
14' 15'	S 07100	2 2 3	18"	Soft olive-gray clay with a trace of fine gravel, moist.	CL	.50	Background (1030)

NOTES: Background Levels 9-14-87 $\gamma\beta$ = 40 - 140 cpm α = 0 hnu = 0

Background Levels 9-15-87 $\gamma\beta$ = 40-80 cpm α = 0 hnu = 0

Used 40 gallons of H_2O 9-14-87

212

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		Task 3.2
BORING NUMBER: 324	COORDINATES:		DATE: 9-15 & 9-16-87
ELEVATION:	GWL: Depth 17.2	Date/Time 9-15 @ 1450	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 11.3	Date/Time 9-15 / 1600	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool			PAGE 2 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16'	SS 07101	6 6 9	18"	Soft, olive gray clay with a trace to some sand and gravel, moist	CL	.50	Background Levels (1040)
17'	SS 07102	2 3 12	6"			.50	Background Levels (1350)
18'				18.2' Soft olive gray clay, moist. 18.2'		.50	
19'	SS 07103	20 45 40	18"	Very dense gray fine gravel moist	GP		Background levels (1355)
20'	SS 07104	46 30 27	18"	18.8 Dark yellowish-brown, coarse sand 18.8	SW	–	Background
				Very dense gray coarse gravel, moist Wet	GP	–	End of Day 9-15-87 (1530)
21'				21.5			Start Day 9-16-87
22'	SS 07105	16 33 47	18"	21.8 Very dense gray fine to medium sand moist 21.8	SC	–	Sand is actually Medium dense
				22 Hard olive-gray clay, trace of gravel moist. 22	CL	>4.0	(0905)
23'	SS 07106	14 16 22	18"	Dense gray unconsolidated gravel, moist. grading downwards to a:	GW		Background
				23.5 Hard gray clay, some gravel moist 23.5			(1005)
24' 25'	SS 07107	20 50 (3")	12"	Medium dense grayish-brown fine to medium sand with trace of large quartz rock fragments Wet	SP		Background Split Spoon jammed with large rock (1420)
26' 27'	SS 07108	8 18 30	18"	Hard, dark gray olive-gray clay with some sand and fine gravel	CL	>4.5	Background (1440)
28	SS 07110	35 52 30	18"	27.5 Very stiff, grayish-brown silty clay 27.5	ML	3.5	Background
				28 Very hard, gray clay 28	CL	>4.5	(1500)
29' 30'	SS 07111	46 50 –	12"	Very stiff, gray clay with twig-like fragments ?? and a trace of gravel	CL		Background End Day 9-16-87 (1520)

NOTES: Background levels 9-15-87 $\gamma\beta$ = 40-80 cpm α = 0 hnp = 0

Background Levels 9-16-87 $\gamma\beta$ = 40-60 cpm α = 0 hnp = 0

Water level 9-15-87 @ 1600 was 11.3'

" " 9-16-87 @ 0800 " 9.3'

There appears to be a substantial aquafer at 18' - 21.5'

213

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9-17-87	
ELEVATION:	GWL: Depth 41.2 Date/Time 9-17-87 @ 1730	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 10-3-87	
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 11	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30'							Start Day 9-17-87
31'	S 07112	12 20 24	6"	Stiff olive gray clay with a trace of fine gravel moist	CL	2.0	Background Levels (1045)
32' 33'	S 07113	10 11 16	18"	Very stiff gray clay with trace of gravel, moist			Background Levels-(B.G.) (1050)
34'	S 07114	10 25 37	24"	33.7 Stiff gray clay moist 33.7; 34 Very stiff olive-yellow clay moist 34'; Very dense yellow-brownish sand moist		1.5; 4.0	B.G. (1105)
35' 36'	S 07115	23 33 36	12"	Very dense yellowish-brown Sand moist.	SW	-	B.G. Sand is moist, but not saturated. (1400)
37'	S 07116	50 - -	9"	37' Medium stiff brownish-yellow silt clayey moist 37'	SM	-	B.G. (1530)
38' 39'	S 07117	9 24 42	13"	Very dense yellowish-brown, well sorted, fine grain sand Moist, but basically dry.			B.G. Very friable Sand Actually (1555)
40' 41' 42' 43' 44'					SW	-	Begin catching 5' Samples. Loose Unconsolidated Sand
45'	S 07118	25 43 45	18"				B.G. Sample 44'-45.5' End Day 9-17-87 1715

NOTES: Background Levels for 9-17-87 $\gamma\beta$ = 40-60 cpm, α = 0 hnu = 0

214

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:		DATE: 9-18-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool			PAGE 4 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45'	07118	26 43 45	18"	SAND - As Described above	SW		End Day 9-17-87 (1715)
46' 47' 48' 49' 50'				Very dense yellowish-brown well sorted fine grain sand moist.	SW	-	Start Day 9-18-87
51'	S 07119	15 20 21	18"	Dense yellowish-brown, well sorted, damp, but not wet sand			B.G. Loose unconsolidated Sand (1345)
52' 53' 54' 55'							
56'	S 07120	13 27 (4")-50	12"	55.8 Loose grayish-brown coarse sand, moist 55.8			B.G.
				56.1 Hard gray clay moist. 56.1	CL		(1415)
57' 58'	S 07121	13 23 43	12"	Very dense gray, salt & pepper looking, medium to coarse grain sand with trace of fine gravel. moist	SW		B.G. Sand is actually loose & unconsolidated. (1440)
59' 60'							

NOTES:

215

402-11-88

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 324	COORDINATES:	DATE: 9-19-87
ELEVATION:	GWL: Depth 51.6 Date/Time 9-19/1030	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 62.6 Date/Time 9-19/1730	DATE COMPLETED: 10-3-87
DRILLING METHODS:		PAGE 5 OF 11

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60'							
61'	S 07122	13 25 28	18"	Very dense, dark gray coarse sand with some fine gravel wet	SW		Background End of 9-18-87 (1515)
62'							~~End~~ Start of 9-19-87
63'							
64'	S 07123	6 3 3	14"	Loose gray, lightly salt & peppered looking fine to coarse grain sand with a trace of gravel WET	SW		Borehole drilled down to 70'. Blow sand came up hole to 63' where this sample was taken. B.G. Levels (1545)
65'							
66'	S None	S 2 2	0"	Sand pump indicates very loose, grayish-brown unconsolidated sand, wet	SM ?		Blow Sand coming into hole. Could not obtain a sample even with catcher End Day 9-19-87
67'							Start Day 9-20-87
68'							
69'							
70'							10" Temporary Casing driven to 80' to cut off blow sand.
71'	S 07124	6 14 21	12"	Dense, gray coarse sand with some fine & coarse gravel. Wet	SP		Background Levels Only (1000)
72'							
73'							Bailer - Sand Pump bringing up large cobbles ie. 1½" x 2½" large - Diameter - = 1½"
74'							
75'							

NOTES: Background Levels 9-19-87 β = 40-80 α = 0 hnu = 0
" " 9-20-87 β = 40-70 α = 0 hnu = 0

216

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:	DATE: ~~9-19-87~~ & 9-20	
ELEVATION:	GWL: Depth 61.5' Date/Time 9-20/0900	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 10-3-87	
DRILLING METHODS: Cable Tool		PAGE 6 OF 11	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Feet)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75'							
76'	S 07125	16 31 46	14"	Very dense grayish-brown gravel (Color: 2.5 Y, 5/2) and Coarse Sand See Remarks →	GP		Background Levels (B.G.) (1140)
77'							Sand pump collecting large carbonate cobbles & gravel rocks with fossil Inclusions.
78'							
79'							
80'							
81'	S 07126	2 6 16	18"	Medium dense, gray, very coarse grain sand with some fine gravel 80.8 / 80.8	SW		Background levels (1350)
				Medium dense grayish-brown fine gravel with some coarse gravel	GW		
82'							Drove 10" Temporary Casing to 90'
83'							Sand Pump bringing up fine to coarse gravel
84'							
85'							
86'	S 07127	20 50 (3")-50	12"	Very dense, dark gray, sandy gravel with fine to coarse sand. (Color: 2.5 Y, N4/) & large cobbles i.e. 1" x 2" x 1½".	GP		Large rock jammed in Split Spoon. Actually a loose gravel. Background levels (1600)
87'							
88'							
89'							
90'							

NOTES: Background levels 9-20-87 : γ & β = 40-75 cpm. α = 0, hnu = 0

217

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9-20 & 9/21/87	
ELEVATION:	GWL: Depth 52' Date/Time 9-20/1400	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 52' Date/Time 9-21/0730	DATE COMPLETED: 10-3-87	
DRILLING METHODS: Cable Tool		PAGE 7 OF 11	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90'							
91'		2 2 5 3 8 4	0"	Sand Pump collecting fine grain Sand	SW		Lost Sample both times even with Catcher In.
92'							End 9-20-87 Start 9-21-87
93'				93 ± ? — — — ? — — — ?	?		Approximate depth of material change.
94'							
95'				Very Dark Gray, fine gravel with coarse sand (10YR 3/1)	GW		
				95.5 Dense gray fine to coarse gravel (2.5 Y N5) 95.5	GW		
96'	S 07128	18 29 36	24"	96.25 Very dense, grayish-brown silty sand moist. 96.25 (Color: 2.5 Y, 5/2)	GM ?		Background levels 1350
97'							
98'							Sand pump quit sucking up sand. Sample Taken.
99'							
100'	S 07129	17 ~~13~~ 20	18"	Very Stiff, dark gray clay moist (Color: 5 Y, 4/1)	CL	3.5	Background levels (1500)
101'							
102'				— — ? — — ? — — ? — —	?		
103'							
104'							
105'							

NOTES: Background Levels 9-21-87 $\gamma\beta$ = 40-80 cpm, α = 0, hum = 0

218

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9-22-87	
ELEVATION:	GWL: Depth 52' Date/Time 9-21/1700	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 64.5' Date/Time 9-22/1550	DATE COMPLETED: 10-3-87	
DRILLING METHODS: Cable Tool	92' 9-22/1715	PAGE 8 OF 11	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105'							
106'	S 07130	6 7 14	6"	Medium dense, grayish-brown fine grain, well graded, silty Sand (Color : 2.5 Y, 5/2)	SM		Background levels (1620)
107'							End 9-21-87
108'							
109'							
110'							
111'	S 07131	6 10 11	12"	111.4' Soft, dark gray silty clay (Color : 5 Y, 4/2) 111.4'	CL		Background levels (1035)
112'						.~~95~~ .5	
113'							Picking Up clay On hammer 113'-115'
114'							
115'				Medium Stiff, Olive-Gray Clay (5Y, 4/2) 115.5'			
116'	S 07132	9 14 18	18"	Very Stiff, olive gray day (Color : 5 Y, 4/2) 115.5'	CL	.75 3.5	Background levels (1338)
117'							Casing Driven Down To 120'
118'							
119'							
120'							

NOTES: Background Levels 9-22-87 : $\gamma\beta$ = 40-80 cpm, α = 0, hnu = 0

219

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9/22 & 9/23/87	
ELEVATION:	GWL: Depth 64.5' Date/Time 9-22/1550	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 92' Date/Time 9-22/1715	DATE COMPLETED: 10-3-87	
DRILLING METHODS: CABLE TOOL	95' 9-23/1750	PAGE 9 OF 11	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120'							
121'	S 07133	2 3 6	18"	Medium Stiff, gray (5Y, 5/1) to Olive gray (5Y, 5/2) clay with some fine gravel wet	CL		Moderately gravelly Sand. Background levels (1650)
122'							End Day 9-22-87 Start Day 9-23-87
123'				123.5'			
124'							Noticed Sand & Gravel On Sticking On Hammer
125'							
126'	S 07134	27 17 10	6"	Medium Dense, Olive-~~Gray~~-Brown, fine to coarse gravel wet (Color: 2.5Y, 4/4)	GP		Scanned - Background Readings Only (1025)
127'							
128'							
129'							
130'							
131'	S 07135	18 33 19	5"	Very Dense, Olive-Brown Fine Gravel (Color: 2.5Y, 4/4) wet	GW		Background levels. Spoon Plugged with light Olive-brown carbonate rock fragment (2.5Y, 5/4) (1108)
132'							132' Drilling became more difficult Lithology Change
133'							
134'							Drilled Down To 135' & Sand blew In To 124'
135'							Drive 10" Csg to 140'

NOTES: Water Level checked at 1550, 9-22-87 when temporary Casing was at 121'.

Background Levels 9-23-87: $\gamma\beta$ = 40-120 cpm hnu = 0 α = 0

220

Smelled Some Brackish, Semi-Petroliferous odor observed at 125'

Hole Monitored with LLE & hnu. No Readings Detected.

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9-24-87 / 9-29-87	
ELEVATION:	GWL: Depth 66.4' Date/Time 9-24/1245	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 58.5 Date/Time 9/29/0900	DATE COMPLETED: 10-3-87	
DRILLING METHODS: CABLE TOOL		PAGE 10 OF 11	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135'							End Day 9-23-87
136'		#1 #2 11 5 13 7 14 16	0"				Start Day 9-24-87 Attempted twice to obtain sample.
137'							Sand Pump indicates Fine Sand
138'							
139'							Drilled Down to 140', but sand blew in to 135'. Drive Csg to 145'
140'							
141'	S 07136	#1 50-(4") #2 45 (7)-50	12"	Very Dense, very Dark Grayish-Brown Sand & Fine Gravel wet (Color: 2.5 Y, 3/2)	SW		B.G. Felt we hit a Rock (1115)
142'							
143'							Hammer Driving Hard Feels like we were pounding a large rock.
144'							
145'							End Day 9/24
146'	S 07137	38 (8) 50	12"	Very Dense, very dark brownish-gray sand with fine gravel, generally as above (Color: 2.5 Y, 3/2) wet	SP		Start Day 9/29 Background - Scanned. (1050)
147'							
148'							
149'							
150'							

NOTES: Water level with Csg at 145' 9-24 @ 1245 = 66.4'
" " " " " " 9-29 @ 58.5' after well sitting 4 days

Background Levels 9/29/87: $\gamma\beta$ = 60-120
α = 0
hmr = 0

221

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 324	COORDINATES:	DATE: 9-29-87	
ELEVATION:	GWL: Depth 60.7 Date/Time 9-29/1615	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 58.6 Date/Time 9-30/1340	DATE COMPLETED: 10-3-87	
DRILLING METHODS: CABLE TOOL		PAGE 11 OF 11	

DEPTH (Ft.) 150	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151'	S 07138	20 37 (4")50	14"	Medium Dense, Gray Silty Sand grading downwards into: (Color 2.5 Y, N5/)	SM		Scanned - Background levels
				Very Dense black fine gravel wet (Color: 2.5 Y, N2/)	GW		(1415)
152'							
153'							
154'							
155'							BOB.
156'	S 07139	7 22 45	18"	Very Dense, Dark gray coarse Sand w/ some fine gravel wet (Color: 5 Y, 4/1)			Scanned - Background levels (1540)
157'				Bottom of Borehole (10") = 155' Bottom of 1mt Split Spoon = 156.5'			
158'							
159'							
160'							

NOTES: Blow Sand coming into hole with Csg @ 150' to a depth of 147'
10" Csg Driven to 155' to obtain 150-151.5' Split Spoon Sample.

222

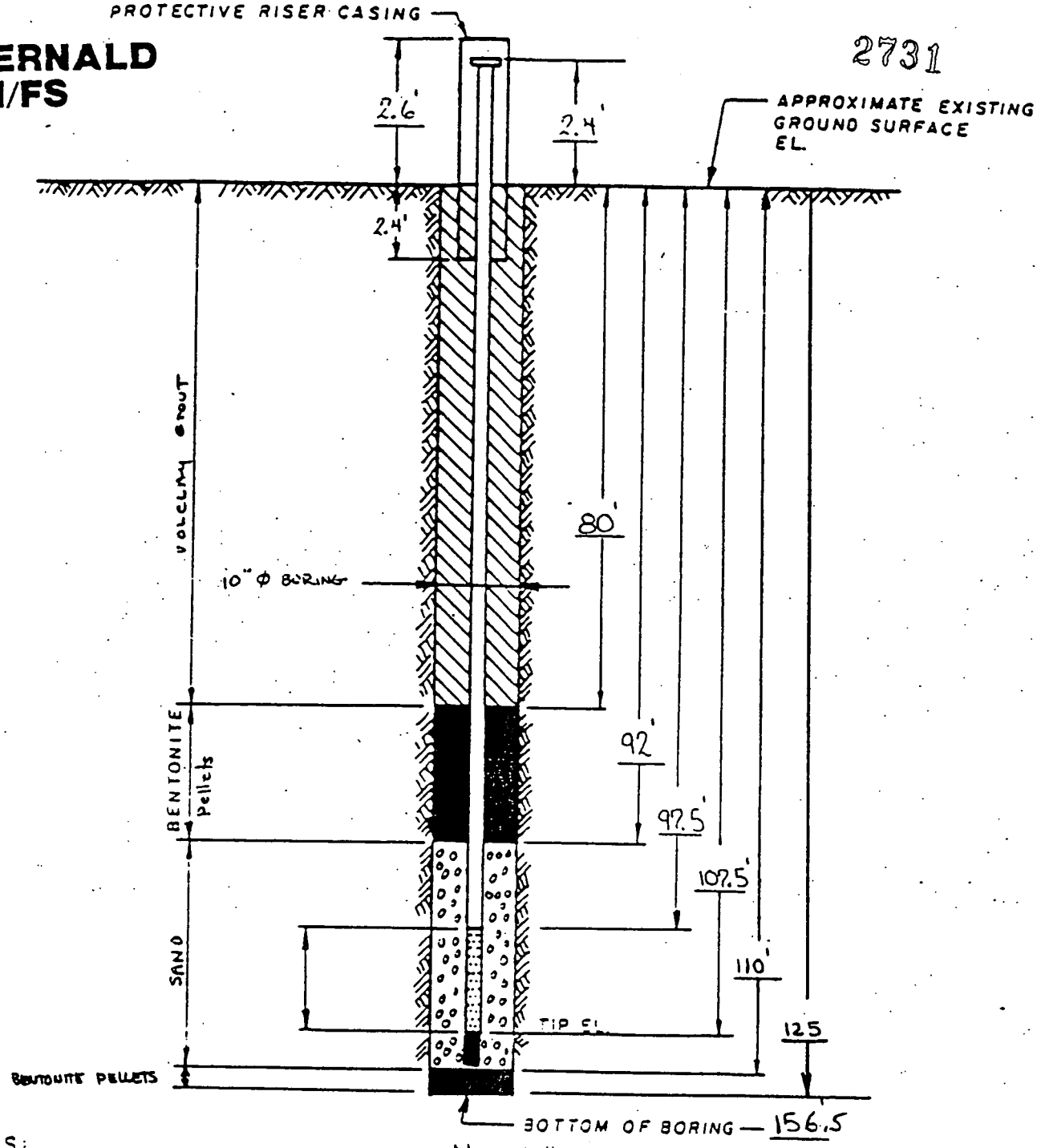
Used a total of 500 gallons to Drill Entire Well.

402-11-86

WELL 324

FERNALD RI/FS

2731



NOTE: HOLE WAS ALLOWED TO COLLAPSE TO 125'. PUMPED WITH BENTONITE 125'-110'.

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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 324

PREPARED FOR

FMPC RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

223

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

2731

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. B. Dunning DATE 10/16/87
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 324
PIEZOMETER NO. ~~324~~ 324 DATE OF INSTALLATION 10-3-87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 155'	SIZE 10" FROM 0' TO 155'
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel monitoring well	RISER PIPE MATERIAL Stainless Steel (316)
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10'
AVERAGE SIZE OF PERFORATIONS .010"	JOINING METHOD Flush Joint Threaded
TOTAL PERFORATED AREA 10'	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION LOCKING CAP AND LOCK
PROTECTIVE PIPE O.D. 10"	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft.)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	+ 2.4'			
GROUND SURFACE	0.0		579.9	
BOTTOM OF PROTECTIVE PIPE	- 2.4'			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 80'	TOP	BOTTOM
BENTONITE	TOP 80'	BOTTOM 92'	TOP	BOTTOM
SAND	TOP 92	BOTTOM 110'	TOP	BOTTOM
BENTONITE PELLETS	TOP 110'	BOTTOM 125'	TOP	BOTTOM
PERFORATED SECTION	TOP 97.5'	BOTTOM 107.5'	TOP	BOTTOM
PIEZOMETER TIP	~~NA~~ ~110'			
BOTTOM OF BOREHOLE	155.5			
GWL AFTER INSTALLATION	58'			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑ 224
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Hole was drilled to 155' to clearly define stratigraphy. Casing was filled up to 125' and sand-hole was allowed to collapse in. The well was then plugged from 125' to 110' with bentonite to insure that no communication through "Blue Clay" was present. Well was then set from 110'.

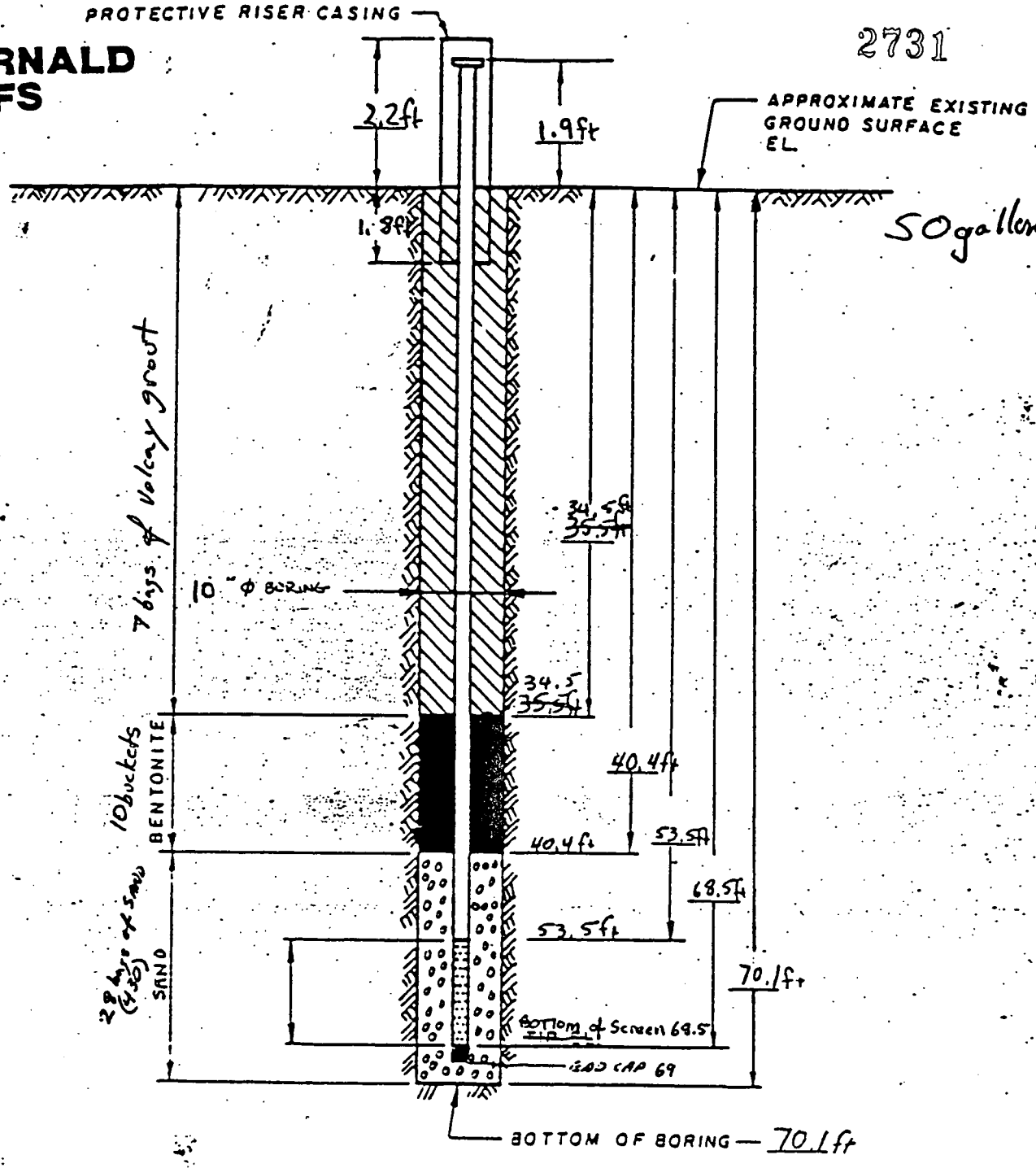
409-11-86

BORING 224

#18

2731

FERNALD RI/FS



NOTES:

1. RISER PIPE IS IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS IN I.D PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 224

PREPARED FOR

225

DRAWING NUMBER

CHECKED BY

APPROVED BY

WELL 2027

PAC

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 603	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 227	COORDINATES:		DATE: 12-10-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-10-87
ENGINEER/GEOLOGIST HEUEY/OAKLEY	Depth	Date/Time	DATE COMPLETED: 12-17-87
DRILLING METHODS: CABLE & TOOL			PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	07841 13:10	4 4 4	14	VERY STIFF YELLOWISH BROWN (10YR 5/4) CLAY, SOME SAND AND GRAVEL, TRACE CLAY - ~~TRAC~~ DRY 1.7	ML	3.5	HNU-0PPM Bd-120CPM γ-0CPM
2 3	07842 13:35	4 7 7	12	HARD GRAY (2.5,5/0) SILT, SOME SAND AND LIMESTONE GRAVEL. 2.9 TRACE CLAY -DRY	ML	4.5	HNU-0PPM Bd-120CPM γ-0CPM
4	07843 13:50	8 8 9	15	HARD YELLOWISH BROWN (10YR,5/4) SILT AND CLAY, SOME GRAVEL-DRY	ML	4.0	HNU-0PPM Bd 120CPM γ-0CPM
5 6	07844 14:00	14 24 28	15	HARD YELLOWISH BROWN (10YR,5/4) SILT 5.1 AND CLAY, SOME GRAVEL -DRY. DENSE LIGHT GRAY (10YR, 7/2) LIMESTONE GRAVEL AND CLAY - DRY 6.0	ML / GC	4.5 / 4	HNU-0PPM Bd-120CPM γ-0CPM
7	07845 14:10	14 23 26	15	HARD YELLOWISH BROWN (10YR,5/6) MOTTLED SILT AND CLAY, SOME GRAVEL AND SAND-DRY	ML	4.5+	HNU-0PPM Bd-120CPM γ-0CPM
8 9	07846 16:23	4 12 19	14	HARD YELLOWISH BROWN (10YR,5/6) CLAY AND SILT, SOME SAND, TRACE GRAVEL - VERTICAL FRACTURES WITH IRON STAINING - DRY	CL	4.5+	HNU-0PPM Bd-60CPM γ-0CPM
10	07847 16:44	13 17 22	18	HARD STRONG BROWN (7.5YR,5/6) SILT, SOME SAND AND CLAY-DRY VERTICAL FRACTURES WITH IRON STAINING	ML	4.5+	HNU-0PPM Bd-60CPM γ-0CPM
11 12	07848 17:02	6 12 18	10	HARD YELLOWISH BROWN (10YR,5/6) SILT, SOME SAND AND CLAY-DRY. VERTICAL FRACTURES WITH IRON STAINING.	ML	4.5	HNU-0PPM Bd-60CPM γ-0CPM
13	07849 8:25	12 15 24	18	HARD LIGHT YELLOWISH BROWN (2.5Y,6/4) SILT, SOME CLAY AND GRAVEL, TRACE SAND- DRY.	ML	3.25	12-11-87 8:00 HNU-0PPM Bd-80CPM γ-0CPM
14 15	07850 8:50	7 12 6	13	VERY STIFF LIGHT YELLOWISH BROWN SILTY CLAY, TRACE FINE GRAVEL AND SAND - MOIST	CL	3.75	HNU-0PPM Bd-80CPM γ-0CPM

NOTES:
CONTRACTOR: PENNDRILL
RIG: CYCLONE 42
DRILLER: HARN DYKES SR.
ASSISTANT: JOHN VANDINE

WATER ADDED TO HOLE
1 = 10 GALLONS
~~HH~~ ~~HH~~ ~~HH~~
~~HH~~ ~~HH~~ II

SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS.
COLORS CLASSIFIED USING MUNSELL COLOR CHARTS

227

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 227	COORDINATES:	DATE: 12·11·87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12·10·87
ENGINEER/GEOLOGIST: D.OAKLEY	Depth Date/Time	DATE COMPLETED: 12·17·87
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	07851 9:05	5 7 12	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) 15Y CLAY, SOME SILT, TRACE FINE SAND AND SAND, MOIST	CL	3.5	HNU-0PPM Bα-70CPM γ-0CPM
				VERY STIFF GRAY (5Y,5/1) CLAY, TRACE SAND AND SILT - MOIST. 16.5	CL	1.5	
17 18	07852 9:15	7 15 15	18	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y 6/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND MOIST 18.2	CL	3.5	HNU-0PPM Bα-70CPM γ-2CPM
19	07853 8:20	3 7 11	5	VERY STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME SILT, TRACE GRAVEL AND SAND - WET.	CH	1.0	12-14-87 8:00 HNU-0PPM Bα-60CPM γ-0CPM
20 21	07854 8:40	4 5 8	9	STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME SILT AND GRAVEL - MOIST 21.3	CH	1.0	HNU-0PPM Bα-50CPM γ-0CPM
22	07855 8:50	7 7 7	8	STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL AND SILT, TRACE SAND - WET	CH	1.25	HNU-0PPM Bα-40CPM γ-0CPM
				MEDIUM DENSE OLIVE GRAY (5Y,5/2) SAND, SOME GRAVEL, TRACE CLAY - WET.	SW	-	
23 24	07856 9:15	7 7 6	7	MEDIUM DENSE OLIVE GRAY (5Y,5/2) SAND AND GRAVEL, TRACE CLAY - WET.	SW	-	HNU-0PPM Bα-40CPM γ-0CPM
25	07857 9:35	22 14 21	7	DENSE OLIVE GRAY (5Y,5/2) SAND AND GRAVEL - WET. 25.4	SW	-	HNU-0PPM Bα-50CPM γ-0CPM
26 27	07858 10:40	11 31 37	5	HARD LIGHT OLIVE GRAY (5Y,6/2) CLAY, SOME SAND AND GRAVEL, TRACE SILT - DRY 26.7	CL	-	DARKER THAN THE MUNSELL COLOR.
				VERY DENSE LIGHT OLIVE GRAY (5Y,6/2) CLAYEY GRAVEL, SOME SAND - WET 27.4	GC	-	HNU-0PPM Bα-40CPM γ-0CPM
28	07859 11:00	24 44 27	16	VERY DENSE LIGHT OLIVE GRAY (5Y,6/2) SAND AND GRAVEL - MOIST. 28.1	SW	-	HNU-0PPM Bα-60CPM γ-0CPM
				HARD GREENISH GRAY (1) CLAY, SOME SILT - MOIST	CL	2.0	
29 30	07860 13:30	13 16 27	10	HARD OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL AND SAND, TRACE SILT - MOIST	CL	2.5	HNU-0PPM Bα-100CPM γ-0CPM

NOTES:

(1) NOT CLOSE TO ANY MUNSELL COLOR.

228

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 227	COORDINATES:	DATE: 12.14.87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12.10.87	
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 12.17.87	
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6"/6"/6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	07861 13:50	4 11 15	14	VERY STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CL	2.5	HWL - 0CPM BG - 60CPM S - 0CPM
32	07862 14:15	7 11 27	14	HARD OLIVE GRAY (5Y,5/2) CLAY, TRACE GRAVEL, SAND, AND SILT	CL	2.75	HWL - ? BG - 20CPM S - 0CPM
33							
34	07863 15:30	15 15 17	15	HARD OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CL	2.75	HWL - 0CPM BG - 30CPM S - 0CPM
35	07864 15:50	5 12 19	10	HARD OLIVE GRAY (5Y,5/2) CLAY, TRACE GRAVEL, SAND, AND SILT, - MOIST	CL	2.5	HWL - 0CPM BG - 70CPM S - 0CPM
36							
37	07865 9:25	7 11 18	3	VERY STIFF OLIVE GRAY (5Y,5/2) CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST	CL	—	HWL - 0CPM BG - 60CPM S - 0CPM
38	07866 9:40	7 12 15	14	VERY STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CL	1.75	HWL - 0CPM BG - 90CPM S - 0CPM
39							
40	07867 10:05	8 20 30	6	VERY STIFF OLIVE GRAY (5Y,5/2) CLAY, SOME GRAVEL TRACE SAND AND SILT - MOIST	CL	1.5	HWL - 0CPM BG - 60CPM S - 0CPM
				40.7	CL	1.5	
41	07868 11:05	7 9 13	16	VERY STIFF GRAY (5Y,6/1) SILT, WET.	ML	0.5	HWL - 0CPM BG - 60CPM S - 0CPM
42				42.2 HARD GRAY (5Y,6/1) SILT - MOIST	ML	—	
				42.3 HARD [illegible] SILT - MOIST	ML	—	
43	07869 13:35	16 24 46	15	VERY DENSE DARK YELLOWISH BROWN (10YR,4/4) SAND AND GRAVEL DRY	SW	—	HWL - 0CPM BG - 60CPM S - 0CPM
44							
45							

NOTES:

229

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 227	COORDINATES:	DATE: 12.15.87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12.10.87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 12.17.87
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	07810 11:20	9-12 RF	5	VERY DENSE DARK YELLOWISH BROWN (10YR 4/4) ~~SANDY GRAVEL~~ GRAVEL AND SAND MOIST	GW	—	HNU-0 ppm
47							
48							
49							
50							
51	07811 16:00	48 50 RF	10	VERY DENSE DARK YELLOWISH BROWN (10YR 4/4) GRAVEL AND SAND MOIST	GW	—	HNU ? BX - X - 0 ppm
52							
53							12:16.87 8:15
54				54.5			DRILLER'S CONTACT.
55	07812 9:40	44 50 RF	0	VERY DENSE YELLOWISH BROWN (10YR 5/4) VERY FINE SAND - DRY	SP	—	HNU - 0 ppm BX - 100 ppm X - 0 ppm
56							
57							
58							
59							
60							

NOTES:

230

402-11-8

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 227	COORDINATES:		DATE: 12.16.87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12.10.87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED: 12.17.87
DRILLING METHODS: CABLE TOOL			PAGE 5 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	07873 13:35	30 49 32	8	VERY DENSE YELLOWISH BROWN (10YR, 6/4) GRAVEL AND SAND - MOIST.	GW	-	HNU - OPPM 3α - 100CPM γ - 0CPM
				VERY DENSE GRAY (10YR, 5/1) SAND, SOME GRAVEL - MOIST.	SW	-	
62							
63							
64							
65	07874 14:35	25 25 25	10	~~VERY~~ DENSE DARK GRAY (10YR, 4/1) SAND, SOME GRAVEL - WET.	SW	-	HNU - OPPM 3α - 70CPM γ - OCPM
66							
67							
68							
69							
70	07875 15:55	11 13 15	9	MEDIUM DENSE DARK GRAY (10YR, 4/1) FINE SAND, TRACE GRAVEL - WET.	SP	-	HNU - OPPM 3α - 50CPM γ - 0CPM
71							
72							
73							
74							
75							

NOTES: 1 1/2" x 1' 3" x 4"

231

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 227	COORDINATES:		DATE: 12.17.87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12.10.87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED: 12.17.87
DRILLING METHODS: CABLE TOOL			PAGE 6 OF 6

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	07876 9:35	44 25 24	10	DENSE DARK GRAY (10YR, 4/1) SAND AND GRAVEL - WET 76.5	SW	-	HNU - 0 ppm Bx - 60 cpm S - 0 ppm
77				BOTTOM OF BORING			
78							

NOTES:

232

402-11-86

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07841	12/10/87 1310	4 4 4	14	VERY STIFF YELLOWISH-BROWN (10YR, 5/4) SILT, SOME SAND AND GRAVEL, TRACE CLAY - DRY.	ML	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
3.0	07842	12/10/87 1335	4 7 7	12	VERY STIFF YELLOWISH BROWN (10YR, 5/4) SILT, SOME SAND AND GRAVEL, TRACE CLAY - DRY. HARD GRAY (2.5, 5/0) SILT, SOME SAND AND LIMESTONE GRAVEL, TRACE CLAY - DRY. H	ML ML ML	3.5 4.5 4.0	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
4.5	07843	12/10/87 1350	8 8 9	15	HARD YELLOWISH BROWN (10YR, 5/4) SILT AND CLAY, SOME GRAVEL - DRY.	ML	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
6.0	07844	12/10/87 1400	14 24 28	15	HARD YELLOWISH BROWN (10YR, 5/4) SILT AND CLAY, SOME GRAVEL - DRY. DENSE LIGHT GRAY (10YR, 7/2) LIMESTONE GRAVEL AND CLAY - DRY.	ML GC	4.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
7.5	07845	12/10/87 1410	14 23 26	15	HARD YELLOWISH BROWN (10YR, 5/6) MOTTLED SILT AND CLAY, SOME GRAVEL AND SAND - DRY.	ML	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
9.0	07846	12/10/87 1623	4 12 19	14	HARD YELLOWISH BROWN (10YR, 5/6) CLAY AND SILT, SOME SAND, TRACE GRAVEL - VERTICAL FRACTURES WITH IRON STAINING - DRY.	CL	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
10.5	07847	12/10/87 1644	13 17 22	18	HARD STRONG BROWN (7.5YR, 5/6) SILT, SOME SAND AND CLAY - DRY. VERTICAL FRACTURES WITH IRON STAINING.	ML	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
12.0	07848	12/10/87 1702	6 12 18	10	HARD YELLOWISH BROWN (10YR, 5/6) SILT, SOME SAND AND CLAY - DRY. VERTICAL FRACTURES WITH IRON STAINING.	ML	4.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
13.5	07849	12/11/87 0825	12 15 24	18	HARD LIGHT YELLOWISH BROWN (2.5Y, 6/4) SILT, SOME CLAY AND GRAVEL, TRACE SAND - DRY.	ML	3.25	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
15.0	07850	12/11/87 0850	7 12 6	13	VERY STIFF LIGHT YELLOWISH BROWN SILTY CLAY, TRACE FINE GRAVEL AND SAND - MOIST.	CL	3.75	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07851	12/11/87 0905	5 7 12	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5YR, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST. VERY STIFF GRAY (5Y, 5/1) CLAY, TRACE SAND AND SILT - MOIST.	CL CL	3.5 1.5	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
18.0	07852	12/11/87 0915	7 15 15	18	VERY STIFF LIGHT YELLOWISH BROWN (2.5YR, 6/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND - MOIST.	CL	3.5	Hnu= 0 ppm α = 2 cpm βΓ = 70 cpm
19.5	07853	12/14/87 0820	3 7 11	5	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND - MOIST. VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME SILT, TRACE GRAVEL AND SAND - WET.	CL CH	3.5 1.0	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
21.0	07854	12/14/87 0840	4 5 8	9	STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME SILT AND GRAVEL - MOIST.	CH	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
22.5	07855	12/14/87 0850	7 7 7	8	STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL AND SILT, TRACE SAND - WET. MEDIUM DENSE OLIVE GRAY (5Y, 5/2) SAND, SOME GRAVEL, TRACE CLAY - WET.	CH SW	1.25 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
24.0	07856	12/14/87 0915	7 7 6	7	MEDIUM DENSE OLIVE GRAY (5Y, 5/2) SAND AND GRAVEL, TRACE CLAY - WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
25.5	07857	12/14/87 0935	22 14 21	7	DENSE OLIVE GRAY (5Y, 5/2) SAND AND GRAVEL - WET. HARD LIGHT OLIVE GRAY (5Y, 6/2) CLAY, SOME SAND, AND GRAVEL, TRACE SILT - DRY.	SW CL	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
27.0	07858	12/14/87 1040	11 31 37	5	HARD LIGHT OLIVE GRAY (5Y, 6/2) CLAY, SOME SAND, AND GRAVEL, TRACE SILT - DRY. VERY DENSE LIGHT OLIVE GRAY (5Y, 6/2) CLAYEY	CL		Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
28.5	07859	12/14/87 1100	24 44 27	16	VERY DENSE LIGHT OLIVE GRAY (5Y, 6/2) CLAYEY GRAVEL, SOME SAND - WET. VERY DENSE LIGHT OLIVE GRAY (5Y, 6/2) SAND AND GRAVEL - HARD GREEN (NOT CLOSE TO ANY MUNSELL COLOR) GRAVELLY CLAY, SOME SILT - MOIST.	GC SW	N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
30.0	07860	12/14/87 1330	13 16 27	10	HARD OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL AND SAND, TRACE SILT - MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07861	12/14/87 1350	4 11 15	14	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
33.0	07862	12/14/87 1415	7 11 27	14	HARD OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT.	CL	2.75	α = 0 cpm βΓ = 70 cpm
34.5	07863	12/14/87 1530	5 15 17	15	HARD OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CL	2.75	Hnu= 0 ppm α = 0 cpm βΓ = 30 cpm
36.0	07864	12/14/87 1550	5 12 19	18	HARD OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
37.5	07865	12/15/87 0915	7 11 18	3	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST.	CL		Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
39.0	07866	12/15/87 0940	7 12 15	14	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CL	1.75	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
40.5	07867	12/15/87 1005	8 20 30	6	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
42.0	07868	12/15/87 1105	7 9 13	16	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST. VERY STIFF GRAY (5Y, 6/1) SILT - WET.	CL ML	1.5 0.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
43.5	07869	12/15/87 1335	16 24 40	15	HARD GRAY (5Y, 6/1) SILT - MOIST. HARD DARK YELLOWISH BROWNISH (10YR, 4/4) SILT - MOIST. VERY DENSE DARK YELLOWISH BROWN (10YR, 4/4) SAND AND GRAVEL - DRY.	ML ML SW	N/A N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
45.0								

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 6

DEPTH	SAMPLE / DATE / TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	07870 12/15/87 1420	50	5	VERY DENSE DARK YELLOWISH BROWN (10Y, 4/4) GRAVEL AND SAND - MOIST.	GW	N/A	Hnu= 0 ppm
50.0							
51.5	07871 12/15/87 1600	48 50	10	VERY DENSE DARK YELLOWISH BROWN (10YR, 4/4) GRAVEL AND SAND - MOIST.	GW	N/A	α = 0 cpm
55.0							
56.5	07872 12/16/87 0940	44 50	8	VERY DENSE YELLOWISH BROWN (10YR, 5/4) VERY FINE SAND - DRY.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
60.0							

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 6

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07873	12/16/87	1335	30 49 32	8	VERY DENSE YELLOWISH BROWN (10YR, 5/4) GRAVEL AND SAND - MOIST VERY DENSE GRAY (10YR, 5/1) SAND, SOME GRAVEL - MOIST.	GW SW	N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
65.0									
66.5	07874	12/16/87	1435	25 25 25	10	DENSE DARK GRAY (10YR, 4/1) SAND, SOME GRAVEL - WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
70.0									
71.5	07875	12/16/87	1550	11 13 15	9	MEDIUM DENSE DARK GRAY (10YR, 4/1) FINE SAND, TRACE GRAVEL - WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
75.0									

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2027	COORDINATES: NORTH 481,969.29 EAST 1,379,317.37	DATE: 12/10/87
GROUND ELEVATION: 583.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/10/87
ENGINEER/GEOLOGIST: KEGLEY/OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 6

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07876	12/17/87	0935	44	25	24	18	DENSE DARK GRAY (10YR, 4/1) SAND AND GRAVEL - WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm

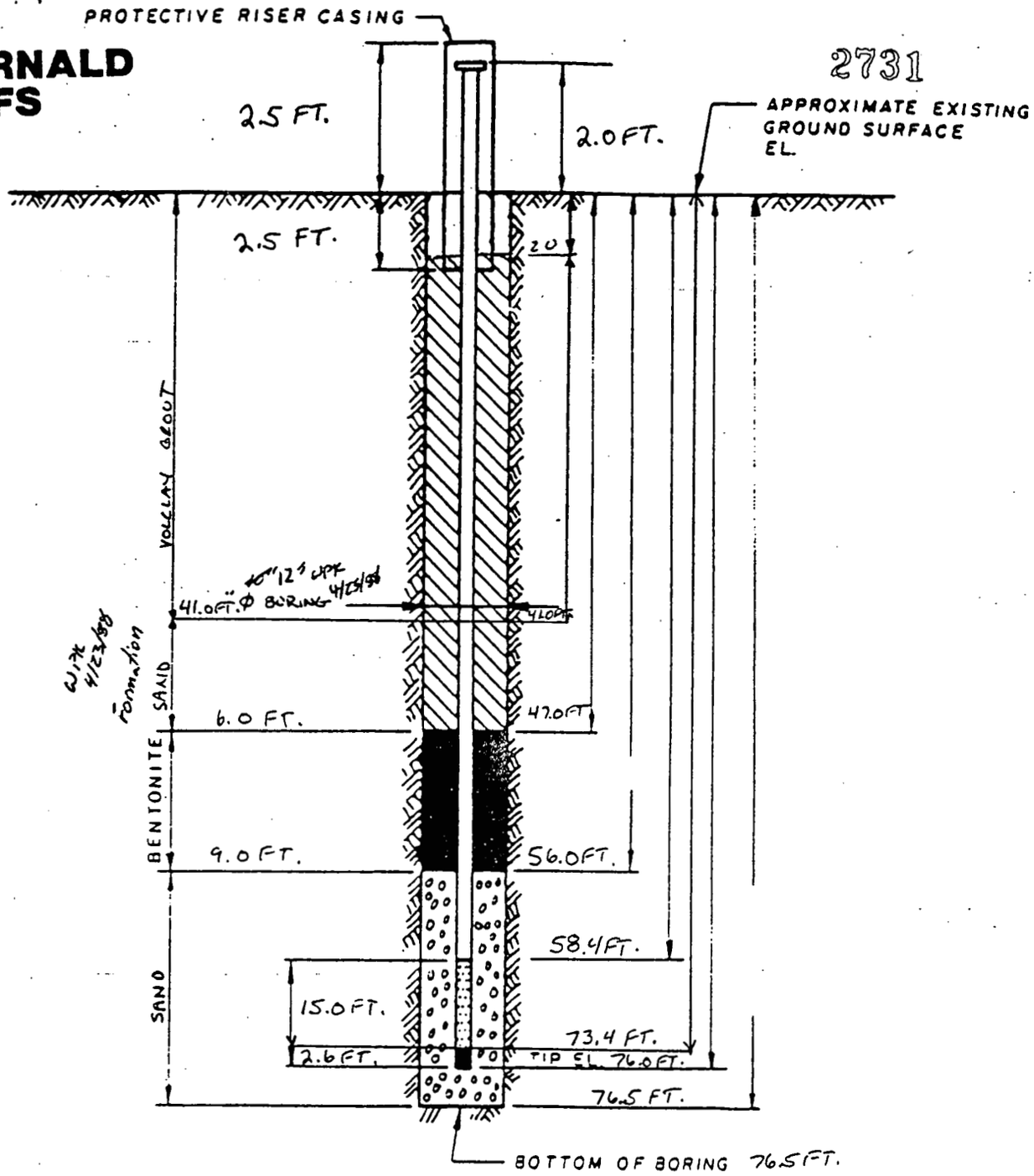
BOTTOM OF BORING 76.5

NOTES:
SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS. COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.

WELL # 901

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 227

PREPARED FOR

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY D.B.O.

239

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 243	COORDINATES:		DATE: 12/14 & 12/15/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/14/87
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 12/16/87
DRILLING METHODS: Cable Tool			PAGE 1 OF 2

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				Refer to sample descriptions from well 343.			
3							
5	ST 077995	NA	24"	SHELBY TUBE	CL		(1130)
7							
10	S 077996	12 11 13		Duplicate SAMPLE TAKEN	CL	1.5	Hnu=0 BB=20-40 α=0 (1343)
13							
15	ST 077997	NA	21"	SHELBY TUBE "	CL		(1618)
18							
20							
23							
25							
27							
30							

NOTES:

I.) Background Measurement 12/14 & 12/15/87 = α=0
Hnu=0
BB=40-60 cpm.

242

II.) Drilling Contractor: Pennsylvania Drilling
Drilling Personnel.
Driller: Tim Harris
Helper: Craig Coulter

III. WATER USED 12/14 = 13 gal.
" " 12/15 = 80 gal.

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 243	COORDINATES:		DATE: 12/15 & 12/16/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/14/87
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 12/16/87
DRILLING METHODS: Cable Tool			PAGE 2 OF 3

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
32				See Descriptions on Soil log 343.			
35							
40							End of Day 12/15/87 Start Day 12/16/87
45							
50							
55							
60							

NOTES:

I.) Background Measurements 12/16/87

Hnu = 0

α = 0

$\beta\gamma$ = 40-80 c.p.m.

II.) Water Used 12/16/87 = 29 gallons

243

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 243	COORDINATES:	DATE: 12/16/87	
ELEVATION:	GWL: Depth 57' Date/Time 12/16/87 @ 1100	DATE STARTED: 12/14/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/16/87	
DRILLING METHODS: Cable Tool		PAGE 3 OF 3	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60				See Soil Descriptions on Log for well 343			
63							
65	6 07798	9 14 17	36"	Duplicate Sample Taken	SW		Hnw = 0 δB = 40-60 cpm. α = 0 (1452)
68							Drilled Well To 69.3'
				69.3 ↑ Bottom of Boring			
70							Had to Drive 10" casing to 73' & keep a full hydrostatic head in ens. to keep sand from coming into borehole.
75							
80							

NOTES:

244

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2043	COORDINATES: NORTH 481,760.81 EAST 1,377,051.97	DATE: 12/14/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 2

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
5.0								
7.0	07795 12/14/87 1130			24	SHELBY TUBE.	CL		
10.5								
12.0	07796 12/14/87 1348		12 11 13		DUPLICATE SAMPLE TAKEN.	CL	1.5	Hnu= 0 ppm α = 0 cpm Bγ = 20-40 cpm
15.0								

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLING PERSONNEL: DRILLER: TIM HARRIS, HELPER: CRAIG COULTER.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2043	COORDINATES: NORTH 481,760.81 EAST 1,377,051.97	DATE: 12/14/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/18/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 2

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
17.0	07797	12/14/87	1618		21	SHELBY TUBE.	CL		
65.0									
66.5	07798	12/16/87	1452	9 14 17	36	DUPLICATE SAMPLE TAKEN.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm

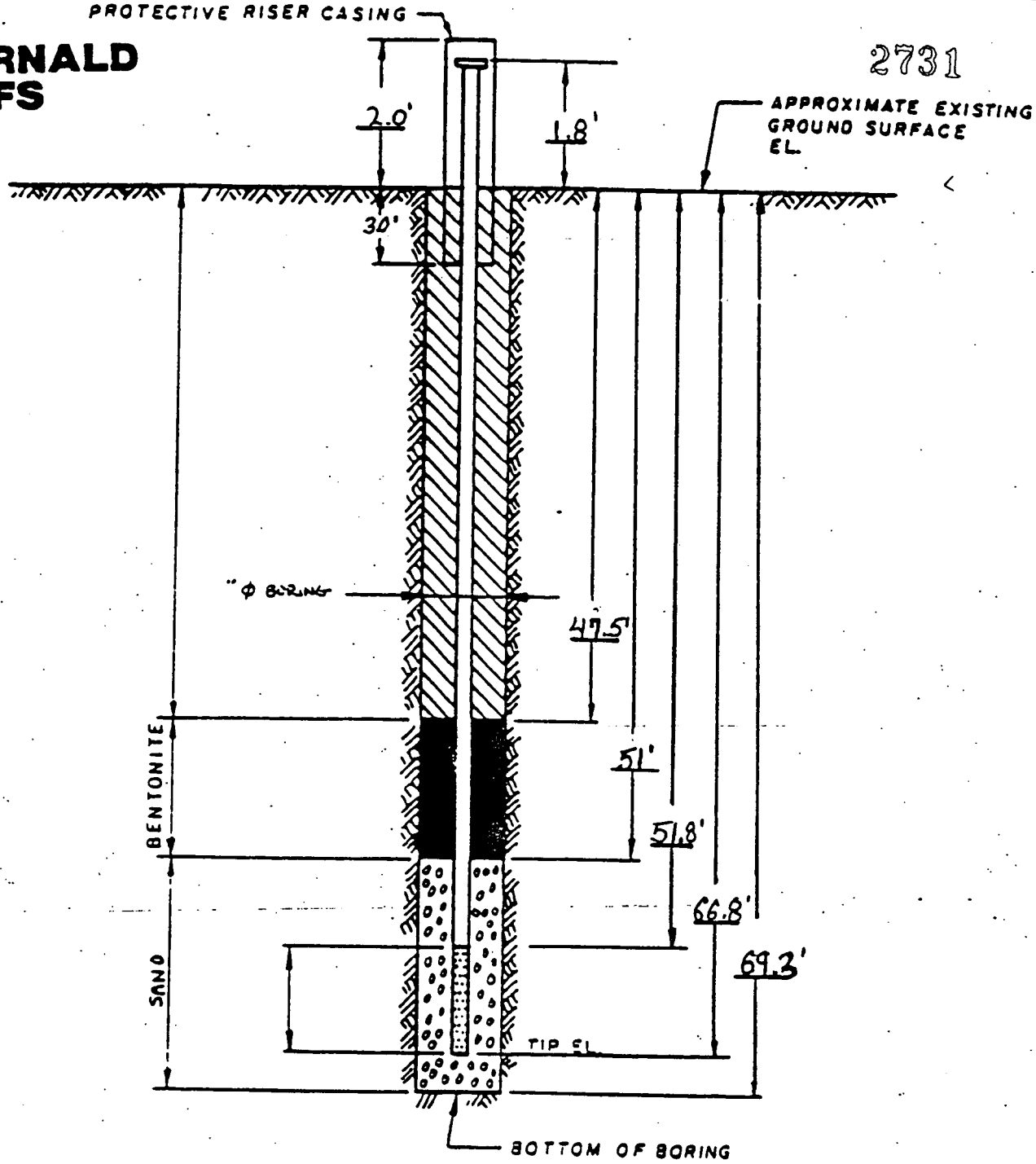
BOTTOM OF BORING 69.3

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLING PERSONNEL: DRILLER: TIM HARRIS, HELPER: CRAIG COULTER.

Monitor Well 243

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 243

PREPARED FOR

FMPC RI/FS

247

DRAWING NUMBER

CHECKED BY

APPROVED BY

N

FERNALD
RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 T 3.2
BORING NO. 243
PIEZOMETER NO. NA

FIELD ENG./GEO. B. Dunning DATE 12/18/87
CHECKED BY DATE
DATE OF INSTALLATION 12/18/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 69.2
FLUID NA FROM NA TO NA

TYPE OF BIT Hammer-Type
CASING SIZE (S) USED:
SIZE 10" FROM 0' TO 69.2'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel
DIAMETER OF PERFORATED SECTION 4" ϕ
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. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10' & 2½'
JOINING METHOD Flush Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10 inches

OTHER PROTECTION Locking cap with lock.

ITEM	DISTANCE ABOVE BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	+1.8 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.0'			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 47.5'	TOP	BOTTOM
BENTONITE	TOP 47.5'	BOTTOM 51'	TOP	BOTTOM
SAND	TOP 51.0'	BOTTOM 69.3	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 51.8	BOTTOM 66.8	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	69.3			
GWL AFTER INSTALLATION	57.0'			

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

248

REMARKS

WELL 2051

RI/FS ∞ 2/4/89

VISUAL CLASSIFICATION OF SOILS

File 4.4 | WPF 8/12/88 | RIG #3

PROJECT NUMBER 602.32	PROJECT NAME Fernald RI/FS	
BORING NUMBER 6251	COORDINATES	DATE Nov 12, 1987
ELEVATION	GWL: Depth Date/Time	DATE STARTED Nov 12, 1987
ENGINEER/GEOLOGIST Lowell Wille	Depth Date/Time	DATE COMPLETED Nov 19, 1987
DRILLING METHODS Cable Tool		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (1/2 ft)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				Detailed Soil Classification - refer to Boring 3051			Consistency and density based on relative soil texture
5				hard brownish yellow 10YR 6/6 clay, some silt, and gravel, trace sand and pebbles - dry	cl	NA	
10	ST 10.0	1.0	1.0				Sample # 07425 10-14-87 @ 0800
				10.0			
				hard gray 10YR 5/1 clay, some gravel and silt, trace sand and pebbles - dry			
15					cl	NA	
20	ST	1.0	0.0				pushed shelby tube at 20 ft, NO RETURN, tried again at 22.0 ft. ~~NO RETURN~~ 10-14-87 @ 1115 sample # 07426
	ST 22.0	1.0	0.7				
25							

250

NOTES
Pennsylvania Drilling Co
Driller Dave Neumann
Helper Bob Johnson
Drilling Rig Bucyrus Erie W24
water added to boring: 450 gallons

Shelby tube sampling follow ASTM Standard for undisturbed 2 in diameter, thin wall, 2 foot sampling tube
Background r: 2 cpm HNU: 0 ppm
BG: 140 cpm

602-11

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602.32	PROJECT NAME Fernald RI/FS		
BORING NUMBER B251 B251	COORDINATES:	DATE Nov 19, 1987	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED Nov 12, 1987	
ENGINEER/GEOLOGIST Lewell Wille	Depth Date/Time	DATE COMPLETED Nov 19, 1987	
DRILLING METHODS Cable Tool		PAGE 2 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35				Stiff grey 10YR 5/1 gray mottled brown 10YR 4/2 gravelly clay some silt and gravel, trace pebbles - dry	cl	NA	No ~~some~~ soil samples collected
40							
45				46.0			
50				dense gray 5YR 5/1 sand and gravel mixed with gray silty clay, some pebbles - dry	sm	NA	
				53.0			
55				dense gray 5YR 5/1 sand and gravel some silt, clay and pebbles - moist	sm	NA	

NOTES

2731

251

FERNALD U 2731
RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER 60232	PROJECT NAME Fernald RI/FS		
BORING NUMBER B25+ B03 B25'	COORDINATES.		DATE Nov 18, 1987
ELEVATION.	GWL: Depth	Date/Time	DATE STARTED Nov 2, 1987
ENGINEER/GEOLOGIST Lowell Wilke	Depth	Date/Time	DATE COMPLETED Nov 19, 1987
DRILLING METHODS Cable tool			PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				dense gray 5YR 5/1 sand and gravel, some silt and clay - trace pebbles - moist			no soil samples collected
65							
					SM	NA	
70							
75							
80				very dense gray 5YR 5/1 sand, some gravel and silt, trace clay and pebbles - moist	SM		very hard drilling
85						NA	

NOTES

402-1

RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER 60232	PROJECT NAME Fernald RI/FS		
BORING NUMBER B251 B251	COORDINATES	DATE Nov 16, 19, 87	
ELEVATION	GWL: Depth Date/Time	DATE STARTED Nov 12, 87	
ENGINEER/GEOLOGIST Howell Wills	Depth Date/Time	DATE COMPLETED Nov 19 1987	
DRILLING METHODS Cable Tool		PAGE 4 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
95				dense gray 7½YR6/0 sand and gravel, some silt, clay and pebbles - dry wet	SM	NA	No soil samples collected
100							
105				105.0 bottom of boring			
110							
115							

NOTES

253

VISUAL CLASSIFICATION OF SOILS

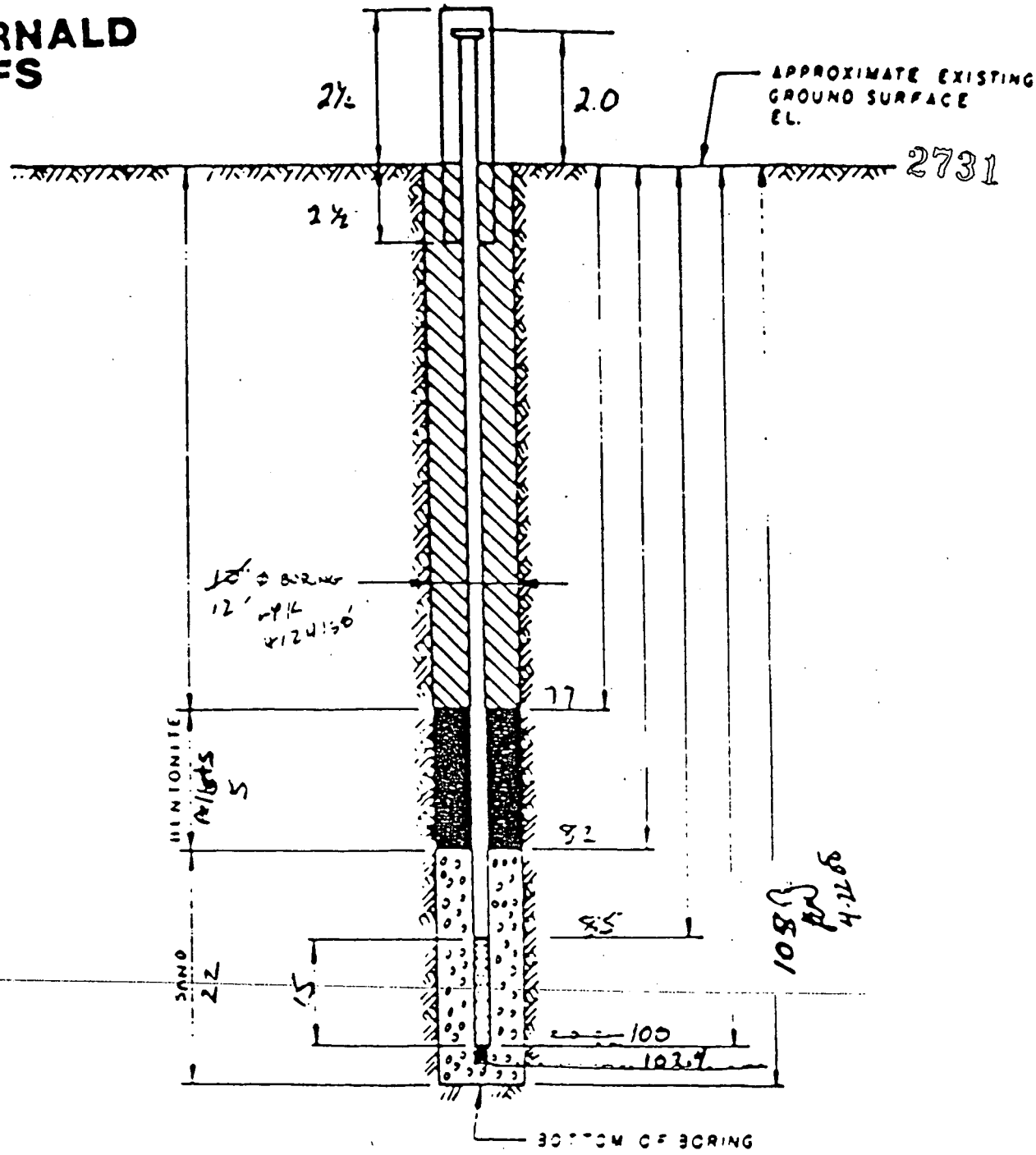
PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2051	COORDINATES: NORTH 481,597.05 EAST 1,383,279.97	DATE: 11/14/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/14/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 11/17/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 1

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
10.0											
11.0	07425	11/14/87	0800	1		1		HARD, BROWNISH YELLOW (10YR, 6/8) CLAY, SOME SILT AND GRAVEL, TRACE SAND AND PEBBLES - DRY.	CL	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 140 cpm
22.0											
23.0	07426	11/14/87	1115	1		1		HARD, GRAY (10YR, 5/1) CLAY, SOME GRAVEL AND SILT, TRACE SAND AND PEBBLES - DRY.	CL	N/A	α = 2 cpm βΓ = 140 cpm

BOTTOM OF BORING 105

NOTES:
SHELBY TUBE USED AT 200FT, NO REUTRN, TRIED 22FT. TUBE SAMPLING FOLLOWED ASTM STANDARD FOR UNDISTURBED 2" DIA., THEIR WELL, 2" SAMPLING TUBE. PENN DRILL, D. NEUMAN, DRILL, HELP B. JOHNSON. RIG BACKUS ERIE W24. 450 GAL H2O USED IN BORING.

FERNALD RI/FS



NOTES

1. RISER PIPE IS 4 IN I.D SCHEDULE PIPE, THREADED FLUSH JOINTED.
2. SCREEN IS 4 IN I.D Stainless steel PE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 91.7 below top of casing
5. WATER LEVEL READING ON JUL 19, 1987

INSTALLATION DETAILS
MONITORING WELL ~~251~~ 255

PREPARED FOR

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

255

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. Lowell Wille DATE Nov 19, 1991
PROJECT NO. 602.3.2 CHECKED BY _____ DATE _____
BORING NO. B251
PIEZOMETER NO. 251 DATE OF INSTALLATION Nov 17, 18 and 19

BOREHOLE DRILLING

DRILLING METHOD cable tool	TYPE OF BIT NA
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM _____ TO _____	SIZE ~~NA~~ FROM NA TO _____
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring well	RISER PIPE MATERIAL Stainless steel
DIAMETER OF PERFORATED SECTION 4 in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4 in
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 ft
AVERAGE SIZE OF PERFORATIONS 0.010 in	JOINING METHOD Screw FLUSH JOINT
TOTAL PERFORATED AREA _____	THREADS.

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft	OTHER PROTECTION NA locking cap
PROTECTIVE PIPE O.D. 10 3/4 in	AND lock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 78	TOP	BOTTOM
BENTONITE	TOP 78	BOTTOM 82	TOP	BOTTOM
SAND	TOP 82	BOTTOM 103	TOP	BOTTOM
NO GRAVEL USED.	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 85	BOTTOM 100	TOP	BOTTOM
PIEZOMETER TIP	102.4			
BOTTOM OF BOREHOLE	103.5			
GWL AFTER INSTALLATION	91.7 top of casing			

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

256

REMARKS _____

WELL 2064

FERNALD RI/FS

COPY

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

#43 pA

R-2731

WFK 4/23/88

RIG #3

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B-264~~ B2064 B0	COORDINATES:	DATE: Jan 11, 1988
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: Jan 11, 1988
ENGINEER/GEOLOGIST: Lowell Willo	Depth Date/Time	DATE COMPLETED: JAN 15, 1988
DRILLING METHODS: Cable Tool		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				stiff brown 10YR 5/6 gravelly clay some silt and sand, trace cobbles dry			Consistency and density based on relative soil textures.
5					Cl		Soil Descriptions based on soil cuttings ~~of~~ observed while drilling and boring ~~B64~~ 3064 drilling log RMG 2/6/89
10	ST 7762 845	NA	1.2				
				13.0			
15				~~dense~~ stiff gray 10YR 5/6 gravelly clay, some silt and sand, trace cobbles - dry			
					Cl		
20	ST 1030	NA	0.4				did not keep first try, not enough recovery
	7763 1130	NA	0.8				
25							

NOTES: Pennsylvania Drilling Co
Driller Dave Newman
Helper Bob Johnson
water added ~~while~~ while drilling - 230 gallons

Shelby tube sample collected following ASTM Standard, color following Munsell soil color chart

background HNU = 0 ppm
JB = 160 ppm
O = 2 ppm

258

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B264~~ B2064 BB 1-5-88	COORDINATES:	DATE: Jan 12, 1988
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: Jan 11, 1988
ENGINEER/GEOLOGIST: Lowell Wille	Depth Date/Time	DATE COMPLETED: JAN 15, 1988.
DRILLING METHODS: Cable Tool		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				stiff gray 10YR 5/3 gravelly clay, some silt, ~~sand~~ and sand, trace cobbles dry 34.0	CL	20	
35				dense gray 10YR 6/0 sand, some silt and clay, trace gravel and cobbles dry			
40							
					SP		
45							
50							
55							

NOTES:

See page 1 of 3

FERNALD RI/FS

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B264~~ B2064 BB 1-13-89	COORDINATES:	DATE: Jan 13, 1988
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: Jan 11, 1988
ENGINEER/GEOLOGIST: Lowell Wille	Depth Date/Time	DATE COMPLETED: JAN 15, 1988
DRILLING METHODS: Cable tool		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				dense gray 10YR 6/0 sand, some silt, clay and gravel, trace cobbles- dry			
65							
70				71.0			
				dense gray 10YR 6/0 sand, some silt, clay and gravel, trace cobbles-wet	SP		
75							
80							
85				85.0			
				bottom of boring			

NOTES:

260

see page 1 of 3

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2064	COORDINATES: NORTH 480,720.10 EAST 1,382,183.97	DATE: 01/12/88
GROUND ELEVATION: 587.8	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/12/88
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
10.0								
12.0	07762 01/12/88 0845			1.2	STIFF, BROWN (10YR, 6/6) GRAVELLY CLAY, SOME SILT, TRACE COBBLES - DRY. CONSISTENCY AND DENSITY BASED ON RELATIVE SOIL TEXTURES. SOILD DESCRIPTIONS BASED ON SOIL CUTTINGS OBSERVED WHILE DRILLING AND BORING 364 DRILLING LOG.	CL		Hnu= 0 ppm α = 2 cpm Bγ = 160 cpm
22.0								
24.0	07763 01/12/88 1130			0.8	STIFF GRAY (10YR, 6/0) GRAVELLY CLAY, SOME SILT AND SAND, TRACE COBBLES - DRY.	CL		

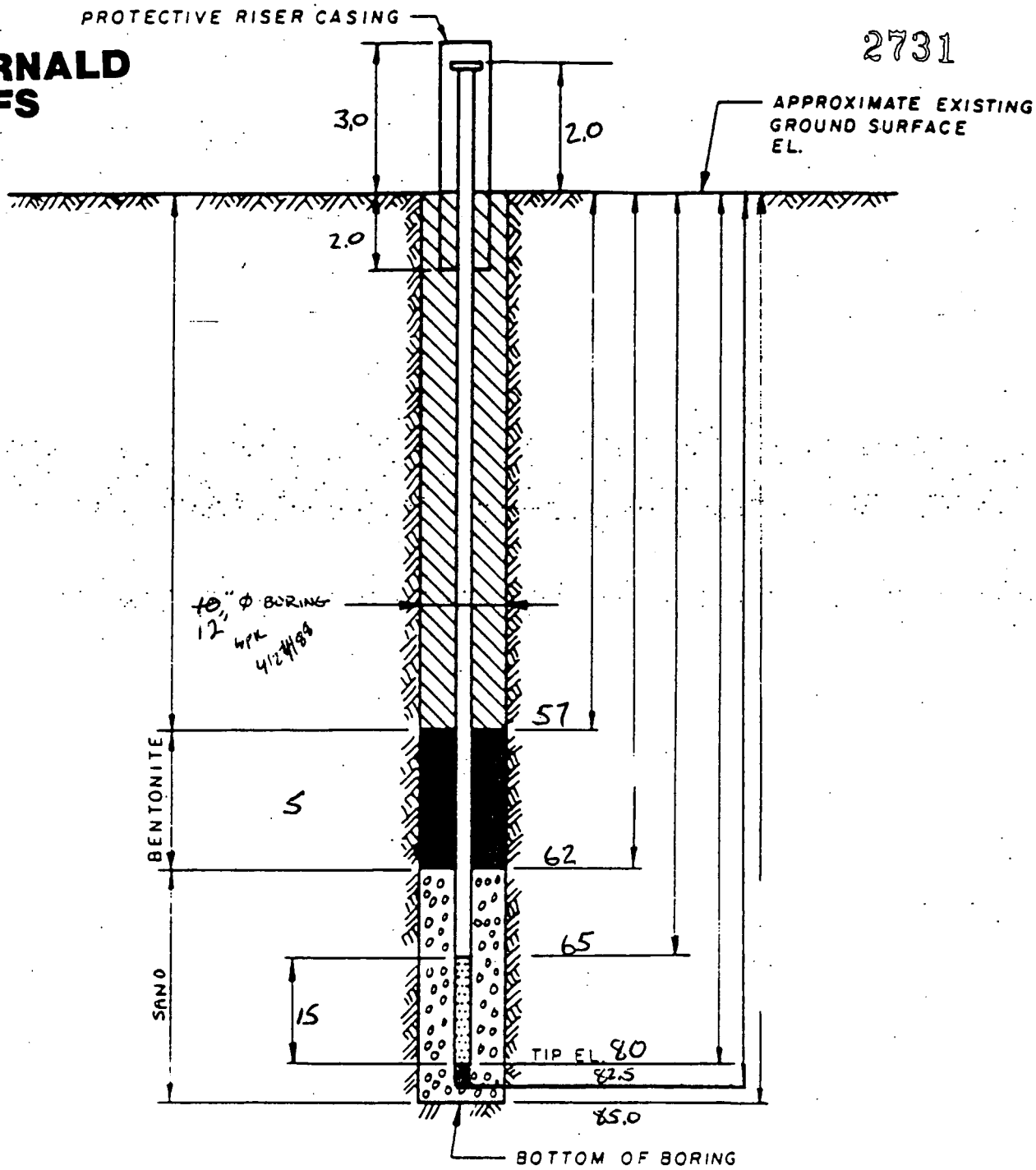
BOTTOM OF BORING 85

NOTES:
PENNSYLVANIA DRILLING, CO. DRILLER: DAVE NEUMAN, HELPER: BOB JOHNSON. WATER ADDED WHILE DRILLING - 230 GALLONS. SHELBY TUBE SAMPLE COLLECTED FOLLOWING ASTM STANDARD, COLOR FOLLOWS MUNSELL SOIL COLOR CHART. BACKGROUND HNU=0PPM, ALPHA=2PPM AND BET

QC/DH/24.89 WELL ~~264~~ 2064 BB 1-5-89 # 42

2731

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE 5 PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 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 70.5
5. WATER LEVEL READING ON 1-15-88

INSTALLATION DETAILS
MONITORING WELL ~~264~~ 2064

PREPARED FOR BB 1-5-89

262

QC/D#/2-4/89

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

2731

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. Lowell Willis DATE 1-15-88
PROJECT NO. 602.3.2 CHECKED BY R Galbraith DATE 2/6/89
BORING NO. B264 B2064 JB 1-5-89
PIEZOMETER NO. MW264 2064 DATE OF INSTALLATION

BOREHOLE DRILLING

DRILLING METHOD cable tool
DRILLING FLUID (S) USED:
FLUID WATER FROM 0 TO 80 ft
FLUID NA FROM NA TO NA

TYPE OF BIT drive shoe
CASING SIZE (S) USED: 10 inch
SIZE 10 in FROM 0 TO 85 ft.
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring well
DIAMETER OF PERFORATED SECTION 4 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 15 feet

RISER PIPE MATERIAL Stainless steel (316)
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4 in
LENGTH OF PIPE SECTIONS 10 ft
JOINING METHOD Screw FLUSH JOINT THREADED

PROTECTION SYSTEM

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

OTHER PROTECTION LOCKING CAP AND LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	3.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.0			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 57	TOP	BOTTOM
BENTONITE	TOP 57	BOTTOM 62	TOP	BOTTOM
SAND	TOP 62	BOTTOM 85	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 65	BOTTOM 80	TOP	BOTTOM
PIEZOMETER TIP	82.5			
BOTTOM OF BOREHOLE	85			
GWL AFTER INSTALLATION	705 Jan 15, 1988			

263

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS While corrections were made by Lowell Willis at the time this form was completed. WPL 2-24-89

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 2064
WELL NUMBER: 2064

FIELD ENG./GEO.: LOWELL WILLE DATE: 01/15/88
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 480720.10, 1382183.9
DATE OF INSTAL.:

2731

BOREHOLE DRILLING

DRILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 80
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: DRIVE SHOE
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 85
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.010 (In.)
TOTAL PERFORATED AREA: 15 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
* LOCKING CAP AND LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	3.0 Ft.		589.39	
GROUND SURFACE	0.0		587.8	
BOTTOM OF PROTECTIVE PIPE	2.0 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	57	N/A	N/A
Bentonite Pellets	57	62	N/A	N/A
Sand	62	85	N/A	N/A
PERFORATED SECTION	65	80	N/A	N/A
TIP	82.5		N/A	
BOTTOM OF BOREHOLE	85		N/A	
GWL AFTER INSTALLATION	70.5		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : WHITE CORRECTIONS WERE MADE BY LOWELL WILLIE AT THE TIME THIS FORM WAS COMPLETED.

COMMENTS:

264

WELL 2066

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 266	COORDINATES:		DATE: 8/25/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED: 8/31/87
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
1.5	7000	6 6 5	13"	STIFF BROWN SILT, TRACE FINE SAND.	ML		SAMPLE SCANNED - BACKGROUND READINGS
3.0	7001	6 6 6	14"	STIFF BROWN SILTY CLAY, TRACE FINE SAND.	CL		SAMPLE SCANNED - BACKGROUND READINGS
4.5	7002	1 2 3	14"	MEDIUM STIFF REDDISH YELLOW CLAY - TRACE SILT	CL		SAMPLE SCANNED - BACKGROUND READINGS.
				MEDIUM STIFF LIGHT GRAY CLAY TRACE SAND AND SILT	CL		
6.0	7003	1 2 3	17"	MEDIUM STIFF LIGHT GRAY CLAY, TRACE SAND AND SILT.	CL		SAMPLE SCANNED - BACKGROUND READINGS
7.5	7004	1 1 2	14"	SOFT LIGHT YELLOWISH BROWN CLAY	CL		SAMPLE SCANNED - BACKGROUND READINGS 7:45 8-26-87
				SOFT LIGHT GRAY SILT, TRACE FINE SAND AND CLAY	ML		
9.0	7005	1 3 2	14"	LIGHT YELLOWISH BROWN SILT, SOME CLAY.	ML		SAMPLE SCANNED - BACKGROUND READINGS
				SOFT LIGHT GRAY CLAY, TRACE SILT.	CL		
				MEDIUM STIFF YELLOWISH BROWN CLAY, SOME SILT, TRACE SAND.	CL		
10.5	7006	6 7 10	13"	MEDIUM DENSE YELLOWISH BROWN ~~GRAY~~ COARSE SAND, TRACE GRAVEL AND SILT.	SP		SAMPLE SCANNED - BACKGROUND READINGS
12.0	7007	6 7 11	8"				SAMPLE SCANNED - BACKGROUND READINGS
				VERY STIFF YELLOWISH RED SILT, SOME SAND, TRACE CLAY	ML		
				~~VERY STIFF~~ REDDISH BROWN ~~COARSE~~ SAND, ~~SOME~~ MEDIUM DENSE TRACE ~~SOME~~ GRAVEL, ~~AND~~ SILT.	SP		
13.5	7008	4 16 17	17"	~~SANDY~~ HARD ~~SA~~ GRAY SANDY SILT, TRACE GRAVEL.	ML		PANCAKE - 100-120 COUNTS PER MINUTE. OTHER METER READINGS AT BACKGROUND.
				LENS REDDISH BROWN MEDIUM SAND, TRACE GRAVEL AND SILT.	SP		
15.0	7009	2 5 6	9"	STIFF GRAY SILT, TRACE CLAY	ML		SAMPLE SCANNED - BACKGROUND READINGS
				STIFF DARK GRAY MEDIUM SAND SOME SILT, TR. GRAVEL	SM		

NOTES:

DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS
RIG - CYCLONE 42

SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" OD.

266

402-11-66

PK

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 266	COORDINATES:	DATE: 8-26-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-25-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 8-31-87
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16.5	7010	3 6 7	9"	STIFF GRAY CLAY, SOME SILT, TRACE SAND AND GRAVEL.	CL		SAMPLE SCANNED. - BACKGROUND READINGS.
18.0	7011	5 7 8	13"				SAMPLE SCANNED - BACKGROUND READINGS
19.5	7012	4 5 9	9"	STIFF GRAY SILT, SOME CLAY, TRACE GRAVEL	ML		SAMPLE SCANNED BACKGROUND READINGS
21.0	7013 7014	11 13 22	15"	HARD GRAY & CLAY AND SILT, TRACE GRAVEL.	CL		SAMPLE SCANNED BACKGROUND READINGS
22.5	7015	8 12 20	13"	HARD GRAY SILTY CLAY, TRACE GRAVEL AND SAND.	CL		SAMPLE SCANNED, BACKGROUND READINGS
24.0	7016 7017	20 15 25	12"				8-27-87 8:00 SAMPLE SCANNED- BACKGROUND READINGS
25.5	7018	9 19 26	13"				SAMPLE SCANNED - BACKGROUND READINGS
27.0	7019	5 26 REF. 50	10"				SAMPLE SCANNED- BACKGROUND READINGS
28.5	7020 7021	7 10 50	16"				SAMPLE SCANNED- BACKGROUND READINGS
30.0	7022 7023	17. 27 40	14"				SAMPLE SCANNED- BACKGROUND READINGS.

NOTES:

DRILLER - HARRY DYMES
ASSISTANT - TIM HARRIS
RIG - CYCLONE 42

SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" OD

267

402-11-88

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 266	COORDINATES:	DATE: 8-27-87
ELEVATION:	GWL: Depth 19.5 Date/Time 8-28-87 8:00	DATE STARTED: 8-25-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 8-31-87
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
31.5	7024	13 17 37	13	HARD GRAY CLAY, SOME SILT AND GRAVEL, TRACE ~~ET.~~ SAND.	CL		SAMPLE SCANNED - BACKGROUND READINGS.
				HARD GRAY SILTY CLAY, TRACE GRAVEL AND SAND.	CL		
33.0	7025	5 7 10	10	VERY STIFF GRAY SILTY CLAY, TRACE SAND AND GRAVEL.	CL		SAMPLE SCANNED - BACKGROUND READINGS
34.5	7026	13 16 40	16	VERY DENSE STRONG BROWN SAND, TRACE GRAVEL AND SILT.	SP		SAMPLE SCANNED - BACKGROUND READINGS,
36.6	7027	14 51 REF 20	12	VERY DENSE STRONG BROWN SAND, TRACE GRAVEL.	SP		8-28-87 8:00 SAMPLE SCANNED - BACKGROUND READINGS
40.0							
41.5	7028	30 50 REF	9"	VERY DENSE STRONG BROWN SANDY GRAVEL, TRACE CLAY	GP		SAMPLE SCANNED, BACKGROUND READINGS
45.0				HARD GRAY SILT, TRACE CLAY AND SAND.	ML		

NOTES:

DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS
R16 - CYCLONE 42

SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" O.D.

268

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 266	COORDINATES:	DATE: 8-31-87
ELEVATION:	GWL: Depth 39.45 Date/Time 8:10 8-31-87	DATE STARTED: 8-25-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time 13:00 8-31-87	DATE COMPLETED: 8-31-87
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46.5	7029	18 25 17	17	HARD GRAY SILT, TRACE CLAY AND SAND, LENS GRAY CLAY.	ML		8-31-87 8:10 SAMPLES SCANNED-BACKGROUND READINGS.
50.0							ADDED ~15 GAL. OF WATER TO HOLE.
51.5	7030	4 20 18	16	HARD GRAY CLAY, TRACE SILT	CL		SAMPLE SCANNED-BACKGROUND READINGS
				HARD GRAY SILT, SOME SAND, TRACE CLAY.	ML		IN WATER 2.
55.0							
56.5	7031 7032		18"	VERY STIFF GRAY SILT, SOME SAND, TRACE CLAY.	ML		SAMPLE SCANNED-BACKGROUND READINGS.
				VERY STIFF GRAY CLAY, SOME SAND, TRACE SILT.	CH		
				MEDIUM DENSE ~~SAN~~ GRAY ~~SAND~~, TRACE CLAY, SOME SILT.	SM		WET SAND
60.0							

NOTES:

DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS
RIG - CYCLONE 42

SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" O.D.

269

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 266	COORDINATES:	DATE: 8-31-87	
ELEVATION:	GWL: Depth 52.5 Date/Time 8/31/87 14:25	DATE STARTED: 8-25-87	
ENGINEER/GEOLOGIST: D. OAKLEY	Depth 51.65 Date/Time 8/31/87 14:45	DATE COMPLETED: 8-31-87	
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	7033	6	18	MEDIUM DENSE GRAY SAND, SOME SILT, TRACE CLAY	SM		
61.5	7034	6 10		VERY STIFF GRAY CLAY, TRACE SAND AND SILT.			
62.0					CL		
63.0				63.0' TD			NEW TD. 9-9-87

NOTES:

DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS
RIG - CYCLONE 42

SPLIT SPOON SAMPLES TAKEN WITH STANDARD TUBE - 2.0" OD

270

402-11-88

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07000	08/25/87 1110	6 6 5	13	STIFF BROWN SILT, TRACE FINE SAND.	ML	N/A	
3.0	07001	08/25/87 1150	6 6 6	14	STIFF BROWN SILTY CLAY, TRACE FINE SAND.	CL		
4.5	07002	08/25/87 1500	1 2 3	14	MEDIUM STIFF REDDISH YELLOW CLAY - TRACE SILT. MEDIUM STIFF LIGHT GRAY CLAY, TRACE SAND AND SILT.	CL CL		
6.0	07003	08/25/87 1510	1 2 3	17	MEDIUM STIFF LIGHT GRAY CLAY, TRACE SAND AND SILT.	CL		
7.5	07004	08/25/87 1700	1 1 2	14	SOFT LIGHT YELLOWISH BROWN CLAY. SOFT LIGHT GRAY SILT, TRACE FINE SAND AND CLAY.	CL		
9.0	07005	08/26/87 0800	1 3 2	14	LIGHT YELLOWISH BROWN SILT, SOME CLAY. SOFT LIGHT GRAY CLAY, TRACE SILT. MEDIUM STIFF YELLOWISH BROWN CLAY, SOME SILT, TRACE SAND.	ML CL CL	N/A	
10.5	07006	08/26/87 0840	6 7 10	13	MEDIUM DENSE YELLOWISH BROWN, COARSE SAND, TRACE GRAVEL AND SILT.	SP	N/A	
12.0	07007	08/26/87 0900	6 7 11	8	VERY STIFF YELLOWISH RED SILT, SOME SAND, TRACE CLAY. REDDISH BROWN SAND MEDIUM DENSE GRAVE, TRACE SILT.	ML SP	N/A N/A	
13.5	07008	08/26/87 1345	4 16 17	17	HARD GRAY SANDY SILT, TRACE GRAVEL. LENS REDDISH BROWN MEDIUM SAND, TRACE GRAVEL AND SILT.	ML SP	N/A N/A	
15.0	07009	08/26/87 1430	2 5 6	9	STIFF GRAY SILT, TRACE CLAY. STIFF DARK GRAY MEDIUM SAND, SOME SILT, TRACE GRAVEL.	ML SM	N/A N/A	

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42. SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" O.D.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 6

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07010	08/26/87	1510	3 6 7	9	STIFF GRAY CLAY, SOME SILT, TRACE SAND AND GRAVEL.	CL		
18.0	07011	08/26/87	1530	5 7 8	13				
19.5	07012	08/26/87	1540	4 5 9	9	STIFF GRAY SILT, SOME CLAY, TRACE GRAVEL.	ML	N/A	
21.0	07013 07014	08/26/87	1555	11 13 22	15	STIFF GRAY SILT, SOME CLAY, TRACE GRAVEL. HARD GRAY CLAY AND SILT, TRACE GRAVEL.	ML CL	N/A	
22.5	07015	08/26/87	1615	8 12 20	13	HARD GRAY SILTY CLAY, TRACE GRAVEL AND SAND.	CL		
24.0	07017	08/27/87	1025	20 15 25	12				
24.0	07016	08/27/87	1025	20 15 25	12				
25.5	07018	08/27/87	1110	9 19 26	13				
27.0	07019	08/27/87	1150	5 26 50	10				
28.5	07020	08/27/87	1330	7 10 50	16				
28.5	07021	08/27/87	1330	7 10 50	16				
30.0	07022	08/27/87	1410	17 27 40	14		272		

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SAMPLES TAKEN WITH SANTDARD SPLIT SPOON SAMPLER - 2.0" O.D. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
30.0	07023	08/27/87 1410	17 27 40	14				

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SAMPLES TAKEN WITH SANTDARD SPLIT SPOON SAMPLER - 2.0" O.D. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07024	08/27/87 1450	13 17 37	13	HARD GRAY CLAY, SOME SILT AND GRAVEL, TRACE SAND. HARD GRAY SILTY CLAY, TRACE GRAVEL AND SAND.	CL CL		
33.0	07025	08/27/87 1520	5 7 10	10	VERY STIFF GRAY SILTY CLAY, TRACE SAND AND GRAVEL.	CL		
34.5	07026	08/27/87 1550	13 16 40	16	VERY DENSE STRONG BROWN SAND, TRACE GRAVEL AND SILT.	SP	N/A	
36.0	07027	08/28/87 0900	14 51	12	VERY DENSE STRONG BROWN SAND, TRACE GRAVEL.	SP	N/A	
40.0								
41.5	07028	08/28/87 1100	30 50	9	VERY DENSE STRONG BROWN SANDY GRAVEL, TRACE CLAY. HARD GRAY SILT, TRACE CLAY AND SAND.	GP ML	N/A N/A	
45.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SAMPLES TAKEN WITH SANTDARD SPLIT SPOON SAMPLER - 2.0" O.D. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS 2731	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	07029	08/31/87 0830	18 25 17	17	HARD GRAY SILT, TRACE CLAY AND SAND, LENS GRAY CLAY.	ML	N/A	
50.0								
51.5	07030	08/31/87 0930	4 20 18	16	HARD GRAY CLAY, TRACE SILT. HARD GRAY SILT, SOME SAND, TRACE CLAY.	CL ML	N/A	
55.0								
56.5	07031 07032	08/31/87 1025		18	VERY STIFF GRAY SILT, SOME SAND, TRACE CLAY. VERY STIFF GRAY CLAY, SOME SAND, TRACE SILT. MEDIUM DENSE GRAY SAND, TRACE CLAY, SOME SILT.	ML CH SM	N/A N/A N/A	
60.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. WET SAND. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42.
SAMPLES TAKEN WITH STANDARD SPLIT SPOON SAMPLER - 2.0" O.D.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2066	COORDINATES: NORTH 483,938.95 EAST 1,376,703.45	DATE: 08/25/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 08/25/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 08/31/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 6

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07033 07034	08/31/87	1420	6 6 10	18	MEDIUM DENSE GRAY SAND, SOME SILT, TRACE CLAY. VERY STIFF GRAY CLAY, TRACE SAND AND SILT.			

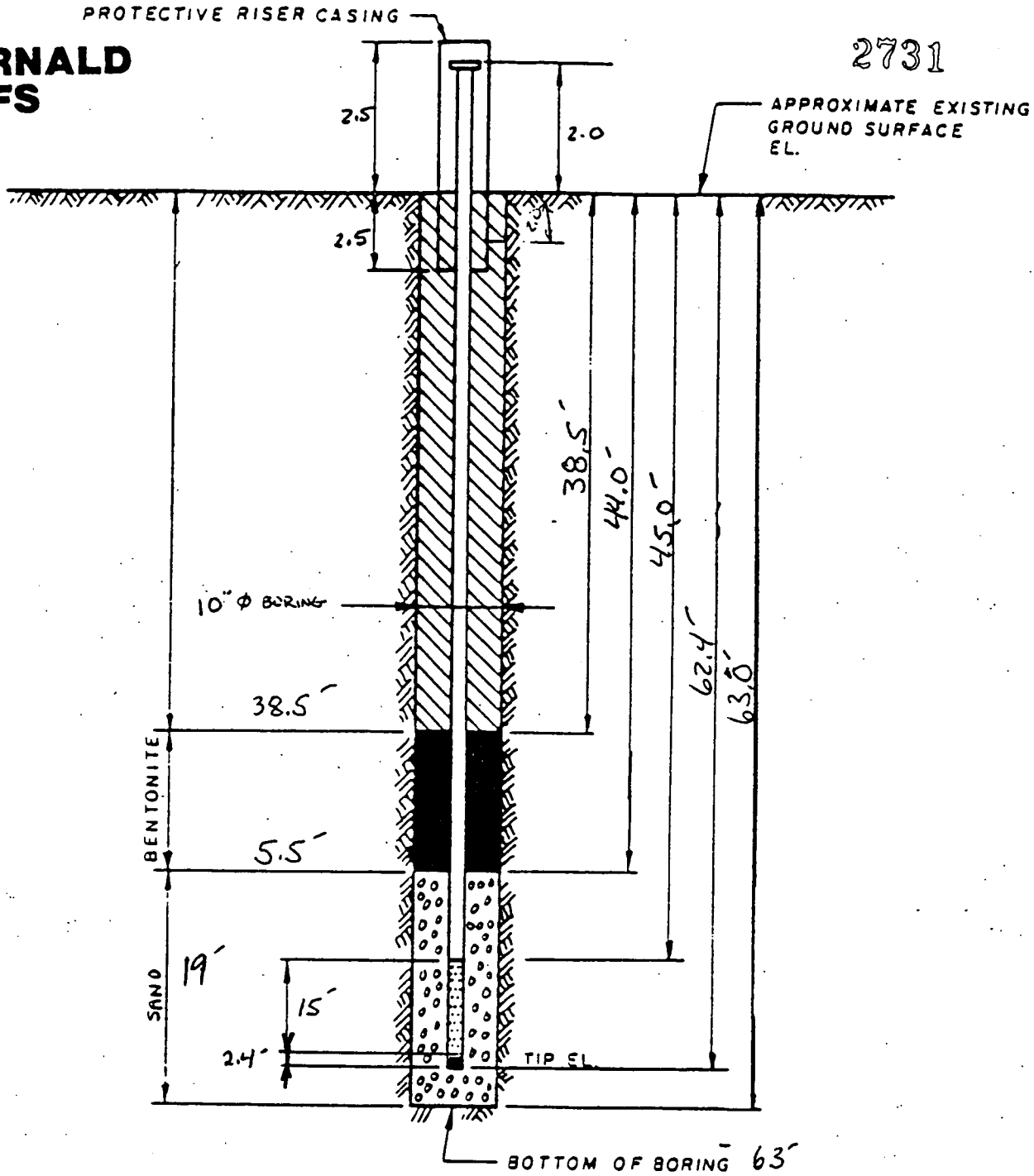
BOTTOM OF BORING 63

NOTES:
DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. RIG - CYCLONE 42. SPLIT SPOON SAMPLES TAKEN WITH STANDARD TUBE - 2.0" O.D.

WELL #266

FERNALD RI/FS

2731



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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 266

PREPARED FOR

FMPC RI/FS

277

DRAWING NUMBER	
CHECKED BY	APPROVED BY
D30	
DRAWN BY	

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. D.OAKLEY DATE 9-23-87
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 266
PIEZOMETER NO. 266 DATE OF INSTALLATION 8-31-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 5 TO 62'
FLUID ~~OIL~~ FROM NA TO NA

TYPE OF BIT FLAT HEAD HAMMER
CASING SIZE (S) USED: TEMPORARY
SIZE 12" FROM 0 TO 60'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL (316)
DIAMETER OF PERFORATED SECTION 4" ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .01 INCH
TOTAL PERFORATED AREA 15'

RISER PIPE MATERIAL STAINLESS STEEL (316)
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10 FT.
JOINING METHOD THREAD AND COUPLE (FLUSH JOINT THREADED)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.
PROTECTIVE PIPE O.D. 10 INCHES

OTHER PROTECTION LOCKABLE CAP AND LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 FT.			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT.			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (VOLCLAY)	TOP 2'	BOTTOM 38.5	TOP	BOTTOM
BENTONITE PELLETS	TOP 38.5	BOTTOM 44.0'	TOP	BOTTOM
SAND	TOP 44.0	BOTTOM 63'	TOP	BOTTOM
NO ~~GRAVEL~~ USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 45'	BOTTOM 60'	TOP	BOTTOM
PIEZOMETER TIP	62.4' (SILT TRAP)			
BOTTOM OF BOREHOLE	63'			
GWL AFTER INSTALLATION	39'			

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

278

REMARKS WELL TO BE DEVELOPED LATER.

409-11-86

WELL 2070

UNSITE

2731

WELL INFORMATION SHEET

Well Number:
WMCO: IT-5A

Installer/I.D. Number:
D&M: _____ (IT:) IT-5A NLO: _____ Weston: 200 level well

Location:
Well Location: Intersection of southern access road w/ Willey Rd.
State Plane Coordinates: _____ E _____ N
Approx. Site Coordinates: 1382029 S or N 476752 E
Ground Elevation: 592.170

Monitoring:
Aquifer: upper s&G
Monitoring Program: _____
Parameters Monitored/Frequency: _____

Approx. Water Table Elevation: 522.66 Depth to Water: 72.52

Drilling:
Drilling Method: hollow-stem auger Driller: [illegible]
Date of Installation: 3-24-86 Completion Date: 3-25-86
Borehole Diameter: _____ Casing Diameter: 4"
Borehole Depth: 102.70 Casing Length: _____
Type Of Logs: _____

Well Construction:
Backfill Type: _____ Type Annular Space Seals: _____
Screen Interval: 499-489 (10') Screenpack Material: _____
Screen Type: _____ Casing Type: _____
Type of Pump: _____ Pump Model: _____
Pump Capacity: _____ Date Pump Installed: _____
Casing Elevation: 594.220' Height of Stick-up: 2.05'

Hydrologic Tests: _____

Remarks: _____

Completed By: _____ **Ext.:** _____ **Date:** _____

DATE BEGAN: 3-24-86
DATE FINISHED: 3-25-86
GROUND SURFACE EL.: 592.2'

BORING NO. IT-5A

N 476,752 E 1,382,029

FIELD ENGINEER: P. E. NEMANIC
CHECKED BY: S. E. TITUSKIN

2731

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	PROFILE	DESCRIPTION	U.S.C.S.	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
590.0		S 1		SOFT DARK BROWN-ORANGE SILT AND CLAY, TRACE ROOTS, MOIST 0.7'	cl		
		S 2		SOFT ORANGE-BROWN AND DARK GRAY MOTTLED SILTY CLAY, TRACE ROOTS, MOIST 3.8'	ml/cl		
	5.0	S 3		SOFT ORANGE-BROWN AND LIGHT GRAY MOTTLED SILTY CLAY, TRACE FINE TO COARSE SAND AND FINE GRAVEL, WET ~7.0'	ml/cl		PERCHED GROUND WATER FROM 6.5' TO 7.5'; VISIBLE AFTER AUGER REMOVAL
		S 4		MEDIUM STIFF BROWN SILTY CLAY, SOME FINE TO MEDIUM GRAVEL, TRACE FINE TO COARSE SAND, MOIST 8.5'	ml/cl ml/cl		
	10.0						
580.0				MEDIUM STIFF BROWN SILTY CLAY, TRACE FINE GRAVEL, MOIST ~12.0'			
		S 5		MEDIUM STIFF GRAY CLAY, TRACE FINE TO COARSE SAND AND FINE TO COARSE GRAVEL, MOIST 14.4'	cl ml		
	15.0						
		S 6		VERY STIFF GRAY SILT, TRACE FINE TO COARSE SAND AND FINE GRAVEL, SOME FINE SAND STRINGERS, MOIST ~22.0'	ml		HARD GRAVELLY MATERIAL FROM 19.75' TO 21.5'.
	20.0						
570.0		S 7		MEDIUM STIFF GRAY CLAYEY SILT, TRACE FINE TO COARSE SAND AND FINE TO COARSE GRAVEL, MOIST ~26.0'	cl/ml		
	25.0						
		S 8		MEDIUM STIFF GRAY CLAY, SOME SILT, TRACE FINE TO COARSE SAND AND FINE GRAVEL, MOIST 32.5'	cl		GRAVELLY ZONES AT 31' AND 32'
	30.0						
580.0							
		S 9		DENSE GRAY FINE TO COARSE SAND, SOME FINE GRAVEL, TRACE SILT, MOIST TO DRY ~38.0'	sw		
	35.0						
	40.0						
550.0							
		S 10		VERY DENSE GRAY FINE TO COARSE SAND AND FINE GRAVEL, TRACE SILT, DRY TO MOIST ~48.0'	sw		
	45.0						
	50.0			DENSE GRAY FINE SAND, TRACE FINE GRAVEL, DRY			

87

281

PROJECT NO. 303083

BORING NO. IT-5A
SHEET 1 OF 3

DATE BEGAN: 3-24-86
DATE FINISHED: 3-25-86
GROUND SURFACE EL.: 592.2'

BORING NO. IT-5A

N 476,752 E 1,382,029

FIELD ENGINEER: P. E. NEMANIC
CHECKED BY: S. E. TITUSKIN

2731

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	DESCRIPTION	U.S.C.S.	REMARKS
540.0	55.0	S 11	DENSE GRAY FINE SAND, TRACE FINE GRAVEL, DRY	sp	
			~58.0'		
530.0	60.0, 65.0	S 12	VERY DENSE GRAY FINE TO COARSE SAND AND FINE GRAVEL, DRY	sw	
			~66.0'		
3-25-86	70.0	S 13	VERY DENSE GRAY FINE TO COARSE SAND AND FINE TO COARSE GRAVEL, DRY	sw/gw	
520.0			73.2'	sw/gw	
	75.0	S 14	DENSE GRAY FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE SILT, WET	sp	S-14 RETAINED FOR CHEMICAL ANALYSES.
			~79.0'		
510.0	80.0, 85.0	S 15	VERY DENSE GRAY FINE TO COARSE SAND AND FINE GRAVEL, TRACE COARSE GRAVEL, TRACE SILT, WET	sw	
			~91.0'		
500.0	90.0, 95.0	S 16	VERY DENSE GRAY FINE TO COARSE SAND, SOME FINE GRAVEL, TRACE COARSE GRAVEL, TRACE SILT, WET	sw	
			~96.0'		
	100.0	S 17	VERY DENSE GRAY FINE TO COARSE SAND AND FINE TO COARSE GRAVEL, TRACE SILT, WET	sw/gw	

PENETRATION RESISTANCE (BLOWS PER FOOT): 10, 30, 50

61, 98, 82, 82

282

PROJECT NO. 303063

BORING NO. IT-5A
SHEET 2 OF 3

DATE BEGAN: 3-24-86
DATE FINISHED: 3-25-86
GROUND SURFACE EL.: 592.2'

BORING NO. IT-5A

N 476,752 E 1,382,029

FIELD ENGINEER: P. E. NEMANIC
CHECKED BY: S. E. TITUSKIN

2731

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	PROFILE	DESCRIPTION	U.S.C.S.	PENETRATION RESISTANCE (BLOWS PER FOOT) 10 30 50	REMARKS
490.0				VERY DENSE GRAY FINE TO COARSE SAND AND FINE TO COARSE GRAVEL, TRACE SILT, WET			
489.2	103.0						
				BOTTOM OF BORING 103.0'			

283

PROJECT NO. 303083

BORING NO. IT-5A
SHEET 3 OF 3

GENERAL NOTES AND LEGEND

Symbols to be used for designation of subsurface materials on all boring logs and subsurface sections

GRAVEL
SAND
SILT
CLAY
ORGANIC MATTER
ROOTS

FILL
WATER
APPROXIMATE EXISTING GROUND
APPROXIMATE TOP OF ROCK

2 O D SPLIT BARREL SAMPLE

75/0 5' PENETRATION REFUSAL RESISTANCE AND FRACTIONAL INCREMENT DRIVEN IN FEET

GROUND WATER LEVEL AND DATE

U S C S UNIFIED SOIL CLASSIFICATION SYSTEM (CAPITAL LETTERS INDICATE LAB TEST CLASSIFICATION. LOWER CASE LETTERS INDICATE VISUAL FIELD CLASSIFICATION)

TRACE – INDICATES PRESENCE OF 5 TO 12% OF SUBJECT MATERIAL BY WEIGHT
SOME – INDICATES PRESENCE OF 12 TO 30% OF SUBJECT MATERIAL BY WEIGHT
AND – INDICATES APPROXIMATELY EQUAL PORTIONS OF SUBJECT MATERIAL BY WE

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 WAS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6 INCH INTERVAL. THE RESISTANCE TO PENETRATION IS INDICATED ON THE DRAWING AS BLOWS PER FOOT.

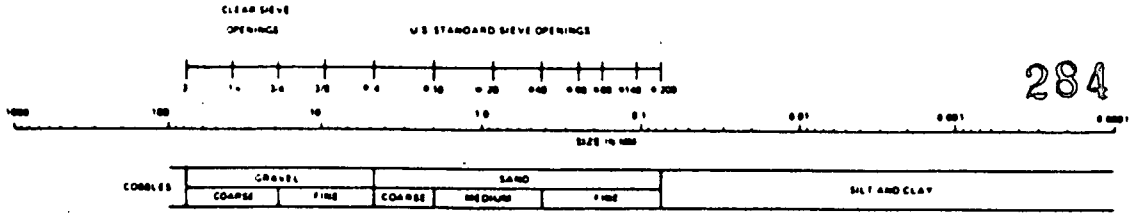
THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS

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

DESIGNATION	BLOWS PER FOOT
VERY LOOSE	0 4
LOOSE	5 10
MEDIUM DENSE	11 30
DENSE	31 50
VERY DENSE	OVER 50



U S C S CLASSIFICATION FOR SOILS

WELL 2106

FERNALD RI/FS

COPY

RECEIVED 4/23/89

	Initial	Date
Field Check	WAH	2-9-89
1st Key In	JMT	3-28-89
2nd Key In	DBS	6-15-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2106	COORDINATES: N 476096.82 E 1379580.27	DATE: 1/25/89, 1/26/89, 1/31/89
ELEVATION: 538.9 ft ~~540.0 FT~~ MB	GWL: Depth 20.2 FT Date/Time 1/31/89 0900	DATE STARTED: 1-25-89
ENGINEER/GEOLOGIST: TESORIERO 4-2-91	Depth Date/Time	DATE COMPLETED: 1/31/89
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 1

DEPTH 1 FT	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 N/A	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS 2731
				SEE BORING 3106 FOR SAMPLE DESCRIPTION			
10							
20							
30							
				BOTTOM OF BORING 2106 = 35 FT			
~~30~~ 40							

286

NOTES:

Total water = 300 gallons for drilling & completion

Ground Water level was from MW 3106, approximately 10 Ft. away from this well. Elevations of the 2 wells are very close to being equal. WAH 2-9-89

4C2-11-86

FERNALD RI/FS

2731

	Initial	
1st Key In	CMT	5-25-89
2nd Key In	WAH	6-16-89
Hard Copy Verification		

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. S. Battelle DATE 1/31/89
PROJECT NO. 602-3.2 CHECKED BY WAHertel DATE 2-9-89
BORING NO. 2106
PIEZOMETER NO. 2106 DATE OF INSTALLATION 1/31/89

BOREHOLE DRILLING

DRILLING METHOD Cable
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 35
FLUID -- FROM -- TO --

TYPE OF BIT Hammer
CASING SIZE (S) USED: ID WAH 2-9-89
SIZE 10 in FROM 0 TO 35
SIZE -- FROM -- TO --

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4 inch
PERFORATION TYPE: ID WAH 2-9-89
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 in
TOTAL PERFORATED AREA 15 ft

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4 in
LENGTH OF PIPE SECTIONS 2, 5, 10 ft Secs
JOINING METHOD ~~flush-thread~~, WAH 2-9-89
Screw Type, Threaded, Flush Joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE O.D. 10.5 in

OTHER PROTECTION locking lid w/padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.1			
GROUND SURFACE	0.0		538.9	
BOTTOM OF PROTECTIVE PIPE	(-2.5) ft			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP Surface	BOTTOM 5ft	TOP	BOTTOM
BENTONITE	TOP 5ft	BOTTOM 10ft	TOP	BOTTOM
(10x20) SAND SB 1/31/89	TOP 10ft	BOTTOM 32ft	TOP	BOTTOM
~~GRAVEL~~ #4/30 Cris Sd.	TOP 32 ft	BOTTOM 35ft	TOP	BOTTOM
PERFORATED SECTION	TOP 15.2ft	BOTTOM 30.2ft	TOP	BOTTOM
PIEZOMETER TIP	31.9 ~~34~~ ft SB 1/31/89			
BOTTOM OF BOREHOLE	35ft			
GWL AFTER INSTALLATION				

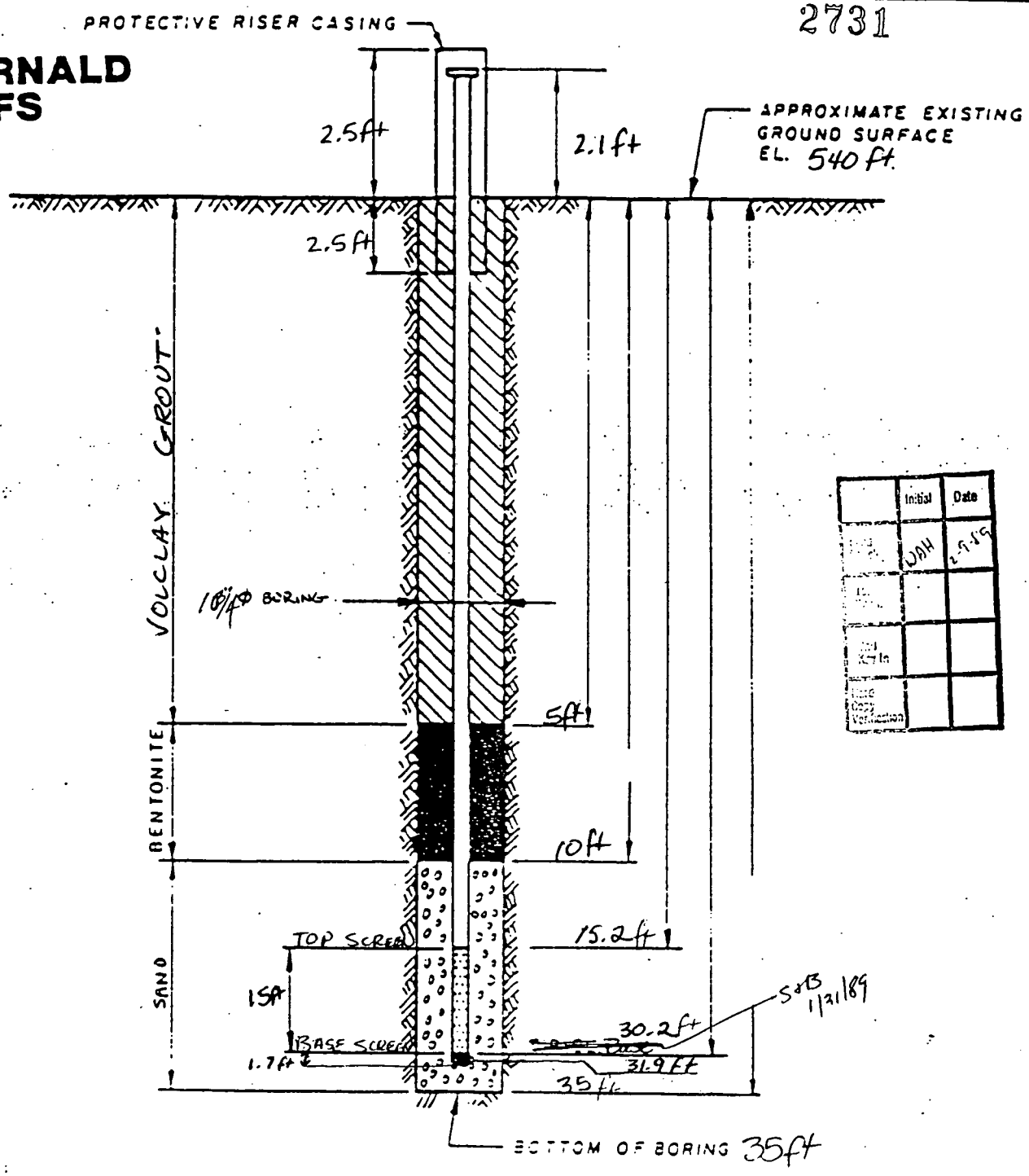
287

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

REMARKS Jim Tascierio observed drilling of boring
Sarah Battelle observed well installation

2731

FERNALD RI/FS



	Initial	Date
	WAH	2-9-89

DRAWING NUMBER	
CHECKED BY	WAH
APPROVED BY	
DRAWN BY	S&B

2-9-89

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 520 ft (20ft)
5. WATER LEVEL READING ON 01-31-89

INSTALLATION DETAILS
MONITORING WELL 2106

PREPARED FOR

288

15ft screen w/ 1.7' welded silt trap
17.3 ft of blank casing

23 bags of 1020 (80 lbs/SX), 3 Bags of volclay grout buckets
2 bags of 430 (80 lbs/SX), 7 1/2 SX pellets (bentonite)

Total water used during drilling & completion = 300 gallons.

MONITORING WELL INSTALLATION RECORD
11/21/91

ROJECT NAME: Fernald RI/FS
ROJECT NO. : 602.3.2
ORING NO. : 2106
ELL NUMBER: 2106

FIELD ENG./GEO.: S. BATTELLE DATE: 01/31/89
CHECKED BY : W. A. HERTEL DATE: 02/09/89
N,E COORDINATES: 476096.82, 1379580.2
DATE OF INSTAL.: 01/31/89

2731

LE DRILLING

LLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 35
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 35
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .010 (In.)
TOTAL PERFORATED AREA: 15 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 2 Ft.
2ND PIPE SECTION: 5 Ft.
3RD PIPE SECTION: 10 Ft.
COMMENTS

RISER JOINING METHOD: SCREW TYPE, THREADED, FLUSH JOINT

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10.5 In.
* LOCKING LID W/ PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.1 Ft.		540.80	
GROUND SURFACE	0.0		538.9	
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	5	N/A	N/A
Bentonite Pellets	5	10	N/A	N/A
and	10	32	N/A	N/A
nd	32	35	N/A	N/A
ORATED SECTION	15.2	30.2	N/A	N/A
WELL TIP	31.9		N/A	
BOTTOM OF BOREHOLE	35		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

AS THE WELL FLUSHED AFTER INSTALLATION? : No
AS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

EMARKS : JIM TESORIERO OBSERVED DRILLING OF BORING, SARAH BATTELLE OBSERVED WELL INSTALLATION.
OMMENTS:

WELL 2120

FERNALD
RI/FS

1st Attempt
Casing broke off in hole while driving from [illegible] to 80.0 ft.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER 602.3.2.1	PROJECT NAME Fernald RI/FS		
BORING NUMBER #2120	COORDINATES NA	DATE 2-15-90	
ELEVATION NA	GWL: Depth 63.1 ft Date/Time 2-13-90/1520	DATE STARTED 2-4-90	
ENGINEER/GEOLOGIST M. Hardner	Depth Date/Time	DATE COMPLETED 2-13-90	
DRILLING METHODS Cable tool rig, 10.0" OD OVER CASING		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0	NA	NA	NA	* SEE VISUAL CLASSIFICATION OF SOILS LOG FOR BORING #3120 for description of SOILS.				
10								
20								
				APPROXIMATE TILL Bottom 27.0' APPROXIMATE TOP OF SAND and Gravel AQUIFER				
30								
40								
50								
60								

NOTES.

Drilling Contractor Penn Drill

Drilling Equipment CYCLONE Cable Tool RIG

Driller: Joe Barile
Ken Reynolds

Background levels:
$\beta\gamma$ = 40 to 140 cpm
on 2-13-90
α = 0 cpm

291

Water Quantity used during drilling: 950 gallons

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 2731

PROJECT NUMBER	602.3.2.1	PROJECT NAME	Fernald RI/FS		
BORING NUMBER	#2120	COORDINATES	NA	DATE	2-15-90
ELEVATION	NA	GWL Depth	Date/Time	DATE STARTED	2-4-90
ENGINEER/GEOLOGIST	M. Hardner	Depth	Date/Time	DATE COMPLETED	2-13-90
DRILLING METHODS	See p.1			PAGE	2 OF 2

DEPTH (FT)	SAMPLE (TYPE & NO.)	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
60	NA	NA	NA					
63.1' 2-13-90 1520hrs								GWL measured @ 63.1' bgs** @ 1520hrs on 2-13-90. Fine to medium sand from 63.0' to 80.0'
70								
80				Bottom of Boring @ 80.0'				

NOTES: 1) 20.0ft of 10.0" OD CASING left @ Bottom of Boring @ 80.0' up to ~60.0'.
2) NO WELL INSTALLED.
3) Grout up hole.

NOTES. See p.1

** bgs = below ground surface

Drilling Contractor: TENN DRILL

Drilling Equipment: CYCLONE 43

Driller: JOE BARILE

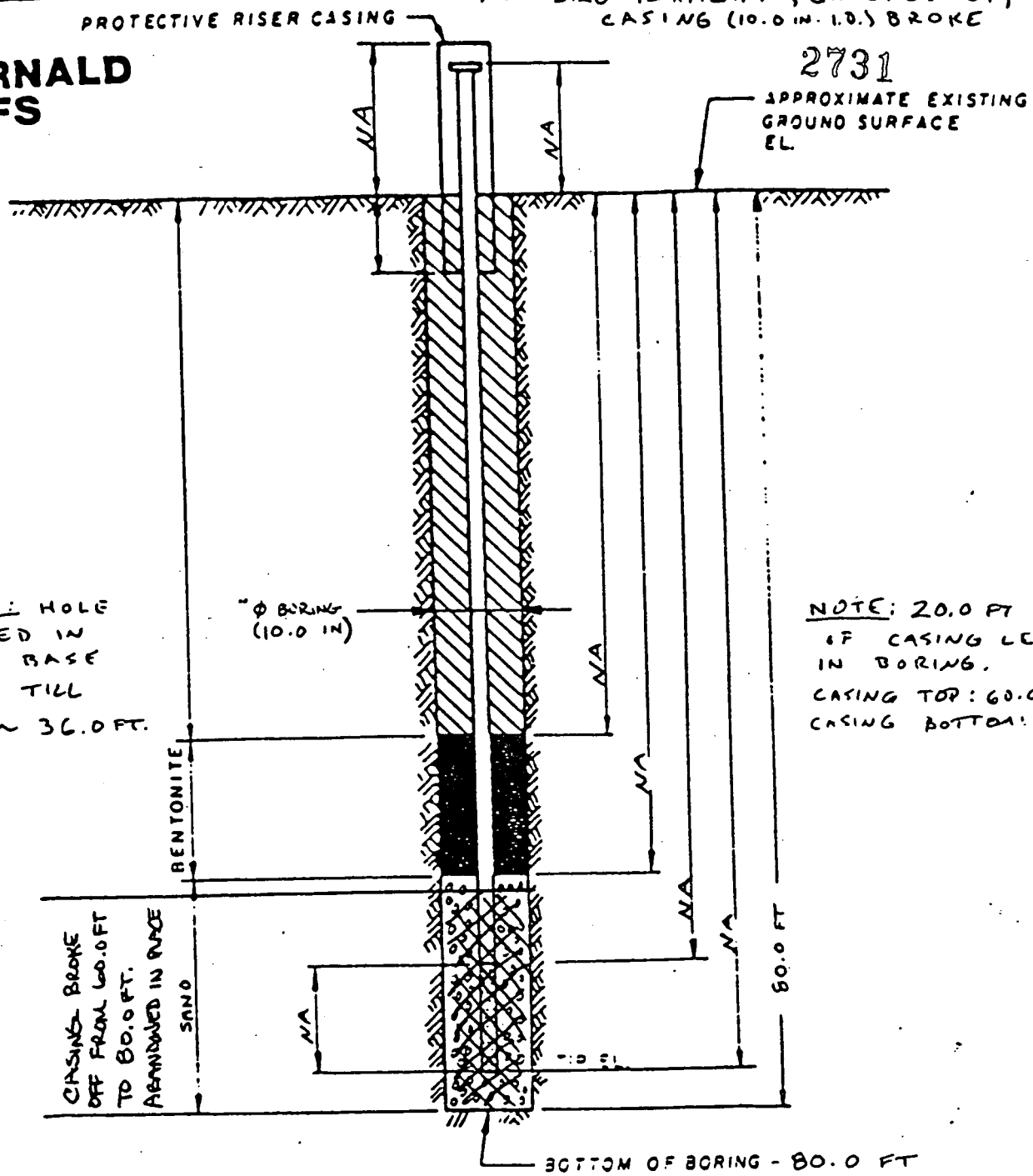
ASST. KEN REYNOLDS

292

NO WELL INSTALLED, BORING ONLY
MW #2120 1ST ATTEMPT, GROUTED UP, CASING (10.0 IN. I.D.) BROKE

FERNALD RI/FS

2731



NOTE: HOLE CAVED IN TO BASE OF TILL AT ~ 36.0 FT.

NOTE: 20.0 FT OF CASING LEFT IN BORING.
CASING TOP: 60.0 FT
CASING BOTTOM: 80.0

DRAWING NUMBER	
CHECKED BY	APPROVED BY
MG 2-28-90	
DRAWN BY	

NOTES:

1. RISER PIPE IS IN 10 SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS IN 1.0 PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

MATERIALS USED TO PLUG BORING:
m.6.2-28-90
~~5~~ 3 BUCKETS BENTONITE PELLETS (5 gal. each)
21 BAGS VOLCLAY GROUT (50 lbs. EACH)
1 BAG CEMENT (50 lbs.)

INSTALLATION DETAILS
MONITORING WELL #2120

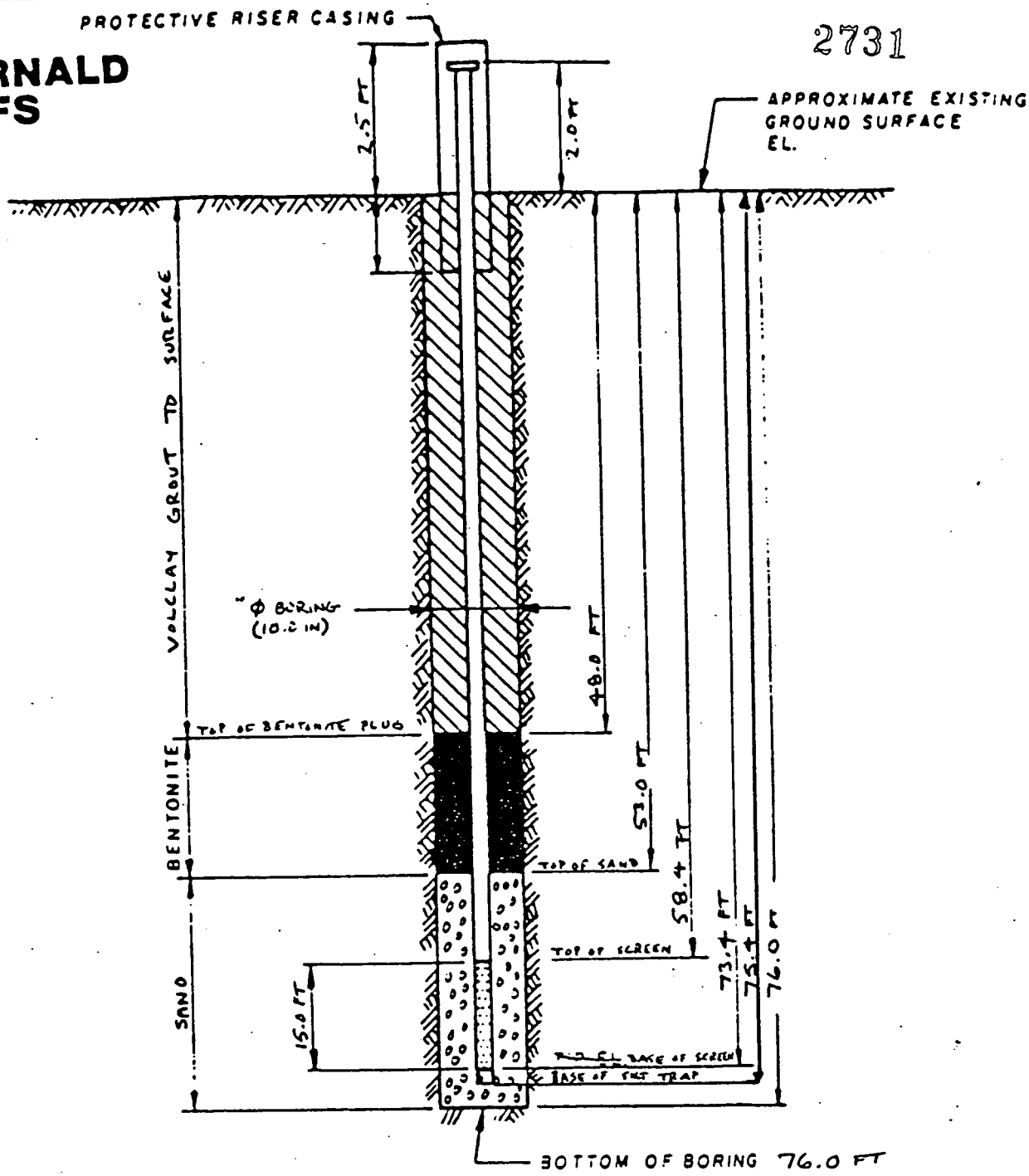
PREPARED FOR
FERNALD RI\FS

TOTAL WATER ADDED DURING DRILLING AND GROUTING = 950 gal.

293

FERNALD RI/FS

2731



DRAWING NUMBER

CHECKED BY | APPROVED BY

DRAWN BY | 2-28-90

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 (W\ WELDED SILT TRAP)
4. ELEVATION OF WATER LEVEL 63.65 FT FROM TOP OF RISER
5. WATER LEVEL READING ON 3-1-90 (A-SCOPE SN-00263)

MATERIALS USED DURING WELL INSTALLATION:

16 BAGS 10\20 SAND (80 lbs EACH)

11 BAGS VOLCLAY GROUT (50 lbs. EACH)

48 BUCKETS BENTONITE PELLETS (5 gal. EACH)

1 - 15.0 FT SCREEN WITH 2.0 FT WELDED SILT TRAP, 6 - 10.0 FT SECTIONS STAINLESS STEEL RISER (4.0 IN I.D.) 2.0 FT STICK UP ABOVE GROUND SURFACE

INSTALLATION DETAILS
MONITORING WELL # 2120

PREPARED FOR FERNALD RI\FS 294

TOTAL WATER ADDED DURING DRILLING AND GROUTING = 870 gal

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI\FS FIELD ENG./GEO. M. GARMAN DATE 2-28-90
PROJECT NO. 602.3.2.1 CHECKED BY S.T. DATE 3-2-90
BORING NO. 2120
PIEZOMETER NO. 2120 DATE OF INSTALLATION 2-28-90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0 TO 76.0 FT
FLUID N/A FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10.0 IN I.D. FROM 0 TO 78.0 FT
SIZE N/A 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 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 10.0 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	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 48.0	TOP	BOTTOM
BENTONITE	TOP 48.0	BOTTOM 53.0	TOP	BOTTOM
SAND	TOP 53.0	BOTTOM 76.0	TOP	BOTTOM
GRAVEL NONE USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 58.4	BOTTOM 73.4	TOP	BOTTOM
PIEZOMETER TIP	75.4			
BOTTOM OF BOREHOLE	76.0			
GWL AFTER INSTALLATION	63.65			

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

295

REMARKS FIRST ATTEMPT OF THIS BORING WAS RELOCATED DUE TO CASING BREAKING FROM 60.0 FT. TO 80.0 FT. 20 FT. TOTAL LEFT IN GROUND.

ACB-11-88

MONITORING WELL INSTALLATION RECORD
11/21/91

OJECT NAME: Fernald RI/FS FIELD ENG./GEO.: M. GARMAN DATE: 02/28/90
OJECT NO. : 602.3.2 CHECKED BY : E.T. DATE: 03/02/90
RING NO. : 2120 N,E COORDINATES: 480186.92, 1382123.0
LL NUMBER: 2120 DATE OF INSTAL.: 02/28/90

2731

E DRILLING

LLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 76.0
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITOR WELL
CASING DIAM.: 4.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 78.0
SIZE: N/A FROM: N/A TO: N/A

LL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: 0.01 (In.)
TOTAL PERFORATED AREA: 15. Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10.0 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: FLUSH JOINT THREADED

OTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
* HINGED LOCKING COVER WITH PADL

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	584.56
GROUND SURFACE	0.0	582.5
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0.0	48.0	N/A	N/A
Bentonite Pellets	48.0	53.0	N/A	N/A
nd	53.0	76.0	N/A	N/A
RATED SECTION	58.4	73.4	N/A	N/A
LL TIP	75.4		N/A	
BOTTOM OF BOREHOLE	76.0		N/A	
GWL AFTER INSTALLATION	63.65		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MARKS : FIRST ATTEMPT OF THIS BORING WAS RELOCATED DUE TO CASING BREAKING FROM 60.0 FT. TO 80.0 FT. 20 FT. TOTAL LEFT IN GROUND.
MMENTS:

WELL 2648

FERNALD
RI/FS

2731

	Date	Initial	Field Check	1st Key In	2nd Key In	Hard Copy Verification
	11/2/90	FT				

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1 | PROJECT NAME: FMPC RI/FS
BORING NUMBER: 2648 | COORDINATES:
ELEVATION: | GWL: Depth 61.3 FT Date/Time 9-24-90 @ 1600 | DATE: 9-18-90 ; 9-19-90
ENGINEER/GEOLOGIST: M SWANSON | Depth 60.6 FT Date/Time 9-25-90 @ 1600 | DATE STARTED: 9-18-90
DRILLING METHODS: CABLE TOOLS | DATE COMPLETED: 9-25-90
PAGE 1 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS MANUAL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0	33118 1430 9-18	5 11 18	18	CLAYEY SILT, BROWNISH YELLOW (10YR 6/6), NO PLASTICITY, SOME SAND, SILT & ORG. 0.4	ML	N/A	N/A	Hnu: 0.0 PPM ∝: 0 CPM βγ: 100-120 CPM
1		18		DENSE, BROWNISH YELLOW (10YR 6/6), POORLY GRADED CLAY SAND, SOME SILT, TRACE OF PEBBLES, DRY 2.5	SP	N/A		
2	33119 1434 9-18	30 23 25	18					Hnu: 0.0 PPM ∝: 0 CPM βγ: 90-100 CPM
3				HARD, OLIVE YELLOW (2.5Y 6/6), SANDY, SILTY CLAY, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 5.0	CL	3.0		
4	33120 1439 9-18	27 28 20	18					Hnu: 0.0 PPM ∝: 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 ∝: 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) POORLY GRADED PEBBLES - DRY 8.0	CL	0.50		Hnu: 0.0 PPM ∝: 0 CPM βγ: 80-120 CPM
8	33123 1500 9-18	21 21 23	18					Hnu: 0.0 PPM ∝: 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 12.0	CL	0.50		Hnu: 0.0 PPM ∝: 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 ∝: 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 ∝: 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 ∝: 0 CPM βγ: 80-100 CPM
15								

NOTES

Drilling Contractor: PERNI 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	RANGE	BACKGROUND READINGS
Hnu	0.0-199	0.0 PPM
∝	0.1-0.4	0 CPM
βγ	0.1-0.11	80-140 CPM

298

FERNALD
RI/FS

2731

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 1400 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	7	LOOSE, GRAY (2.5Y 5/0), SILT-CLAY-GRAVEL MIXTURE, SOME COBBLES, TRACE OF SAND, WET 15.6	GC	N/A	H_{AV}: 0.0 ppm
16	1426 9-19	5 5		LOOSE, GRAY (2.5Y 5/0), CLAYEY-SILTY SAND, TRACE OF GRAVEL AND COBBLES, WET	SM	N/A	α: 0 cpm; $\beta\gamma$: 80-100 cpm
17	33129	5	18	LOOSE, GRAY (2.5Y 5/0), SILTY CLAYEY SAND, SOME GRAVEL, WET 17.3	SM	N/A	H_{AV}: 0.0 ppm
18	1439 9-19	7 9		VERY SOFT, GRAY (2.5Y 5/0), GRAVELLY-SILTY CLAY, SOME SAND, LOW PLASTICITY, WET 18.8	CL	<.25	α: 0 cpm; $\beta\gamma$: 100-110 cpm
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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 80-100 cpm
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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 90 cpm
23 24	33133 0936 9-20	4 5 14	10	FIRM, GRAY (5Y 5/1), SILTY, GRAVELLY CLAY, SOME COBBLES, LOW PLASTICITY, MOIST	CL	1.5	H_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 80 cpm
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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 110-112 cpm
26 27	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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 100 cpm — ON WASH MATERIAL ON SPOON
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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 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_{AV}: 0.0 ppm; α: 0 cpm; $\beta\gamma$: 110 cpm

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
$\beta\gamma$: 80-140 cpm

299

2438-3-86

FERNALD
RI/FS

2731

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 31	33138 1438 9-20	7 16 17	18	HARD, DARK GRAY (5Y 4/1), SILTY CLAY, SOME SAND AND PEBBLES, TRACE OF LIMESTONE COBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.5	Hnu: 0.0 ppm α: 0 cpm βγ: 80 cpm
32 33	33139 1547 9-20	26 42 50	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	Hnu: 0.0 ppm α: 0 cpm βγ: 100-120 cpm
34	33140 1611 9-20	14 22 33	18	HARD,	CL	4.0	Hnu: 0.0 ppm α: 0 cpm βγ: 100 cpm
35 36	33141 1614 9-20	23 37/6	12	VERY HARD	CL	>4.0	Hnu: 0.0 ppm α: 0 cpm βγ: 100 cpm
37	33142 0906 9-21	13 17 24	18	36.4 HARD, GRAY (5Y 4/1), PEBBLEY-SILTY CLAY, GRAVEL AND COBBLES, LOW PLASTICITY, SLIGHTLY MOIST 36.4	CL	3.5	Hnu: 0.0 ppm α: 0 cpm βγ: 120 cpm
38 39	33143 0911 9-21	27 29 30	6	FIRM, GRAY (5Y 4/1), SILT-CLAY MIXTURE, TRACE OF SAND AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST	CL	1.25	Hnu: 0.0 ppm α: 0 cpm βγ: 120 cpm
40	33144 0926 9-21	4 12 17	10	39.4 HARD, DARK GRAY (5Y 4/1), SILTY CLAY; SOME PEBBLES, LOW PLASTICITY, DRY TO SLIGHTLY MOIST 39.4	CL	3.0	Hnu: 0.0 ppm α: 0 cpm βγ: 100 cpm
				39.7 VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6), CLAYEY SILT, SOME SAND, VERY SLIGHT PLASTICITY, WET	SP	N/A	
41 42				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.	ML	0.25	Hnu: α: βγ:
43							Hnu: α: βγ:
44 45							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: 80-120 cpm

300

2438-3 86

FERNALD
RI/FS

2731

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 CONTAMINATION LEVEL	REMARKS
45	33145	50+	3	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6) WELL-GRADED GRAVELLY SAND, SOME SILT AND PEBBLES, SUBANGULAR TO SUBROUNDED, MOIST	SW	N/A	H_m = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80-90 cpm
46	1514	50/5.in					
	9-21						
47							
48							
49							
50							
50	33146	23	15	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6) POORLY GRADED FINE SAND, SOME SILT, TRACE OF PEBBLES, SUBROUNDED, MOIST.	SP	N/A	H_m = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80 cpm
	1552	41					
51	9-21	50/4					
52							
53							
54							
55	33147	19	14	DENSE, BROWNISH YELLOW (10YR 6/8), POORLY GRADED FINE SAND, SOME SILT, DRY TO SLIGHTLY MOIST 55.6	SP	N/A	H_m = 0.0 ppm α = 0 cpm $\beta\gamma$ = 80 cpm
	0649	30		55.6 VERY DENSE, GRAYISH BROWN (10YR 5/2), POORLY GRADED COARSER SAND, SOME SILT, TRACE OF CLAY, DRY	SP	N/A	
56	9-23	50/4					
57							
58							
59							
60							

NOTES

Drilling Contractor: PENN-DRILL CO.

Drilling Equipment: BUCYRUS BRIE

Driller: D. NEWMAN

ASST.: B. JOHNSON

BACKGROUND
H_m = 0.0 ppm
α = 0 cpm
$\beta\gamma$ = 80-110 cpm

301

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602 3.2.1	PROJECT NAME FMPC RI/FS		
BORING NUMBER 2648	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 CASING TO 60'			PAGE 5 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible] (PPM)	REMARKS
60	33148	6		DENSE, GRAY (10YR 5/1) WITH SOME DEEP DARK GRAY (10YR 3/1) MEDIUM GRADED SILTY SAND, TRACE OF SUBROUNDED PEBBLES, WET	SP TO SW	N/A	H_{av} = 0.0 PPM α = 0 cm $\beta\gamma$ = 100 cm
	1103	14	9				
61	9-23	23					
62							
63							
64							
65							
66	33149	29		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_{av} = 0.0 PPM α = 0 cm $\beta\gamma$ = 100-110 cm
	1405	41	14				
	9-23	49					
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_{av} = 0.0 PPM α = 0 cm $\beta\gamma$ = 100 cm
	1532	21	10				
71	9-23	28					
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_{av}: 0.0 PPM
α: 0 cm
$\beta\gamma$: 80-120 cm

302

FERNALD
RI/FS

2731

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: CABLE TOOLS			PAGE 6 OF 8

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED EXPLOSIVE VAPOR (PPM)	REMARKS
75	33151	11		DENSE, DARK GRAYISH BROWN (10YR 4/2) WELL GRADED GRAVELLY SAND, SOME SUBROUNDED PEBBLES, SILT; WET			
76	1610 9-23	17 29	12		SW	N/A	Hnu: 0.0 ppm α: 0 cpm βγ: 100
77							BLOW SANDS
79							
79	33152 1624 9-23	10 26 38	7	VERY DENSE, GRAYISH BROWN (10YR 5/2). POORLY GRADED COARSE SAND, SOME GRAVEL, SILT, WET	SP	N/A	Hnu: 0.0 ppm α: 0 cpm βγ: 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.: S JOHNSON

BACKGROUND

Hnu: 0.0 ppm

α: 0 cpm

βγ: 80-110 cpm

303

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2648	COORDINATES: NORTH 481,508.29 EAST 1,379,062.57	DATE: 09/18/90
GROUND ELEVATION: 582.5	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/25/90
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	33128	09/19/90 1426	5 5 5	7	LOOSE, GRAY (2.5 Y 5/0), SILT-CLAY-GRAVEL MIXTURE, SOME COBBLES, TRACE OF SAND, WET. LOOSE, GRAY (2.5 Y 5/0), CLAYEY-SILTY SAND, TRACE OF GRAVEL AND COBBLES, WET. L	SM SM CL	N/A N/A <.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-110cpm
18.0	33129	09/19/90 1439	5 7 9	18	LOOSE GRAY (2.5Y 5/0) SILTY CLAYEY SAND SOME GRAVEL WET.	SM	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-110cpm
19.5	33130	09/19/90 1447	2 3 5	18	VERY SOFT, GRAY (2.5 Y 5/0), GRAVELLY-SILTY CLAY, SOME SAND, LOW PLASTICITY, WET. SOFT GRAY (2.5 Y 5/0), SILTY CLAY, SOME PEBBLES AND GRAVEL, MEDIUM TO HIGH PLASTICITY, WET.	CL CH	<.25 0.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-120cpm
21.0	33131	09/20/90 0820	2 2 3	4	LOOSE, GRAY (5 Y 5/1), GRAVEL-SAND-CLAY MIXTURE, SOME SILT, COBBLES, MEDIUM PLASTICITY IN CLAY, WET.	GC	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-100 cpm
22.5	33132	09/20/90 0900	11 7 8	6	FIRM, GRAY (5 Y 5/1), GRAVELLY CLAY, SOME SILT AND COBBLES, LOW TO MEDIUM PLASTICITY, WET.	CL	1.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 90 cpm
24.0	33133	09/20/90 0938	4 5 14	10	FIRM, GRAY (5 Y 5/1), SILTY GRAVELLY CLAY, SOME COBBLES, LOW PLASTICITY, MOIST.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 80 cpm
25.5	33134	09/20/90 0943	7 6 7	8	FIRM, GRAY (5 Y 5/1), SILTY CLAY, TRACE OF GRAVEL AND COBBLES, LOW TO MEDIUM PLASTICITY, MOIST.	CL	1.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 110-112cpm
27.0	33135	09/20/90 1414	6 3 5	0	NO RECOVERY AFTER TWO (2) ATTEMPTS, COBBLE BLOCKING SPOON IN LOOSE MATERIAL - SAMPLED WASH MATERIAL.			Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
28.5	33136	09/20/90 1418	2 3 3	4	LOOSE, GRAY (5 Y 6/1), SILTY GRAVEL WITH LIMESTONE COBBLE FRAGMENTS, TRACE OF CLAY, MOIST TO WET.	GM	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
30.0	33137	09/20/90 1433	11 5 8	13	FIRM, GRAY (5 Y 6/1), SILTY CLAY, SOME SAND AND PEBBLES, LOW TO MEDIUM PLASTICITY, MOIST.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 110 cpm

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2648	COORDINATES: NORTH 481,508.29 EAST 1,379,062.57	DATE: 09/18/90
GROUND ELEVATION: 582.5	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/25/90
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 6

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	33138 09/20/90 1438	7 16 17	18	HARD, DARK GRAY (5 Y 4/1), SILTY CLAY, SOME SAND AND PEBBLES, TRACE OF LIMESTONE COBBLE, LOW PLASTICITY, SLIGHTLY MOIST.	CL	3.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 80 cpm
33.0	33139 09/20/90 1547	26 42 50	18	VERY HARD, DARK GRAY (5 Y 4/1), SILTY CLAY, SOME SAND AND PEBBLES, COBBLE FRAGMENT, ROOT PARTICLE, LOW PLASTICITY, DRY T	CL	>4.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-120cpm
34.5	33140 09/20/90 1611	14 22 33	18	HARD, DARK GRAY (5 Y 4/1), SILTY CLAY, SOME SANDAND PEBBLES, COBBLE FRAGMENT, ROOT PARTICLE, LOW PLASTICITY, DRY TO SLIGHTL	CL	4.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
36.0	33141 09/20/90 1614	23 57	12	VERY HARD DARK GRAY (5Y 4/1) SILTY CLAY SOME SAND AND PEBBLES COBBLE FRAGMENT ROOT PARTICLE LOW PLASTICITY DRY TO SLIGHTLY M	CL	>4.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
37.5	33142 09/21/90 0906	13 17 24	18	VERY HARD, DARK GRAY (5 Y 4/1), SILTY CLAY, SOME SAND AND PEBBLES, COBBLE FRAGMENT, ROOT PARTICLE, LOW PLASTICITY, DRY T H R	CL CL	>4.0 3.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 120 cpm
39.0	33143 09/21/90 0911	27 29 30	6	FIRM, GRAY (5 Y 4/1), SILT-CLAY MIXTURE, TRACE OF SAND AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST.	CL	1.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 120 cpm
40.5	33144 09/21/90 0926	4 12 17	10	HARD, DRK GRAY (2.5 Y 4/0), SILTY CLAY, SOME PEBS, LOW PLAS, DRY TO SLIGHTLY MOIST, MED DENSE, YELLOWISH BROWN (10 YR 5/6),	CL	3.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
45.0							

NOTES:
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2648	COORDINATES: NORTH 481,508.29 EAST 1,379,062.57	DATE: 09/18/90
GROUND ELEVATION: 582.5	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/25/90
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	33145	09/21/90 1519	50		3	VERY DENSE, DARK YELLOWISH BROWN, (10 YR 4/6), WELL-GRADED GRAVELLY SAND, SOME SILT AND PEBBLES, SUBANGULAR TO SUBROUNDED	SW	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-90 cpm
50.0									
51.5	33146	09/21/90 1552	23 41 50		15	VERY DENSE, DARK YELLOWISH BROWN (10 YR 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
55.0									
56.5	33147	09/23/90 0849	19 30 50		14	DENSE, BROWNISH YELLOW (10 YR 6/8), POORLY GRADED FINE SAND, SOME SILT, DRY TO SLIGHTLY MOIST. VERY DENSE GRAYISH BROWN (10 YR 5/2), POORLY GRADED COARSER SAND, SOME SILT, TRACE OF CLAY, DRY.	SP SP	N/A N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80 cpm
60.0									

NOTES:
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PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2648	COORDINATES: NORTH 481,508.29 EAST 1,379,062.57	DATE: 09/18/90
GROUND ELEVATION: 582.5	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/25/90
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 6

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	33148	09/23/90 1103	6 14 23	9	DENSE, GRAY (10 YR 5/1) WITH SOME VERY DARK GRAY (10 YR 3/1), MEDIUM GRADED SILTY SAND, TRACE OF SUROUNDED PEBBLES, WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 100 cpm
65.0								
66.5	33149	09/23/90 1405	29 41 49	14	VERY DENSE, YELLOWISH BROWN (10 YR 5/4), POORLY GRADED COARSE SAND, SOME SUBANGULAR PEBBLES, SILT, TRACE OF CLAY, MOIST TO W	SP	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 100-110cpm
70.0								
71.5	33150	09/23/90 1532	6 21 28	10	DENSE, YELLOWISH BROWN (10 YR 5/4), WELL GRADED GRAVEL, SAND, PEBBLE MIXTURE, SUBROUNDED TO SUBANGULAR, SOME SILT, WET.	GW	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 100 cpm
75.0								

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2648	COORDINATES: NORTH 481,508.29 EAST 1,379,062.57	DATE: 09/18/90
GROUND ELEVATION: 582.5	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 09/25/90
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 6

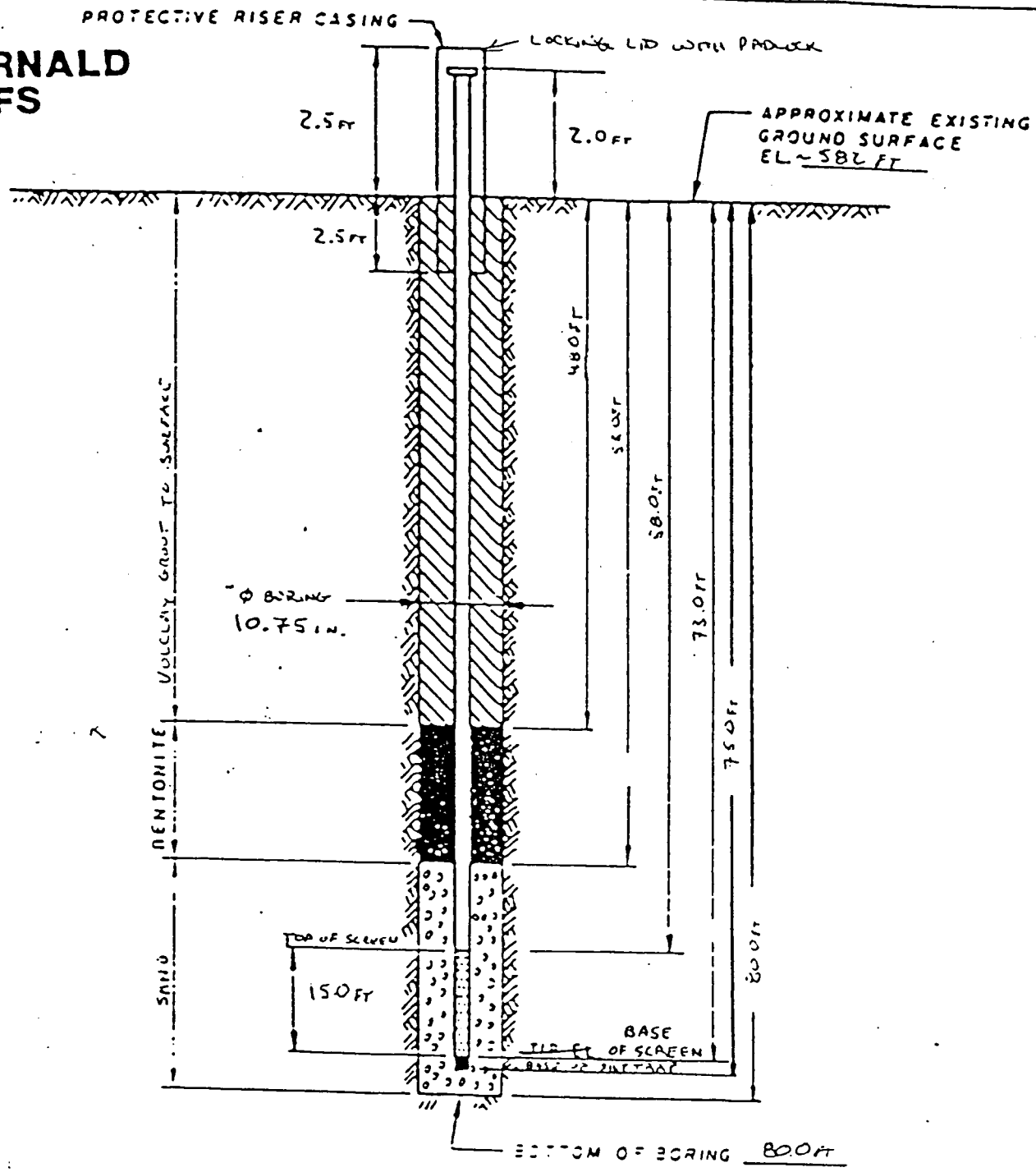
DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
76.5	33151	09/23/90	1610	11 17 29		12		DENSE, DARK GRAYISH BROWN (10 YR 4/2) WELL GRADED GRAVELLY SAND, SOME SUBROUNDED PEBBLES, SILT, WET.	SW	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm
78.5											
80.0	33152	09/23/90	1624	10 26 38		7		BLOW SANDS AT 76.5 - 78.5 FT. NO SAMPLE TAKEN. 78.5 FT. - VERY DENSE, GRAYISH BROWN (10 YR 5/2), POORLY GRADED COARSE SAND, SOME GRAVEL, SILT, WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100 cpm

BOTTOM OF BORING 80.0

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

2731

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY | APPROVED BY

DRAWN BY | 9-25-90

NOTES:

1. RISER PIPE 154.0 IN I.D SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN 154.0 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

309

2731

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 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:				
Volcly 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		310	

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

REMARKS TWO (2) BUCKETS OF BENTONITE POURED AROUND PROTECTIVE CASING. BLOW SANDS TO 75.0 FT.

WELL 2649

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 2649	COORDINATES:		
ELEVATION:	GWL Depth 51.05 Date/Time 10-14-90 @ 0400	DATE: 10-16-90	
ENGINEER/GEOLOGIST: M. SWANSON	Depth 51.28 Date/Time 10-14-90 @ 0750	DATE STARTED: 10-16-90	
DRILLING METHODS: CABLE TOOL		DATE COMPLETED: 10-19-90	
		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) BROWN CLAYEY SILT, SOME SAND, SLIGHT PLASTICITY, DRY 0.5	OL	0.25	Hnu = 0.0 ppm α = 0 cpm βγ = 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	4 7 8	18	HARD, DARK BROWN (10YR 3/3), SANDY SILTY CLAY, LOW PLASTICITY, DRY 3.2	CL	3.0	Hnu = 0.0 ppm α = 0 cpm βγ = 180-220 cpm
3							
4	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	Hnu = 0.0 ppm α = 0 cpm βγ = 140-260 cpm
5	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	Hnu = 0.0 ppm α = 0 cpm βγ = 180-220 cpm
6	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	Hnu = 0.0 ppm α = 0 cpm βγ = 140-240 cpm
8	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	Hnu = 0.0 ppm α = 0 cpm βγ = 120-160 cpm
10	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	Hnu = 0.0 ppm α = 0 cpm βγ = 140-200 cpm
12	33201 1530 10-16-90	2 3 3	18	SOFT, OLIVE GRAY (5Y 5/2), SILTY CLAY, SOME PEBBLES, MEDIUM PLASTICITY, MOIST	CL	.50	Hnu = 0.0 ppm α = 0 cpm βγ = 140-240 cpm
14	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	Hnu = 0.0 ppm α = 0 cpm βγ = 180-230 cpm
16	33203 1544 10-16-90	12 19 23	18	FIRM, OLIVE GRAY (5Y 5/2), CLAY, SOME SILT, HIGH PLASTICITY, MOIST 16.2	CH	1.25	Hnu = 0.0 ppm α = 0 cpm βγ = 120-220 cpm
18				FIRM, MOTTLED OLIVE GRAY (5Y 5/2) AND DARK YELLOWISH BROWN (10YR 4/6), SILTY CLAY, LOW PLASTICITY, MOIST	CL	.75	

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
Hnu	A01344	0.0 ppm
α	ASI #3	0 cpm 312
βγ	ASI #10	120-260 cpm

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	33204	3	18	FIRM, OLIVE GRAY (5Y 4/2), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST, TRACE OF ORGANICS AT 16.0FT	CL	1.5	H_{no}: 0.0 PPM
16	0846 10-17-90	5 6		16.5			α: 0 CPM
							$P\gamma$: 120-180 CPM
17	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_{no}: 0.0 PPM
							α: 0 CPM
							$P\gamma$: 120-160 CPM
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_{no}: 0.0 PPM
							α: 0 CPM
							$P\gamma$: 100-200 CPM
20	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_{no}: 0.0 PPM
21							α: 0 CPM
							$P\gamma$: 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_{no}: 0.0 PPM
							α: 0 CPM
							$P\gamma$: 80-160 CPM
23	33209 0958 10-17	7 10 23	18	FIRM, OLIVE GRAY (5Y 5/2), SILTY CLAY, LOW PLASTICITY, MOIST 22.9	CL	2.0	H_{no}: 0.0 PPM
				VERY SOFT, VERY DARK GRAY (5Y 3/1), CLAYEY SILT, SOME SAND, NO PLASTICITY, TRACE ORGANICS, DRY 23.8	ML	0.25	α: 0 CPM
24				YELLOWISH BROWN (10YR 5/4), MEDIUM DENSE, SILTY SAND SOME GRAVEL, SLIGHTLY MOIST 24.3	SM	N/A	$P\gamma$: 140-220 CPM
25	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_{no}: 0.0 PPM
							α: 0 CPM
							$P\gamma$: 100-180 CPM
26	33211 1048 10-17	12 28 40	18	SOFT, OLIVE (5Y 5/4), SAND CLAY MIXTURE, SOME SILT, SLIGHT PLASTICITY LOW CLAY, SLIGHTLY MOIST 27.2	SC	.50	H_{no}: 0.0 PPM
27							α: 0 CPM
							$P\gamma$: 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_{no}: 0.0 PPM
							α: 0 CPM
							$P\gamma$: 100-200 CPM
29				AQUIFER WILL BE SAMPLED EVERY 5 FT, STARTING AT 35 FT, TILL SATURATED ZONE IS ENCOUNTERED, 15.0 MORE FEET WILL THEN BE SAMPLED.			
30							

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: BUCYRUS ERIE

Driller: C. COULTER

ASST. B. JOHNSON

BACKGROUND

H_{no}: 0.0 PPM

α: 0 CPM

$P\gamma$: 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. JOHNSON	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 GROUNDWATER LEVEL	REMARKS
30							
31							
32							
33							
34							
35							
36	SS213 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_{no} = 0.0 ppm α = 0 cpm $\beta\gamma$ = 120-240 cpm
37							
38							
39							
40	SS214 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_{no} = 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_{no} : 0.0 ppm 314

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 CONDITIONS (PID)	REMARKS
45	332 50 1452 10-17	5 8 14	7	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4), WELL GRADED SAND, SOME SILT, TRACE OF PEBBLES, MOIST	SW	N/A	H_{av} = 0.0 ppm α = 0 cm $P\gamma$ = 100-140 cm
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_{av} = 0.0 ppm α = 0 cm $P\gamma$ = 60-140 cm
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_{av} = 0.0 ppm α = 0 cm $P\gamma$ = 80-160 cm
56							
57							
58							
59							
60							

NOTES

Drilling Contractor: PEND. DRILL CO

Drilling Equipment: BUCYRUS ERIE

Driller: C. COULTER

ASST.: B. JOHNSON

ISA BACKGROUND

H_{av} = 0.0 PPM

α = 0 cm

$P\gamma$ = 120-240 cm

FERNALD
RI/FS

2731

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 [illegible]	REMARKS
60	33253 1619 10-17	3 6 6	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							
62							
63							
64							
65	33254 0840 10-18-90	5 7 11	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							
67							
68							
69	33255 0925 10-18	4 10 14	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
70				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

316

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2649	COORDINATES: NORTH 481,167.42 EAST 1,378,125.73	DATE: 10/16/90
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/16/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 10/19/90
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	33194	10/16/90 1340	2 3 3	18	VERY SOFT, DARK YELLOWISH BROWN (10 YR 4/6), ORGANIC CLAYEY SILT, SOME SAND, SLIGHT PLASTICITY, DRY. FIRM, DARK BROWN (10 YR 3/3), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, DRY.	OL CL	<.25 2.5	Hnu= 0.0 ppm α = 0 cpm Bγ = 180-260cpm
3.0	33195	10/16/90 1346	9 7 8	18	FIRM, DARK BROWN (10 YR 3/3), SILTY CLAY, TRACE OF SAND, LOW PLASTICITY, DRY. HARD, DARK BROWN (10 YR 3/3), SANDY SILTY CLAY, LOW PLASTICITY, DRY.	CL CL	2.5 3.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 180-220cpm
4.5	33196	10/16/90 1352	9 15 8	18	HARD, DARK BROWN (10 YR 3/3), SANDY SILTY CLAY, LOW PLASTICITY, DRY. HARD, DARK GRAYISH BROWN (10 YR 4/2), SILTY CLAY, SOME PEBBLES AND GRAVEL, TRACE OF SAND, LOW PLASTICITY, DRY.	CL CL	3.0 3.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 140-220cpm
6.0	33197	10/16/90 1355	5 6 7	3	FIRM, VERY DARK GRAY (10 YR 3/1), SANDY SILTY CLAY, SOME COBBLES, LOW PLASTICITY, DRY.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 180-220cpm
7.5	33198	10/16/90 1401	6 15 19	3	HARD, VERY DARK GRAY (10 YR 3/1), SILTY CLAY, SOME COBBLES AND GRAVEL, LOW PLASTICITY, DRY.	CL	2.5	Hnu= 0.0 ppm α = 0 cpm Bγ = 140-240cpm
9.0	33199	10/16/90 1407	5 7 8	10	FIRM, OLIVE GRAY (5 Y 4/2), SILTY CLAY, TRACE OF GRAVEL, LOW PLASTICITY, DRY.	CL	1.75	Hnu= 0.0 ppm α = 0 cpm Bγ = 120-180cpm
10.5	33200	10/16/90 1415	6 9 16	12	FIRM, OLIVE GRAY (5 Y 5/2), SILTY CLAY, SOME GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST TO MOIST.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm Bγ = 140-200cpm
12.0	33201	10/16/90 1530	2 3 3	18	SOFT, OLIVE GRAY (5 Y 5/2), SILTY CLAY, SOME PEBBLES, MEDIUM PLASTICITY, MOIST.	CL	.50	Hnu= 0.0 ppm α = 0 cpm Bγ = 140-240cpm
13.5	33202	10/16/90 1537	3 5 6	6	FIRM, OLIVE GRAY (5 Y 5/2), SILTY CLAY, TRACE OF PEBBLES, SAND, MEDIUM PLASTICITY, MOIST TO WET.	CL	.60	Hnu= 0.0 ppm α = 0 cpm Bγ = 180-250cpm
15.0	33203	10/16/90 1544	12 19 23	18	FIRM, OLIVE GRAY (5 Y 5/2), CLAY, SOME SILT, HIGH PLASTICITY, MOIST. FIRM, MOTTLED OLIVE GRAY (5 Y 5/2), AND DARK YELLOWISH BROWN (10 YR 4/6), SILTY CLAY, MEDIUM PLASTICITY, MOIST.	CL	.75	Hnu= 0.0 ppm α = 0 cpm Bγ = 120-220cpm

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2649	COORDINATES: NORTH 481,167.42 EAST 1,378,125.73	DATE: 10/16/90
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/16/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 10/19/90
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	33204	10/17/90 0846	3 5 6	18	FIRM, OLIVE GRAY (5 Y 4/2), CLAY, SOME SILT AND GRAVEL, LOW TO MEDIUM PLASTICITY, MOIST, TRACE OF ORGANICS AT 16.0 FT.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-180cpm
18.0	33205	10/17/90 0855	5 10 11	10	MEDIUM DENSE, OLIVE GRAY (5 Y 4/2), CLAYEY GRAVEL, SOME SILT, TRACE OF SAND, MOIST TO WET.	GC	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-160cpm
19.5	33206	10/17/90 0935	6 6 7	18	HARD, DARK GRAY (5 Y 4/1), CLAY, SOME SILT AND PEBBLES, LOW PLASTICITY, SLIGHTLY MOIST. FIRM, DARK TO VERY DARK GRAY (5 Y 4/1 TO 3/1), SILT-CLAY MIXTURE, TRACE OF SAND AND GRAVEL, LOW PLASTICITY, DRY TO SLIG	CL	2.5	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-200cpm
21.0	33207	10/17/90 0943	5 6 7	18	FIRM, DARK TO VERY DARK GRAY (5 Y 4/1 TO 3/1), SILT-CLAY MIXTURE, TRACE OF SAND AND GRAVEL, LOW PLASTICITY, DRY TO SLIG	CL	1.25	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-160 cpm
22.5	33208	10/17/90 0951	3 7 8	3	VERY SOFT, VERY DARK GRAY (5 Y 3/1), CLAYEY SILT, SLIGHT PLASTICITY, SLIGHTLY MOIST.	ML	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-160 cpm
24.0	33209	10/17/90 0958	7 10 23	18	FIRM, OLIVE GRAY (5 Y 5/2), SILTY CLAY, LOW PLASTICITY, MOIST. VERY SOFT, VERY DARK GRAY (5 Y 3/1), CLAYEY SILT, SOME SAND, NO PLASTICITY, TRACE ORGANICS, DRY. Y	CL ML SM	2.0 <.25 N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 140-220cpm
25.5	33210	10/17/90 1013	22 40 50	18	YELLOWISH BROWN (10 YR 5/4), MEDIUM DENSE, SILTY SAND, SOME GRAVEL, SLIGHTLY MOIST. VERY DENSE, YELLOWISH BROWN (10 YR 5/6), WELL GRADED SILTY SAND, TRACE OF PEBBLES, DRY.	SW	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-180cpm
27.0	33211	10/17/90 1048	12 28 40	18	VERY DENSE, YELLOWISH BROWN (10 YR 5/6), WELL GRADED SILTY SAND, TRACE OF PEBBLES, DRY. SOFT, OLIVE (5 Y 5/4), SAND-CLAY MIXTURE, SOME SILT, SLIGHT PLASTICITY IN CLAY, SLIGHTLY MOIST.	SW SC	N/A .50	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-180cpm
28.5	33212	10/17/90 1116	12 50	9	SOFT, OLIVE (5 Y 5/4), SAND-CLAY MIXTURE, SOME SILT, SLIGHT PLASTICITY IN CLAY, SLIGHTLY MOIST. VERY DENSE, YELLOWISH BROWN (10 YR 5/6), WELL GRADED COARSE SAND, SOME SILT AND PEBBLES, DRY.	SC SW	.50 N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-200cpm
35.0								
36.5	33213	10/17/90 1349	16 21 38	11	VERY DENSE, DARK YELLOWISH BROWN (10 YR 4/6) POORLY GRADED COARSE SAND, SOME PEBBLES AND GRAVEL, TRACE OF SILT, MOIST.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 120-240cpm
40.0								
41.5	33214	10/17/90 1417	10 12 22	12	DENSE, DARK YELLOWISH BROWN (10 YR 4/6) POORLY GRADED FINE SILTY SAND, SOME PEBBLES, SLIGHTLY MOIST.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-140 cpm
45.0								

318

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2649	COORDINATES: NORTH 481,167.42 EAST 1,378,125.73	DATE: 10/16/90
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/16/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 10/19/90
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 4

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	33250	10/17/90 1452	5 8 19	7	MEDIUM DENSE, YELLOWISH BROWN (10 YR 5/4), WELL GRADED SAND, SOME SILT, TRACE PEBBLES, MOIST.	SW	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 100-140cpm
50.0								
51.5	33251	10/17/90 1530	7 11 29	6	DENSE, BROWN (10 YR 5/3) POORLY GRADED COARSE SAND, TRACE OF SILT, MOIST TO WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-140 cpm
55.0								
56.5	33252	10/17/90 1552	6 7 10	5	MEDIUM DENSE, YELLOWISH BROWN (10 YR 5/4), WELL GRADED SILTY SAND, WET.	SW	N/A	Hnu= 0.0 ppm α = 0 cpm βΓ = 80-160 cpm
60.0								

NOTES:
ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 2649	COORDINATES: NORTH 481,167.42 EAST 1,378,125.73	DATE: 10/16/90
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 10/16/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 10/19/90
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 4

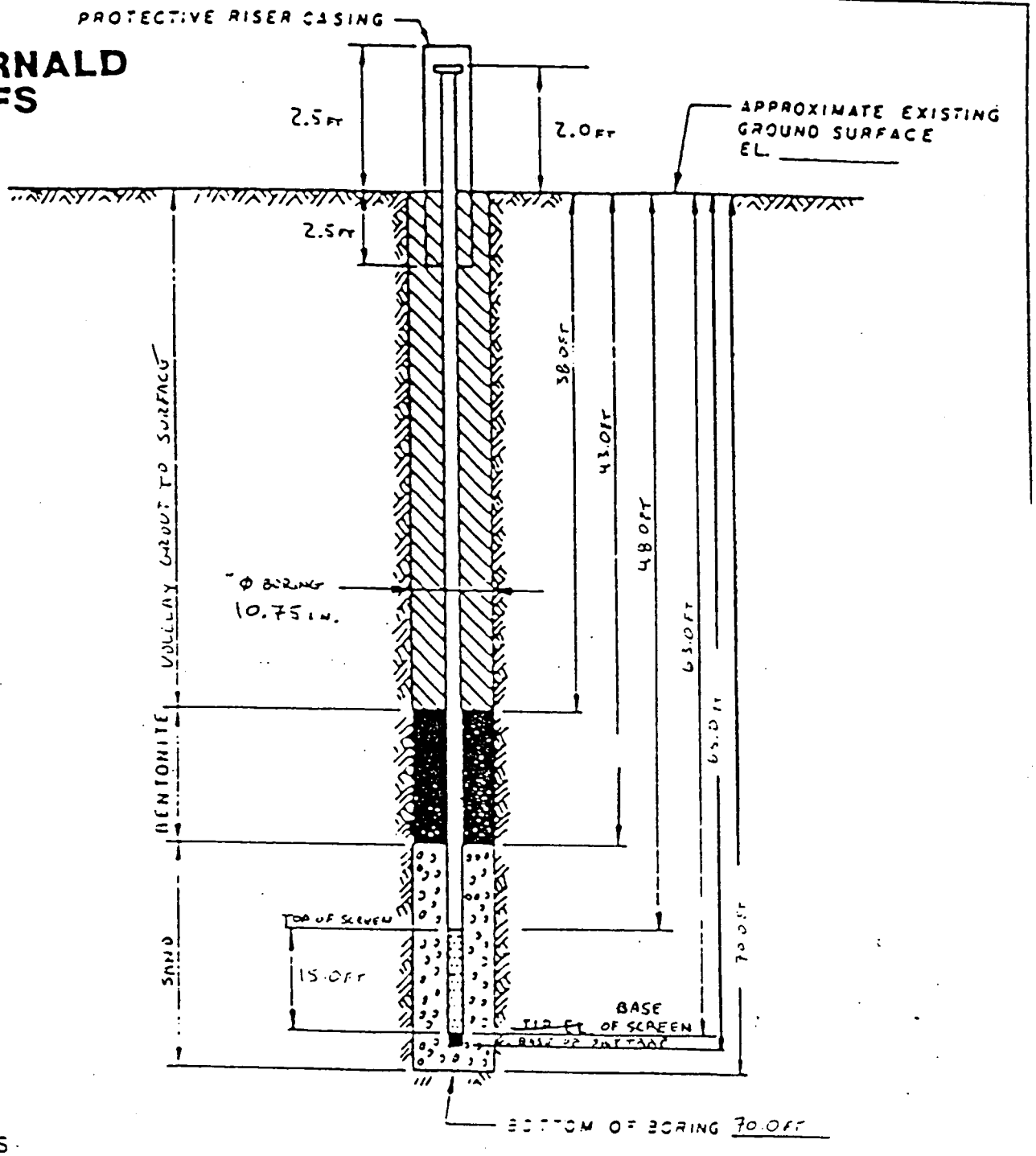
DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	33253	10/17/90 1619	3 6 6	14	MEDIUM DENSE, YELLOWISH BROWN (10 YR 5/6), POORLY GRADED SILTY SAND, SOME PEBBLES, WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 120-180cpm
65.0								
66.5	33254	10/18/90 0840	5 7 11	13	MEDIUM DENSE, YELLOWISH BROWN (10 YR 5/4), POORLY GRADED FINE SAND, SOME SILT, WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 120-200cpm
68.5								
70.0	33255	10/18/90 0925	4 10 19	12	MEDIUM DENSE, YELLOWISH BROWN (10 YR 5/6), POORLY GRADED SILTY SAND, TRACE OF PEBBLES, WET.	SP	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 110-200cpm

BOTTOM OF BORING 70.0

NOTES:
DRILLING, SAMPLING ENDED AT 70.0 FT. BOTTOM OF BORING AT 70.0 FT. ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS IDENTIFIED USING MUNSELL COLOR CHARTS.

2731

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

10-20-90

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 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 SECTION W/ WELDED SILTTRAP, 5 10 FT RISERS

INSTALLATION DETAILS
MONITORING WELL #2644

PREPARED FOR
FERNALD RI/FS

321

1/7

2731

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 _____ DATE _____
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			

322

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 PIEZOMETER CASING

APPENDIX C

WELL CONSTRUCTION INFORMATION FOR THE 3000-SERIES MONITORING NETWORK

WELL 3024

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RE/B		
BORING NUMBER: ~~324~~ 3024	COORDINATES:		DATE: 9-14-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-14-87 0 1330
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 10/3/87
DRILLING METHODS: Cable Tool - Split Spoon Samples			PAGE 1 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5 1.0'	S 07089	5 11 10	12"	Medium stiff, yellowish-brown clay with some sand, moist	CL		Background Ins $\gamma\beta$ = 40-60 α = 0 hrs = 0 Sample Caught (1345)
2' 3'	S 07090	12 17 19	24"	Stiff, dark yellowish-brown silty sand with some fine gravel moist	SM		Background Levels (1400)
4'	S 07091	12 25 32	18	Medium dense dark yellowish-brown silty sand with some gravel moist	SP		Background Levels (1440)
				4.3' Coarse Gravel - brown-brown	GW		
5' 6'	S 07092	22 12 15	14"	Medium dense dark yellowish-brown silty sandy gravel, moist.	GC		Background Levels
				5.5' Stiff yellowish-brown silty clay, moist	CL		(1445)
7'	S 07093	10 21 23	16"	Dense yellowish-brown silty gravel grading downward to a:	GC		Background Levels
				7' Hard dark gray clay with a trace of coarse sand and gravel moist 7'	CL	4.5	(1545)
8' 9'	S 07095	16 19 23	12"	Very stiff gray clay with a trace of fine gravel (slightly damp) moist.	CL	4.0	Background Levels End of Day 9-14-87 (1625)
10'	S 07096	6 11 15	6"	Medium dense, grayish-brown gravel moist.	GC		Start of Day 9-15-87 gravel is actually very heavily consolidated Background (0830)
11' 12'	S 07097	4 5 8	12"	Medium stiff olive-gray clay with a trace of fine gravel, moist.	CL	1.0	Background Lost entire first sample and had to use spring rubber (0935)
13	S 07098	6 11 17	18"	13.2' Loose gray, fine sand, moist. 13.2'	CL SM	.75	Background (0942)
14' 15'	S 07100	2 2 3	18"	Soft olive-gray clay with a trace of fine gravel, moist	CL	.50	Background (1030)

NOTES

Background Levels 9-14-87 $\gamma\beta$ = 40-140 cpm α = 0 hrs = 0

Background Levels 9-15-87 $\gamma\beta$ = 40-80 cpm α = 0 hrs = 0

Used 40 gallons of H_2O 9-14-87

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		Task 3.2
BORING NUMBER: ~~324~~ 326	COORDINATES:	DATE: 9-15 & 9-16-87	
ELEVATION:	GWL: Depth 11.2 Date/Time 9-15 @ 1450	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 11.3 Date/Time 9-15 / 1600	DATE COMPLETED: 10-3-87	
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 11	

2731

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16'	S 07101	6 6 9	18"	Soft, olive gray clay with a trace to some sand and gravel, moist	CL	.50	Background levels (1040)
17'	S 07102	2 3 12	6"			.50	Background levels (1350)
18'				18.2' Soft olive gray clay, moist. 18.2'		.50	
19'	S 07103	20 45 40	18"	Very dense gray fine gravel moist	GP		Background levels (1355)
20'	S 07104	46 30 27	18"	19.8 Dark yellowish-brown coarse sand 19.8	SW	–	Background
21'				Very dense gray coarse gravel, moist Wet	GP	–	End of Day 9-15-87 (1530)
22'	S 07105	16 33 47	18"	21.5 21.5 21.8 Very dense gray fine to medium sand moist 21.8 22 22	SC	–	Start Day 9-16-87 Sand is actually medium dense
				Hard olive-gray clay, trace of gravel moist.	CL	>4.0	(0905)
23'	S 07106	14 16 22	18"	Dense gray unconsolidated gravel, moist. grading downward to a 23.5 hard gray clay, some gravel moist 23.5	GW		Background (1005)
24' 25'	S 07107	20 50 (3")	12"	Medium dense grayish-brown fine to medium sand with trace of large quartz rock fragments Wet	SP		Background Split spoon jammed with hole cuttings (1420)
26' 27'	S 07108	8 16 30	18"	Hard, dark gray olive-gray clay with some sand and fine gravel	CL	>4.5	Background (1440)
28	S 07110	35 52 30	18"	27.5 Very stiff, grayish-brown silty clay 27.5	ML	3.5	Background
				28 Very hard gray clay 28	CL	>4.5	(1500)
29' 30'	S 07111	46 50 –	12"	Very stiff, gray clay with lignite-like fragments ?? and a trace of gravel	CL		Background End Day 9-16-87 (1520)

NOTES: Background levels 9-15-87 $\gamma\beta$ = 40-80 cpm α = 0 $h\gamma$ = 0

Background levels 9-16-87 $\gamma\beta$ = 40-80 cpm α = 0 $h\gamma$ = 0

Water level 9-15-87 @ 1600 was 11.3'

" " 9-16-87 @ 0800 " 9.3'

There appears to be a substantial aquifer at 18' - 21.5'

326

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602	PROJECT NAME FMPC RI/FS		
BORING NUMBER: ~~324~~ 3024	COORDINATES:	DATE 9-17-87	
ELEVATION:	GWL: Depth 41.2 Date/Time 9-17-87 @ 1730	DATE STARTED 9-14-87	
ENGINEER/GEOLOGIST B. Dunning	Depth Date/Time	DATE COMPLETED 10-3-87	
DRILLING METHODS: Cable Tool		PAGE 3 OF 11	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (2731) Start Day 9-17-87
30'							
31'	S 07112	12 20 24	6"	Stiff olive gray clay with a trace of fine gravel moist	CL	2.0	Background Levels (1045)
32'	S 07113	8 11 16	18"	Very stiff gray clay with trace of gravel, moist			Background Levels - (B.G.) (1050)
33'							
34'	S 07114	8 25 37	24"	33.7 Stiff gray clay moist 33.7; 34 Very stiff olive-yellow clay moist 34; Very dense yellow-brownish sand moist		1.5; 4.0	B.G. (1105)
35'	S 07115	23 33 36	12"	Very dense yellowish-brown Sand moist.	SW	-	B.G. Sand is moist, but not saturated. (1400)
36'							
37'	S 07116	50 - -	9"	37' Medium stiff brownish-yellow silt clayey moist 37'	SM	-	B.G. (1530)
38'	S 07117	9 24 42	13"	Very dense yellowish-brown, well sorted, fine grain sand Moist, but basically dry			B.G. Very friable Sand Actually (1555)
39'							
40'					SW	-	Begin catching 5' samples. Loose Unconsolidated Sand
41'							
42'							
43'							
44'							
45'	S 07118	25 43 45	18"				B.G. Sample 44'-45.5' End Day 9-17-87 1715

NOTES Background Levels for 9-17-87 γB = 40-60 cpm. α = 0 hnu = 0

327

402-1 L.88

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS	
BORING NUMBER: 05 ~~9329~~ 3034	COORDINATES:	DATE: 9-18-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool		PAGE 4 OF 11

2731

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (mm)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45'	07118	25 43 45	18"	Sand - As Described above	SW		End day 9-17-87 (1715)
46'				Very dense yellowish-brown well sorted fine grain sand moist.			Start day 9-18-87
47'							
48'							
49'					SW	-	
50'							
51'	S 07119	15 20 21	18"	Dense yellowish-brown, well sorted, damp, but not wet sand			B.S. Loose unconsolidated Sand (1345)
52'							
53'							
54'							
55'							
56'	S 07120	13 27 (4") 50	12"	55.8 Loose grayish brown coarse sand, moist 56.1 Hard gray clay moist.	CL		B.S. (1415)
57'	S 07121	13 23 43	12"	Very dense gray, salt & pepper looking, medium to coarse grain sand with trace of fine gravel. moist	SW		B.S. Sand is actually loose & unconsolidated (1440)
58'							
59'							
60'							

NOTES

328

402-11-88

RI/FS

3/4/?

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: ~~3024~~ 3024	COORDINATES:	DATE: 9-19-87
ELEVATION:	GWL: Depth 51.6 Date/Time 9-19/1030	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 62.6 Date/Time 9-19/1730	DATE COMPLETED: 10-3-87
DRILLING METHODS:		PAGE 5 OF 11

2731

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	S 07122	13 25 28	18"	Very dense, dark gray coarse sand with some fine gravel WET	SW		Background Geo gr 11-18-87 (1515)
62							Geo gr 9-19-87
63							
64	S 07123	6 3 3	14"	Loose grays, lightly salt & peppered looking fine to coarse grain sand with a trace of gravel WET	SW		Borehole filled down to 70'. Blow sand came up hole to 63' where this sample was taken. 7.5' Levels (1545)
65							
66	S none	5 2 2	0"	Sand pump indicates very loose, dark-brown unconsolidated sand, WET	SM ?		Blow Sand coming into hole. Could not obtain a sample even with retriever Geo gr 9-19-87
67							Start day 9-20-87
68							
69							
70							6" Temporary Casing driven to 80' to cut off blow sand.
71	S 07124	6 14 21	12"	Dense, gray coarse sand with some fine & coarse gravel. WET	SP		Background Levels Only (1000)
72							
73							Bailer - Sand Pump bringing up large cobbles i.e. 1/2" x 2/2" large diameter - : 1/2"
74							
75							

NOTES Background Levels 9-19-87 $\gamma\beta$ = 40-60 α = 0 mw = 0
" " 9-20-87 $\gamma\beta$ = 40-70 α = 0 mw = 0

402-11-84

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: ~~3224~~ 3024	COORDINATES:	DATE: ~~9-14-87~~ & 9-20	
ELEVATION:	GWL: Depth 61.5' Date/Time 9-20/0900	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B Dunning	Depth Date/Time	DATE COMPLETED: 10-3-87	
DRILLING METHODS: Cable Tool		PAGE 6 OF 11	

DEPTH (FT) 75'	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (Fmm)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
76'	S 07125	16 31 46	14"	Very dense grayish-brown gravel (Color: 2.5 Y, 5/2) and Coarse Sand See Remarks →	GP		Background levels (B.S.) (1140)
77' 78' 79' 80'							Sand pump collecting large carbonate cobbles & gravel rocks with fossil Inclusions
81'	S 07126	2 6 16	18"	Medium dense, gray, very coarse grain sand with some fine gravel S.B. / Medium dense grayish-brown fine gravel with some coarse gravel S.B.	SW / GW		Background levels (1350)
82' 83' 84' 85'							Drove 10' Temporary casing to 90' Sand Pump bringing up fine to coarse gravel
86'	S 07127	20 50 (3")>50	12"	Very dense, dark gray, sandy gravel with fine to coarse sand (Color: 2.5 Y, N4/) & large cobbles 4.1' x 2" x 1½".	GP		Large rock jammed in Split Spoon: Actually a large gravel. Background levels (1400)
87' 88' 89' 90'							

NOTES: Background levels 9-20-87 : $\gamma\beta$ = 40-75 cpm α = 0, β_{max} = 0

602-11-88

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: BO 3024	COORDINATES:	DATE: 9-20 & 9/21/87
ELEVATION:	GWL: Depth 52' Date/Time 9-20/1400	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 52' Date/Time 9-21/0730	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool		PAGE 7 OF 11

2731

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (")	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90'							
91'		2 2 / 5 3 / 8 4	0"	Sand Pump collecting fine grain sand	SW		Lost Sample both times even with Catcher In
92'							End 9-20-87 Start 9-21-87
93'				93 ± ? — — — ? — — — ?	?	— —	Approximate depth of material change.
94'							
95'				Very loose tan. fine gravel with coarse sand (10YR 3/1)	SW		
				95.5 Coarse gray fine to coarse gravel (2.5 Y N5) 95.5	SW		
96'	S 07128	18 / 29 / 36	24"	96.25 Very dense, grayish-brown silty sand moist. 96.25 (Color: 2.5 Y, 5/2)	SM		Background levels 1350
97'							
98'							Sand pump quit sucking up sand. Sample Taken.
99'							
100'	S 07129	17 / 13 / 20	18"	Very stiff, dark gray clay moist (Color: 5 Y, 4/1)	CL	3.5	Background levels 1500'
101'							
102'				— — ? — — ? — — ? — —	-?-		
103'							
104'							
105'							

NOTES: Background Levels 9-21-87 JB = 40-80 cpm, x = 0, hum = 0

331

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC 91 / FS		
BORING NUMBER: ~~3324~~ 3034	COORDINATES:	DATE: 9-22-87	
ELEVATION:	GWL: Depth 52' Date/Time 9-21 / 1700	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: B. Dunning	Depth 64.5' Date/Time 9-22 / 1550	DATE COMPLETED: 10-3-87	
DRILLING METHODS: Cable Tool	92' 9-22 / 1715	PAGE 8 OF 11	

2731

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105'							
106'	S 07130	6 7 14	6"	Medium dense, grayish-brown fine grain, well graded, silty sand (Color: 2.5 Y, 5/2)	SM		Background levels (1620)
107'							End 9-21-87
108'							
109'							
110'							
111'	S 07131	6 10 11	12"				Background levels (1035)
				111.4' Soft, dark gray silty clay (Color: 5Y, 4/2) 111.4'	CL	~~.95~~ .5	
112'							
113'							Picking up clay on hammer 113'-115'
114'							
115'				Medium Stiff, Olive-Gray Clay (5Y, 4/2) 115.5'			
116'	S 07132	9 14 18	18"	Very Stiff, olive gray clay (Color: 5Y, 4/2) 115.5'	CL	.75 3.5	Background levels (1338)
117'							Casing Driven Down To 120'
118'							
119'							
120'							

NOTES: Background Levels 9-22-87: $\gamma\beta$ = 40-50 cpm, α = 0, β/γ = 0

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS	
BORING NUMBER: OB 9 324 3/124	COORDINATES:	DATE: 9/22 & 9/23/87
ELEVATION:	GWL: Depth 64.5' Date/Time 9-22/1550	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 92' Date/Time 9-22/1715	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool	75' 9-23/1750	PAGE 9 OF 11

2731

DEPTH 120' (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (Inches)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121'	S 07133	2 3 6	18"	Medium Stiff, gray (5Y, 5/1) to Olive gray (5Y, 5/2) clay with some fine gravel wet	CL		Moderately gravelly Sand Background levels (1650)
122'							End Day 9-22-87 Start Day 9-23-87
123'				123.5'			Noticed Sand & Gravel On Sticking On Hammer
124'							
125'							
126'	S 07134	27 17 10	6"	Medium Dense, Olive-~~Gray~~-Brown, fine to coarse gravel wet (Color: 2.5Y, 4/4)	GP		Seamed - Background Readings Only (1025)
127'							
128'							
129'							
130'							
131'	S 07135	18 33 19	5"	Very Dense, Olive-Brown Fine Gravel (Color: 2.5Y, 4/4) wet	GW		Background levels. Spoon Plugged with light Olive-brown carbonate rock fragment (2.5Y, 5/4) (1108)
132'							132' Drilling became more difficult Lithology Change
133'							
134'							Drilled Down To 135' & Sand blew In To 124' Drive 10" Csg to 140'
135'							

NOTES: Water Level checked at 1550, 9-22-87 when temporary Casing was at 121'.

Background Levels 9-23-87: $\gamma\beta$ = 40-120 cpm hnu = 0
α = 0

Smelled Some Brackish, Semi-Petroliferous odor observed at 125'
Hole Monitored with LLG & hnu. No Readings Detected.

333

402-11-86

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: ~~3224~~ 3024	COORDINATES:	DATE: 9-24-87 / 9-29-87
ELEVATION:	GWL: Depth 66.4' Date/Time 9-24/1245	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 58.5 Date/Time 9/29/0900	DATE COMPLETED: 10-3-87
DRILLING METHODS: Cable Tool		PAGE 10 OF 11

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135'							2731 End Day 9-23-87
136'		#1 #2 11 5 13 7 14 10	0"				Start Day 9-24-87 Attempted twice to obtain sample.
137'							Sand Pump indicates Fine Sand
138'							
139'							Drilled Down to 140', but sand blew in to 135'. Drive Csg to 145'
140'		#1					
141'	S 07136	50-(5") #2 45 (5")-60	12"	Very Dense, very dark grayish-brown sand & fine gravel wet (Color: 2.5 Y, 3/2)	SW		B.G. Felt we hit a rock (1115)
142'							
143'							Hammer Driving Hard Feels like we were pounding a large rock.
144'							
145'							End Day 9/29
146'	S 07137	38 (5") 50	12"	Very Dense, very dark brownish-gray sand with fine gravel, generally as above (Color: 2.5 Y, 3/2) wet	SP		Start Day 9/29 Background - Scanned. (1050)
147'							
148'							
149'							
150'							

NOTES: Water level with Csg at 145' 9-24 @ 1245 = 66.4'
" " " " " " 9-29 @ 58.5' after well sitting 4 days

Background Levels 9/29/87: $\gamma\beta$ = 60-120
α = 0
$\gamma\gamma$ = 0

334

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 88 ~~3224~~ 3034	COORDINATES:	DATE 9-29-87
ELEVATION:	GWL: Depth 60.7 Date/Time 9-29/1615	DATE STARTED 9-14-87
ENGINEER/GEOLOGIST: B. Dunning	Depth 58.6 Date/Time 9-30/1340	DATE COMPLETED 10-3-87
DRILLING METHODS: Cable Tool		PAGE 11 OF 11

2731

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
150							
151'	S 07138	20 37 (9")50	14"	Medium Dense, Gray Silty Sand grading downwards into: (Color 2.5 Y, N5/)	SM		Scanned - Background levels (1415)
				Very Dense, black fine gravel wet (Color: 2.5 Y, N2/)	GW		
152'							
153'							
154'							
155'							BOB.
156'	S 07139	7 22 45	18"	Very Dense, Dark gray coarse sand w/ some fine gravel wet (Color: 5 Y, 4/1)			Scanned - Background levels (1540)
157'				Bottom of Borehole (10") = 155' Bottom of 1st Split Spoon = 156.5'			
158'							
159'							
160'							

NOTES: Blow Sand coming into hole with Csg @ 180'. to a depth of 147'
10" Csg Driven to 155' to obtain 150 - 151.5' Split Spoon Sample.

Used a total of 500 gallons to Drill Entire Well.

335

402-11-86

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07089	09/14/87 1345	5 11 10	12	MEDIUM STIFF, YELLOWISH-BROWN CLAY WITH SOME SAND, MOIST.	CL		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
3.0	07090	09/14/87 1400	12 17 19	24	STIFF, DARK YELLOWISH-BROWN SILTY SAND WITH SOME FINE GRAVEL, MOIST.	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-140 cpm
4.5	07091	09/14/87 1440	12 25 32	18	MEDIUM DENSE DARK YELLOWISH-BROWN SILTY SAND WITH SOME GRAVEL, MOIST. COARSE GRAVEL - GRAYISH BROWN. MEDIUM DENSE DARK YELLOWISH-BROWN SILTY SANDY GRAVEL, MOIST.	SP GW GC	N/A N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-140 cpm
6.0	07092	09/14/87 1445	22 12 15	14	MEDIUM DENSE DARK YELLOWISH-BROWN SILTY SANDY GRAVEL, MOIST. STIFF YELLOWISH-BROWN SILTY CLAY, MOIST.	GC CL	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-140 cpm
7.5	07093	09/14/87 1545	10 21 23	16	DENSE YELLOWISH-BROWN SILTY GRAVEL GRADING DOWNWARD TO A: HARD DARK GRAY CLAY WITH A TRACE OF COARSE SAND AND GRAVEL, MO	GC	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-140 cpm
9.0	07095	09/14/87 1625	16 19 23	12	VERY STIFF GRAY CLAY WITH A TRACE OF FINE GRAVEL (SLIGHTLY DAMP), MOIST.	CL	4.0	Hnu= 0 ppm α = 0 cpm βΓ = 40-140 cpm
10.5	07096	09/15/87 0830	6 11 15	6	MEDIUM DENSE, GRAYISH-BROWN GRAVEL, MOIST.	GC	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
12.0	07097	09/15/87 0935	4 5 8	12	MEDIUM STIFF OLIVE-GRAY CLAY WITH A TRACE OF FINE GRAVEL, MOIST.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
13.5	07098	09/15/87 0942	6 11 17	18	MEDIUM STIFF OLIVE-GRAY CLAY WITH A TRACE OF FINE GRAVEL, MOIST. LOOSE GRAY, FINE SAND, MOIST.	CL SM	.75 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
15.0	07100	09/15/87 1030	2 2 3	18	SOFT OLIVE-GRAY CLAY WITH A TRACE OF FINE GRAVEL, MOIST.	CL	.50	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm

NOTES:

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07101	09/15/87 1040	6 6 9	18	SOFT, OLIVE-GRAY CLAY WITH A TRACE TO SOME SAND AND GRAVEL, MOIST.	CL	.50	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
18.0	07102	09/15/87 1350	2 3 12	6	SOFT, OLIVE-GRAY CLAY WITH A TRACE TO SOME SAND AND GRAVEL, MOIST.	CL	.50	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
19.5	07103	09/15/87 1355	20 45 40	18	SOFT OLIVE GRAY CLAY, MOIST. VERY DENSE GRAY FINE GRAVEL, MOIST.	CL GP	.50 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
21.0	07104	09/15/87 1530	46 30 27	18	DARK YELLOWISH-BROWN COARSE SAND. VERY DENSE GRAY COARSE GRAVEL, MOIST.	SW GP	N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
22.5	07105	09/16/87 0900	16 33 47	18	VERY DENSE GRAY COARSE GRAVEL, MOIST. VERY DENSE GRAY FINE TO MEDIUM SAND, MOIST. HARD OLIVE-GRAY CLAY, TRACE OF GRAVEL, MOIST.	GP SC CL	N/A N/A >4.0	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
24.0	07106	09/16/87 1005	14 16 22	18	DENSE GRAY UNCONSOLIDATED GRAVEL, MOIST; GRADING DOWNWARDS TO A HARD GRAY CLAY, SOME GRAVEL, MOIST. MEDIUM DENSE GRAYISH-BROWN FINE TO MEDIUM SAND WITH TRACE OF LARGE QUARTZ ROCK FRAGMENTS.	GW SP	N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
25.5	07107	09/16/87 1420	20 50	12	MEDIUM DENSE GRAYISH-BROWN FINE TO MEDIUM SAND WITH TRACE OF LARGE QUARTZ ROCK FRAGMENTS, WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
27.0	07108	09/16/87 1440	8 18 30	18	HARD, DARK GRAY OLIVE-GRAY CLAY WITH SOME SAND AND FINE GRAVEL	CL	>4.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
28.5	07110	09/16/87 1500	35 52 30	18	VERY STIFF, GRAYISH-BROWN SILTY CLAY. VERY HARD, GRAY CLAY. VERY STIFF, GRAY CLAY WITH TWIG-LIKE FRAGMENTS ?? AND A TRACE OF GRAVEL.	ML CL CL	3.5 >4.5	Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
30.0	07111	09/16/87 1520	46 50	12	VERY STIFF, GRAY CLAY WITH TWIG-LIKE FRAGMENTS ?? AND A TRACE OF GRAVEL.	CL		Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm

NOTES:
WATER LEVEL AT 0800 WAS 9.3'.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07112	09/17/87 1045	12 20 24	6	STIFF, OIVE-GRAY CLAY WITH A TRACE OF FINE GRAVEL, MOIST.	CL	2.0		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
33.0	07113	09/17/87 1050	10 11 16	18	VERY STIFF GRAY CLAY WITH TRACE OF GRAVEL, MOIST.	CL			Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
34.5	07114	09/17/87 1105	10 25 37	24	STIFF GRAY CLAY, MOIST. VERY STIFF OLIVE-YELLOW CLAY, MOIST. VERY DENSE YELLOW-BROWNISH SAND, MOIST.	CL CL SW	1.5 4.0 N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
36.0	07115	09/17/87 1400	23 33 36	12	VERY DENSE YELLOWISH-BROWN SAND, MOIST.	SW	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
37.5	07116	09/17/87 1530	50	9	MEDIUM STIFF BROWNISH-YELLOW SILT, CLAYEY, MOIST. VERY DENSE YELLOWISH-BROWN, WELL SORTED, FINE GRAIN SAND, MOIST BUT BASICALLY DRY.	SM SW	N/A N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
39.0	07117	09/17/87 1555	9 24 42	13	VERY DENSE YELLOWISH-BROWN, WELL SORTED, FINE GRAIN SAND, MOIST, BUT BASICALLY DRY.	SW	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
44.0									
45.5	07118	09/17/87 1715	25 43 45	18	VERY DENSE YELLOWISH-BROWN, WELL SORTED, FINE GRAIN SAND, MOIST, BUT BASICALLY DRY.	SW	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
50.0									
51.5	07119	09/18/87 1345	15 20 21	18	DENSE YELLOWISH-BROWN, WELL SORTED, DAMP, BUT NOT WET SAND.	SW	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
55.0									
56.5	07120	09/18/87 1415	13 27 50	12	LOOSE GRAYISH-BROWN COARSE SAND, MOIST. HARD GRAY CLAY MOIST.	SW CL	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
58.0	07121	09/18/87 1440	13 23 43	12	VERY DENSE GRAY, SALT & PEPPER LOOKING, MEDIUM TO COARSE GRAIN SAND WITH TRACE OF FINE GRAVEL, MOIST.	SW	N/A		Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
60.0									

NOTES:
SAND IS ACTUALLY LOOSE AND UNCONSOLIDATED.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07122	09/18/87 1515	13 25 28	18	VERY DENSE, DARK GRAY COARSE SAND WITH SOME FINE GRAVEL, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-60 cpm
63.0								
64.5	07123	09/19/87 1545	6 3 3	14	LOOSE GRAY, LIGHTLY SALT AND PEPPERED LOOKING FINE TO COARSE GRAIN SAND WITH A TRACE OF GRAVEL, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-80 cpm
70.5								
72.0	07124	09/20/87 1000	6 14 21	12	DENSE, GRAY COARSE SAND WITH SOME FINE AND COARSE GRAVEL, WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-70 cpm
75.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS 2731	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07125	09/20/87 1140	16 31 46		14	VERY DENSE GRAYISH-BROWN GRAVEL (COLOR: 2.5Y, 5/2) AND COARSE SAND.	GP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-75 cpm
80.0									
81.5	07126	09/20/87 1350	2 6 16		18	MEDIUM DENSE, GRAY, VERY COARSE GRAIN SAND WITH SOME FINE GRAVEL. MEDIUM DENSE GRAYISH-BROWN FINE GRAVEL WITH SOME COARSE GRAVEL.	SW GW	N/A N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-75 cpm
85.0									
86.5	07127	09/20/87 1600	20 50 50		12	VERY DENSE, DARK GRAY, SANDY GRAVEL WITH FINE TO COARSE SAND. (COLOR: 2.5Y, N4/) & LARGE COBBLES i.e. 1" X 2" X 1 1/2".	GP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-75 cpm
95.0									
96.5	07128	09/21/87 1350	18 29 36		24	VERY DARK GRAY, FINE GRAVEL WITH COARSE SAND (10YR 3/1). DENSE GRAY FINE TO COARSE GRAVEL (2.5Y N5). VERY DENSE, GRAYISH-BROWN SILTY SAND, MOIST. (COLOR: 2.5Y, 5/2).	GW GM	N/A N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
99.0									
100.5	07129	09/21/87 1500	17 13 20		18	VERY STIFF, DARK GRAY CLAY, MOIST (COLOR: 5Y, 4/1).	CL	3.5	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
105.0									

NOTES:

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	07130	09/21/87 1620	6 7 14	6	MEDIUM DENSE, GRAYISH-BROWN FINE GRAIN, WELL GRADED, SILTY SAND (COLOR 2.5Y, 5/2).	SM	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
110.0								
111.5	07131	09/22/87 1035	6 10 11	12	MEDIUM DENSE, GRAYISH-BROWN FINE GRAIN, WELL GRADED, SILTY SAND (COLOR: 2.5Y, 5/2). SOFT, DARK GRAY SILTY CLAY (COLOR: 5Y, 4/2).	SM CL	N/A .5	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
115.0								
116.5	07132	09/22/87 1338	9 14 18	18	MEDIUM STIFF, OLIVE-GRAY CLAY (5Y, 4/2). VERY STIFF, OLIVE-GRAY CLAY (COLOR: 5Y, 4/2).	CL CL	.75 3.5	Hnu= 0 ppm α = 0 cpm Bγ = 40-80 cpm
120.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	07133	09/22/87 1650	2 3 6	18	MEDIUM STIFF, GRAY (5Y, 5/1) TO OLIVE GRAY (5Y, 5/2) CLAY WITH SOME FINE GRAVEL, WET.	CL		Hnu= 0 ppm α = 0 cpm βΓ = 40-80 cpm
125.0								
126.5	07134	09/23/87 1025	27 17 10	6	MEDIUM DENSE, OLIVE-BROWN, FINE TO COARSE GRAVEL, WET (COLOR: 2.5Y, 4/4).	GP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-120 cpm
130.0								
131.5	07135	09/23/87 1108	18 33 19	5	VERY DENSE, OLIVE-BROWN FINE GRAVEL (COLOR: 2.5Y, 4/4), WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-120 cpm
140.0								
141.5	07136	09/24/87 1115	50 45 50	12	VERY DENSE, VERY DARK GRAYISH-BROWN SAND & FINE GRAVEL, WET (COLOR: 2.5Y, 3/2).	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60-120 cpm
145.0								
146.5	07137	09/29/87 1050	38 50	12	VERY DENSE, VERY DARK BROWNISH-GRAY SAND WITH FINE GRAVEL, GENERALLY AS ABOVE (COLOR: 2.5Y, 3/2) WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60-120 cpm
150.0								

NOTES:
WATER LEVEL WITH CSG AT 145' 9-29 AT 58.5' AFTER WELL SITTING 4 DAYS.

VISUAL CLASSIFICATION OF SOILS

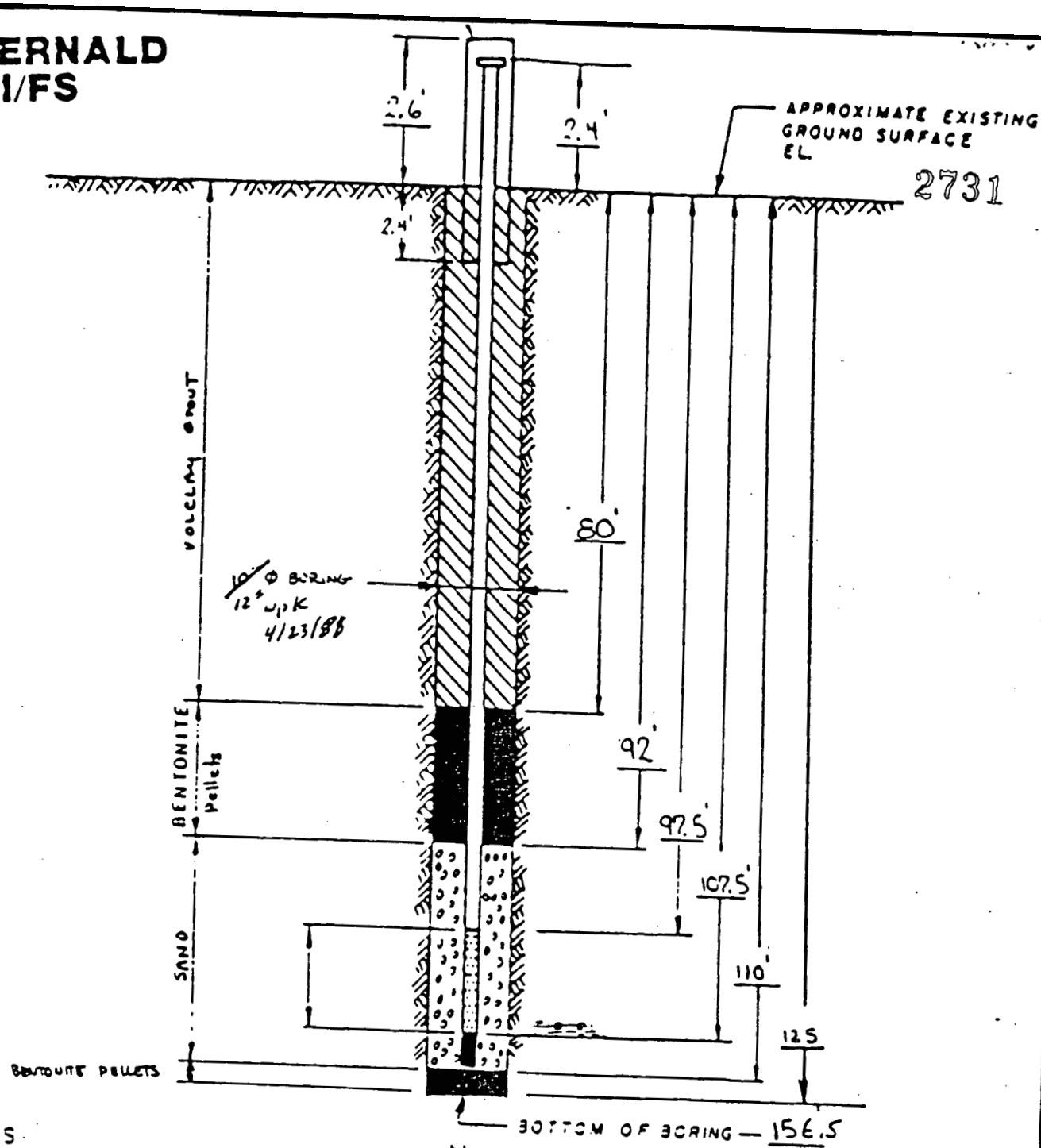
PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3024	COORDINATES: NORTH 482,477.17 EAST 1,378,902.73	DATE: 09/14/87
GROUND ELEVATION: 579.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/14/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 10/03/87
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF 8

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
151.5	07138	09/29/87 1415	20 37 50	14	MEDIUM DENSE, GRAY SILTY SAND GRADING DOWNWARDS INTO: (COLOR 2.5Y, N5/) VERY DENSE, BLACK FINE GRAVEL, WET (COLOR: 2.5Y, N2	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60-120 cpm
155.0								
156.5	07139	09/29/87 1540	7 22 45	18	VERY DENSE DARK GRAY COARSE SAND W/SOME FINE GRAVEL, WET (COLOR: 5Y, 4/1).			Hnu= 0 ppm α = 0 cpm βΓ = 60-120 cpm

BOTTOM OF BORING 155.0

NOTES:

FERNALD RI/FS



NOTE: Hole was allowed to collapse to 125'. Dumped with bentonite 125 - 110'.

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
5. WATER LEVEL READING ON

w.k o.t corrections were made by B. Dinning at the time the form was completed

WPK
4/23/88

INSTALLATION DETAILS
MONITORING WELL ~~324~~
3024 [illegible]

PREPARED FOR

FMPC RI/FS

DRAWN BY
CHECKED BY
APPROVED BY

344

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. B. Dunning DATE 10/16/87
PROJECT NO. 622 CHECKED BY [illegible] DATE [illegible]
BORING NO. MW15-89 ~~324~~ 3674
PIEZOMETER NO. ~~324~~ 3674 DATE OF INSTALLATION 10-3-87 2731

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 TO 155'	SIZE 10" FROM 0' TO 155'
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel monitoring well	RISER PIPE MATERIAL Stainless Steel (316)
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10'
AVERAGE SIZE OF PERFORATIONS .010"	JOINING METHOD Flush Joint Threaded
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10'	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION LOCKING CAP AND [illegible]
PROTECTIVE PIPE ~~Ø~~ O.D. 10"	

ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (Ft.)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	+ 2.4'			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- ~~2.4~~ 2.6 [illegible]			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP 0	BOTTOM 80'	TOP	BOTTOM
BENTONITE	TOP 80'	BOTTOM 92'	TOP	BOTTOM
SAND	TOP 92	BOTTOM 110'	TOP	BOTTOM
BENTONITE PELLETS	TOP 110'	BOTTOM 125	TOP	BOTTOM
PERFORATED SECTION	TOP 97.5'	BOTTOM 107.5'	TOP	BOTTOM
PIEZOMETER TIP	~~[illegible]~~ ~110'			
BOTTOM OF BOREHOLE	~~[illegible]~~ 155.0' NP 4/24/88			
GWL AFTER INSTALLATION	58'			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑ 345
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑

REMARKS Hole was drilled to 155' to clearly define stratigraphy. Casing was pulled up to 125' and sand-hole was allowed to collapse in. The well was then plugged from 125' to 110' with bentonite to insure that no communication through "Blue Clay" was present. Well was then set from 110'.

400-1-F-88

WELL 3043

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		Task 3.2
BORING NUMBER: 343	COORDINATES:		DATE: 12/4/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/4/87
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 12/9/87
DRILLING METHODS: Cable Tool			PAGE 1 OF 9

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	S 0 6 1 4	2 6 7	12"	Very soft, very dark grayish-brown clay (2.5 Y, 3/2). Silty & Dry with rootlets	OL	<.5	Hnu = 0 α = 0 γB = 20-40 cpm. Time Sample Collected (0800)
2	S 0 7 6 1 5	5 7 8	12"	Very stiff, grayish-brown clay (2.5 Y, 5/2) Damp	CL	3.5	Hnu = 0 α = 0 γB = 20-50 cpm (0810)
3 4	S 0 7 6 1 6	11 11 14	12"	Stiff, light olive-brown clay. (2.5 Y, 4/4) with a trace of very fine gravel. Damp	CL	2.0	Hnu = 0 α = 0 γB = 20-50 cpm. (0835)
5	S 0 7 6 1 7	9 11 10	15"	Soft, light olive-brown clay (2.5 Y, 5/6) Silty & Damp	CL	.50	Hnu = 0 α = 0 γB = 20-40 cpm. (0840)
7	S 0 7 6 1 8	8 11 7	9"	Very soft, light olive-brown clay (2.5 Y, 5/6) Fair amount of moisture noted.	CL	<.25	Hnu = 0 α = 0 γB = 20-40 cpm. (0850)
8 9	S 0 7 6 1 9	10 10 10	18"		CL		a/a (1055)
10	S 0 7 6 2 0	7 8 11	18"	Medium stiff, olive-yellow clay (2.5 Y, 6/8) Damp 10' 10.5' Stiff Olive-brown clay (2.5 Y, 4/4) Moist 10.5'	CL	1.0	a/a (1105)
11 12	S 0 7 6 2 1	12 11 13	18"	11' Medium stiff, light olive-brown clay (2.5 Y, 5/6) Dry 11' 11.2' Stiff, dark grayish-brown clay (2.5 Y, 4/2) 11.7'	CL	1.5	Hnu = 0 α = 0 γB = 20-50 cpm. (1120)
13	S 0 7 6 2 2	3 7 4	18"	Medium dense, light olive brown silty sand (2.5 Y, 5/6) Damp 12.5' 12.5' Medium dense, grayish-brown sand (2.5 Y, 5/3) 13' 13' Medium dense, light olive-brown sand (2.5 Y, 6/6)	SM SC SP		Hnu = 0 α = 0 γB = a/a (1130)
14 15	S 0 7 6 2 3	11 13 17	18"	Very stiff, dark gray clay (5 Y, 4/1) with a trace of fine gravel Damp	CL	2.0	Hnu = 0 α = 0 γB = a/a (1140)

NOTES:

I.) Drilling Contractor : Pennsylvania Drilling
DRILLER : Tim Harris
HELPER : Craig Coulter

II.) Background Measurements
A.) Hnu = 0 B) α = 0 C) γB = 40-60 cpm.

III. WATER USED 12/4
20 gallons.

IV. a/a = As Above

V) Samples via Munsell Colors, ASTM

347

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS Task 3.2		
BORING NUMBER: 343	COORDINATES:	DATE: 12/4 & 12/5/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 2 OF 9	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	S 0 7 6 2 4	7 8 12	18"	Stiff, dark grayish-brown (2.5Y, 4/2) clay. Slightly silty. Dry	CL	1.5	Hnu = 0 α = 0 γB = 20-60 c.p.m. (1540)
17	S 0 7 6 2 5	7 8 11	12"	17.5' 17.5'			Hnu = 0 α = 0 γB = 20-60 c.p.m. (1550)
18				Medium dense, dark gray sand (5Y, 4/1), silty with some gravel	SP	–	
19	S 0 7 6 2 6	5 9 9	18"	Stiff, olive gray clay (5Y, 5/2) with a trace of gravel. Dry	CL	1.55	End of Day 12-4-87 Start Day 12-5-87 Hnu = 0 α = 0 γB = 50 cpm (0830)
20	S 0 7 6 2 7	14 22 27	15"				Hnu = 0 α = 0 γB = 40-60 c.p.m. (0841)
21							
22	S 0 7 6 2 8	8 11 16	6"	Medium dense, olive gray clayey gravel (5Y, 5/2), with some coarse gravel and rock fragments. Moist	GC	–	Hnu = 0 α = 0 γB = 40-60 c.p.m. (0944)
23	S 0 7 6 2 9	15 37 29	18"	Hard, dark gray clay (5Y, 4/1) with a trace of fine to coarse gravel Damp.	CL	4.5+	Hnu = 0 α = 0 γB = 20-60 (0950)
24							
25	S 0 7 7 7 0	17 22 31	18"	Stiff, gray clay (5Y, 5/1) with a trace of gravel. Dry 25.3' 25.3'		1.5	Hnu = 0 α = 0 γB = 20-40 c.p.m. (1024)
26	S 0 7 7 7 1	17 24 30	6"	Very dense, gray to dark gray gravel (5Y, 5/1 to 4/1), clayey in parts. Wet.	GC	–	a/a (1035)
27				27.5' 27.5'			
28	S 0 7 7 7 2	5 17 17	18"	Stiff, dark gray clay (5Y, 4/1) with a trace of gravel	CL	1.5-20	a/a (1045)
29	S 0 7 7 7 3	4 11 17	15"	Stiff, dark gray clay (2.5Y, N/4) with a trace of gravel	CL	1.5	a/a (1400)
30							

NOTES: I.) Background Readings for 12/8/87
1.) Hnu = 0
2.) α = 0
3.) γB = 20-60 c.p.m.

II.) Water Used 12/8/87 = 37 gallons

III.) a/a = as above

348

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI / FS		
BORING NUMBER: 343	COORDINATES:	DATE: 12/5/87 & 12/7/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 3 OF 10	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	S 0774	10 13 18	18"	Medium stiff, dark gray clay (2.5 Y, N 4/) with a trace of fine gravel.	CL	.75	Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1405)
32	S 0775	10 14 17	16"	32' Very stiff, dark yellowish-brown clay (10 YR, 4/4) 32'	CL	3.75	Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1420)
33	S 0776	11 14 15	18"	33' Dark gray, dense, fine gravel (2.5 Y, N 4/) 33' Medium [illegible] yellowish-brown sand (10 YR, 5/8) with a trace of fine gravel. Dry.	GW		Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1440)
34							
35							
36				Upper Sand & Gravel contact @ 33.2 Ft.	SW		Began collecting 5' Sample
37							
38							
39							
40	S 0777	10 22 33	18"	Very dense, multicolored brown, loose, fine gravel 40.5 40.5			Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1657)
41				Very dense, yellowish-brown sand (10 YR, 5/6) with a trace of fine gravel. Dry	SW		
42							
43							
44							
45							

NOTES:

I) Background Measurements 12/7/87
Hnu = 0
α = 0
γβ = 20-80 cpm

II.) Water Used 12/7/87 = 23 gallons

349

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 343	COORDINATES:	DATE: 12/7/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 4 OF 9	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							12-7-87
46	S 0 7 7 8	11 28 30	16"	Very dense, yellowish-brown sand (10YR. 5/6). Damp	SW		Hnu = 0 α = 0 γB = 20-50 c.p.m. 0940
47							
48							
49							
50							
51	S 0 7 7 9	12 22 26	18"	Dense, yellowish-brown sand as above. Damp but not saturated.	SW		Hnu = 0 α = 0 γB = 30 c.p.m. 1006
52							
53							
54							
55							
56	S 0 7 7 8 0	12 23 29	18"	56' Very dense, dark grayish-brown (25Y, 4/2) sand gray sand fairly moist 56'	SW		Hnu = α = γB = 1032
57							
58							
59							
60							

NOTES: Background Measurements for 12/8/87

1.) Hnu = 0

2.) α = 0

3.) γB = 20 - 50 c.p.m.

350

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 343	COORDINATES:	DATE: 12/7/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 5 OF 9	

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	S 0 7 7 8 1	9 17 26	16"	Dense, dark grayish-brown (2.5Y, 4/2) sand w/some fine gravel Moist, but questionable about being wet.	SW		Hnu = 0 α = 0 γB = 40-50 c.p.m. 1108
62							
63							
64							
65	S 0 7 7 8 2	9 14 17	18"	Dense, dark grayish-brown (10 YR, 4/2) coarse sand. Appears wet. 66.2	SW		Hnu = 0 α = 0 γB = 40-60 c.p.m. 1316
66				Dense, olive-gray (5Y, 4/2) fine sandy gravel	GW		
67							
68							
69							
70	S 0 7 7 8 3	50 50/4"	10"	Very dense, dark grayish-brown sand (2.5Y, 4/2) WET	SW		Hnu = 0 α = 0 γB = 40-60 c.p.m. 1456
71				Very dense, dark gray (5Y, 4/1) clayey gravel	GC		
72							
73							
74							
75							

NOTES:

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 343	COORDINATES:	DATE: 12/7 & 12/8/87	
ELEVATION:	GWL: Depth 78' Date/Time 12/8/87 - 0800	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 6 OF 9	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75							
76	S 0 7 8 4	19 39 50	18"	Very dense, very dark gray sand with some fine to coarse gravel (5Y, 3/1)	SP		Hnu = 0 α = 0 γβ = 40 c.p.m. 1621
77							Had to drive casing to 80' in order to obtain 75-76.5 & 80-81.5' Samples
78							
79							
80	S 0 7 8 5	10 13 18	14"	Dense, multicolored (brown, grays, white, black) loose poorly graded fine to coarse gravel	GP		Hnu = 0 α = 0 γβ = 40 c.p.m. 1648
81							
82							End of Day 12/7/87 Start Day 12/8/87
83							
84							
85	S 0 7 8 6	18 39 50/2"	18"	multicolored gravel, gen a/a	GW		Hnu = 0 α = 0 γβ = 30 c.p.m. 0845
86				Very dense, dark gray silty to clayey gravel (5Y, 4/1)	GM		
87							
88							
89							
90							

NOTES: Background 12/8/87

Hnu = 0

α = 0

γβ = 30 - 60 c.p.m.

352

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER: 343	COORDINATES:	DATE: 12/8/87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/4/87
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED: 12/9/87
DRILLING METHODS:		PAGE 7 OF 9

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90							
91	S 0 7 7 8 7	7 17 29	16"	Dense, dark grayish-brown (2.5Y, 4/2) sand with some fine gravel	SW		Hnu = 0 α = 0 γB = 40 c.p.m. 1006
92							
93							
94							
95	S 0 7 7 8 8	17 25 35	18"	Very dense, dark grayish-brown (2.5Y, 4/2) sand	SW		Hnu = 0 α = 0 γB = 40-50 c.p.m. 1113
96							
97							
98				WET			
99							
100	S 0 7 7 8 9	23 35 38		Very dense, dark grayish-brown sand (a/a). 100.8			Hnu = 0 α = 0 γB = 40-60 c.p.m. 1137
101				Very dense, dark grayish-brown silty sand. (2.5Y, 4/2)			
102							
103							
104							
105							

NOTES:

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS TASK 3.2	
BORING NUMBER: 343	COORDINATES:	DATE: 12/8/87
ELEVATION:	GWL: Depth 68' Date/Time 12-8-87/0730	DATE STARTED: 12/4/87
ENGINEER/GEOLOGIST: B.D.	Depth Date/Time	DATE COMPLETED: 12/9/87
DRILLING METHODS: Cable Tool		PAGE 8 OF 9

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105							
106							While sandpumping the 105-106.5 Sample was missed. Loose sand
107							
108	S 0779 0	20 37 44	18"	Very dense, dark gray sand. (5Y, 4/1) silty with a trace of clay.	SM		Hnu = 0 α = 0 γB = 40 c.p.m. (1417)
109							
110							10" Casing had to be drove down to 120 Ft. inorder to obtain 115' Split Spoon sample Blow Sand.
111							
112							
113							
114							
115	S 0779 1	1 2 9	12"	Medium dense, bluish-green type of sand (No Muncell color chart correlation). Silty and slightly clayey.			Hnu = 0 α = 0 γB = 30 c.p.m. (1657)
116							
117							Split Spoon began to sink once it was on bottom. (Strap line depth.-) 118.5' End of Day 12/8/87 Start of Day 12/9/87
118							
119	S 0779 2	7 4 12	18"	Medium dense, bluish-green sand with some gravel. very clayey.	SC		Hnu = 0 α = 0 γB = 30-40 c.p.m. (1055)
120							

NOTES: I) Background Measurements 12/9/87 No Water added to hole 12/8 & 12/9

1.) Hnu = 0

2) α = 0

3) γB = 20-50 c.p.m.

354

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS TASK 8.2		
BORING NUMBER: 343	COORDINATES:	DATE: 12/9/87	
ELEVATION:	GWL: Depth 56.7' Date/Time 12-17-87/1000	DATE STARTED: 12/4/87	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/9/87	
DRILLING METHODS: Cable Tool		PAGE 9 OF 9	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (Inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120				120' 120'			
				Medium dense, bluish-green to dark olive-gray clayey gravel. (5Y, 3/2).	GC		Could not get below casing depth without blow sand coming into borehole (120'-) Hnu to catch sample @ 119'.
121							
122							
123							
124							
125				Loose, olive-gray silty sand 125.6' (5Y, 5/2) 125.6'			
	S 0 7 8 3	2 2 3	18"	Soft, "blue-gray" clay. (No Munsell color correlation) closest correlation @ (5Y, 4/1).		<1.0	Hnu = 0 α = 0 γ̄ = 40 c.p.m. (1336)
126							
127							
128				— Bottom of — Borehole @ 126.5'			
129							
130							
131							
132							
133							
134							
135							

NOTES:

TOTAL WATER ADDED TO WELL TO DRILL. = 80 gallons

355

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07614	12/04/87 0800	2 6 7	12	VERY SOFT, VERY DARK GRAYISH-BROWN CLAY (2.5Y, 3/2), SILTY AND DRY WITH ROOTLETS.	OL	<.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
3.0	07615	12/04/87 0810	5 7 8	12	VERY STIFF, GRAYISH-BROWN CLAY (2.5Y, 5/2) DAMP.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
4.5	07616	12/04/87 0835	11 11 14	12	STIFF, LIGHT OLIVE-BROWN CLAY (2.5Y, 4/4) WITH A TRACE OF VERY FINE GRAVEL, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
6.0	07617	12/04/87 0840	9 11 10	15	SOFT, LIGHT OLIVE-BROWN CLAY (2.5Y, 5/6) SILTY AND DAMP.	CL	.50	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
7.5	07618	12/04/87 0850	8 11 7	9	VERY SOFT, LIGHT OLIVE-BROWN CLAY (2.5Y, 5/6), FAIR AMOUNT OF MOISTURE NOTED.	CL	<.25	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
9.0	07619	12/04/87 1055	10 10 10	18	VERY SOFT, LIGHT OLIVE-BROWN CLAY (2.5Y, 5/6), FAIR AMOUNT OF MOISTURE NOTED.	CL	<.25	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
10.5	07620	12/04/87 1105	7 8 11	18	MEDIUM STIFF, OLIVE-YELLOW CLAY (2.5Y, 6/8) DAMP. STIFF OLIVE-BROWN CLAY (2.5Y, 4/4) MOIST.	CL CL	1.0 1.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
12.0	07621	12/04/87 1120	12 11 13	18	MEDIUM STIFF, LIGHT OLIVE-BROWN CLAY (2.5Y, 5/6) DRY. STIFF, DARK GRAYISH-BROWN CLAY (2.5Y, 4/2). MEDIUM DENSE, LIGHT OLIVE BROWN SILTY SAND (2.5Y, 5/6) DAMP.	CL CL SM	1.5 1.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
13.5	07622	12/04/87 1130	3 7 4	18	MEDIUM DENSE, LIGHT OLIVE BROWN SILTY SAND (2.5Y, 5/6), DAMP. MEDIUM DENSE, GRAYISH-BROWN SAND (2.5Y, 5/2). MEDIUM DENSE, LIGHT OLIVE-BROWN SAND (2.5Y, 5/6).	SM SC SP	N/A N/A N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
15.0	07623	12/04/87 1140	11 13 17	18	VREY STIFF, DARK GRAY CLAY (5Y, 4/1) WITH A TRACE OF FINE GRAVEL, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07624	12/04/87 1540	7 8 12	18	STIFF, DARK GRAYISH-BROWN (2.5Y, 4/2) CLAY, SLIGHTLY SILTY, DRY.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-60 cpm
18.0	07625	12/04/87 1550	7 8 11	12	STIFF, DARK GRAYISH-BROWN (2.5Y, 4/2) CLAY, SLIGHTLY SILTY, DRY. MEDIUM DENSE, DARK GRAY SD (5Y, 4/1), SILTY WITH SOME GRAVEL.	CL SP	1.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-60 cpm
19.5	07626	12/05/87 0830	5 9 9	18	STIFF, OLIVE GRAY CLAY (5Y, 5/2) WITH A TRACE OF GRAVEL, DRY.	CL	1.55	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
21.0	07627	12/05/87 0841	14 22 27	15	STIFF, OLIVE GRAY CLAY (5Y, 5/2) WITH A TRACE OF GRAVEL, DRY.	CL	1.55	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
22.5	07628	12/05/87 0944	8 11 16	6	MEDIUM DENSE, OLIVE GRAY CLAYEY GRAVEL (5Y, 5/2) WITH SOME COARSE GRAVEL AND ROCK FRAGMENTS, MOIST.	GC	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
24.0	07629	12/05/87 0950	15 37 29	18	HARD, DARK GRAY CLAY (5Y, 4/1) WITH A TRACE OF FINE TO COARSE GRAVEL, DAMP.	CL	4.5+	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
25.5	07770	12/05/87 1024	17 22 31	18	STIFF, GRAY CLAY (5Y, 5/1) WITH A TRACE OF GRAVEL, DRY. VERY DENSE, GRAY TO DARK GRAY GRAVEL (5Y, 5/1 TO 4/1), CLAYEY IN PARTS, WET.	CL GC	1.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
27.0	07771	12/05/87 1035	17 24 30	6	VERY DENSE, GRAY TO DARK GRAY GRAVEL (5Y, 5/1 TO 4/1), CLAYEY IN PARTS, WET.	GC	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
28.5	07772	12/05/87 1045	5 17 17	18	VERY DENSE, GRAY TO DARK GRAY GRAVEL (5Y, 5/1 TO 4/1), CLAYEY IN PARTS, WET. STIFF, DARK GRAY CLAY (5Y, 4/1) WITH A TRACE OF GRAVEL.	GC CL	N/A 1.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
30.0	07773	12/05/87 1400	4 11 17	15	STIFF, DARK GRAY CLAY (2.5Y, N/4) WITH A TRACE OF GRAVEL.	CL	1.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07774	12/05/87 1405	10 13 18	18	MEDIUM STIFF, DARK GRAY CLAY (2.5Y, N4/) WITH A TRACE OF FINE GRAVEL.	CL	.75	Hnu= 0 ppm α = 0 cpm Bγ = 40-60 cpm
33.0	07775	12/05/87 1420	10 14 17	16	MEDIUM STIFF, DARK GRAY CLAY (2.5Y, N4/) WITH A TRACE OF FINE GRAVEL. VERY STIFF, DARK YELLOWISH-BROWN CLAY (10YR, 4/4).	CL CL	.75 3.75	Hnu= 0 ppm α = 0 cpm Bγ = 40-60 cpm
34.5	07776	12/05/87 1440	11 14 15	18	DARK GRAY, DENSE, FINE GRAVEL (2.5Y, N4). MEDIUM DENSE, YELLOWISH-BROWN SAND (10YR, 5/8) WITH A TRACE OF FINE GRAVEL, DRY.	GW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40-60 cpm
40.0								
41.5	07777	12/05/87 1657	10 22 33	18	VERY DENSE, MULTICOLORED BROWN, LOOSE, FINE GRAVEL. VERY DENSE, YELLOWISH-BROWN SAND (10YR, 5/6) WITH A TRACE OF FINE GRAVEL, DRY.			Hnu= 0 ppm α = 0 cpm Bγ = 40-60 cpm
45.0								

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	07778	12/07/87 0940	11 28 30	16	VERY DENSE, YELLOWISH-BROWN SAND (10YR, 5/6), DAMP.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-50 cpm
50.0								
51.5	07779	12/07/87 1006	12 22 26	18	DENSE, YELLOWISH-BROWN SAND (10YR, 5/6). DAMP BUT NOT SATURATED.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 30 cpm
55.0								
56.5	07780	12/07/87 1032	12 23 29	18	DENSE, YELLOWISH-BROWN SAND (10YR, 5/6). DAMP BUT NOT SATURATED. VERY DENSE, DARK GRAYISH-BROWN (2.5Y, 4/2) SAND, GRAY SAND FAIRLY MOIST.	SW SW	N/A N/A	
60.0								

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07781	12/07/87 1108	9 17 26	16	DENSE, DARK GRAYISH-BROWN (2.5Y, 4/2) SAND W/SOME FINE GRAVEL. MOIST, BUT QUESTIONABLE ABOUT BEING WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-50 cpm
65.0								
66.5	07782	12/07/87 1316	9 14 17	18	DENSE, DARK GRAYISH-BROWN (10YR, 4/2) COARSE SAND, APPEARS WET DENSE, OLIVE-GRAY (5Y, 4/2) FINE SANDY GRAVEL.	SW GW	N/A N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-60 cpm
70.0								
71.5	07783	12/07/87 1456	50 50	10	VERY DENSE, DARK GRAYISH-BROWN SAND (2.5Y, 4/2), WET. VERY DENSE, DARK GRAY (5Y, 4/1) CLAYEY GRAVEL.	SW GC	N/A N/A	Hnu= 0 ppm α = 0 cpm BΓ = 40-60 cpm
75.0								

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07784	12/07/87 1621	19 39 50	18	VERY DENSE, VERY DARK GRAY SAND WITH SOME FINE TO COARSE GRAVEL (5Y, 3/1).	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40 cpm
80.0								
81.5	07785	12/07/87 1648	10 13 18	14	DENSE, MULTICOLORED (BROWN, GRAYS, WHITE, BLACK) LOOSE, POORLY GRADED FINE TO COARSE GRAVEL.	GP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40 cpm
85.0								
86.5	07786	12/08/87 0845	18 39 50	18	MULTICOLORED GRAVEL, GEN A/A. VERY DENSE, DARK GRAY SILTY TO CLAYEY GRAVEL (5Y, 4/1).	GW GM	N/A N/A	Hnu= 0 ppm α = 0 cpm Bγ = 30 cpm
90.0								

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3043	COORDINATES: NORTH 481,770.91 EAST 1,377,050.35	DATE: 12/04/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/04/87
ENGINEER/GEOLOGIST: B. DUNNING	Depth N/A Date/Time N/A	DATE COMPLETED: 12/10/87
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF 7

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	07787	12/08/87	1006	7 17 29	16	DENSE, DARK GRAYISH-BROWN (2.5Y, 4/2) SAND WITH SOME FINE GRAVEL.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
95.0									
96.5	07788	12/08/87	1113	17 25 35	18	VERY DENSE, DARK GRAYISH-BROWN (2.5Y, 4/2) SAND.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-50 cpm
100.0									
101.5	07789	12/08/87	1137	23 35 38		VERY DENSE, DARK GRAYISH BROWN SAND (2.5Y, 4/2). VERY DENSE, DARK GRAYISH-BROWN SILTY SAND (2.5Y, 4/2).			Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
108.0									
109.5	07790	12/08/87	1417	20 37 44	18	VERY DENSE, DARK GRAY SAND (5Y, 4/1), SILTY WITH A TRACE OF CLAY.	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
115.0									
116.5	07791	12/08/87	1657	1 2 9	12	MEDIUM DENSE, BLUISH-GREEN TYPE OF SAND (NO MUNCELL COLOR CHART CORRELATION), SILTY AND SLIGHTLY CLAYEY.			Hnu= 0 ppm α = 0 cpm βΓ = 30 cpm
119.0									
120.5	07792	12/09/87	1055	7 4 12	18	MEDIUM DENSE, BLUISH-GREEN SAND WITH SOME GRAVEL, VREY CLAYEY.	SC	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 30-40 cpm
125.0									
126.5	07793	12/09/87	1336	2 2 3	18	LOOSE, OLIVE-GRAY SILTY SAND (5Y, 5/2). SOFT, "BLUE-GRAY" CLAY. (NO MUNCELL COLOR CORRELATION) CLOSEST CORRELATION IS (5Y, 4/1).		<1.0	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm

BOTTOM OF BORING 120

NOTES:
DRILLING CONTRACTOR: PENNSYLVANIA DRILLING, DRILLER: TIM HARRIS, HELPER: CRAIG COULTER. SAMPLES VIA MUNSELL COLORS, ASTM.

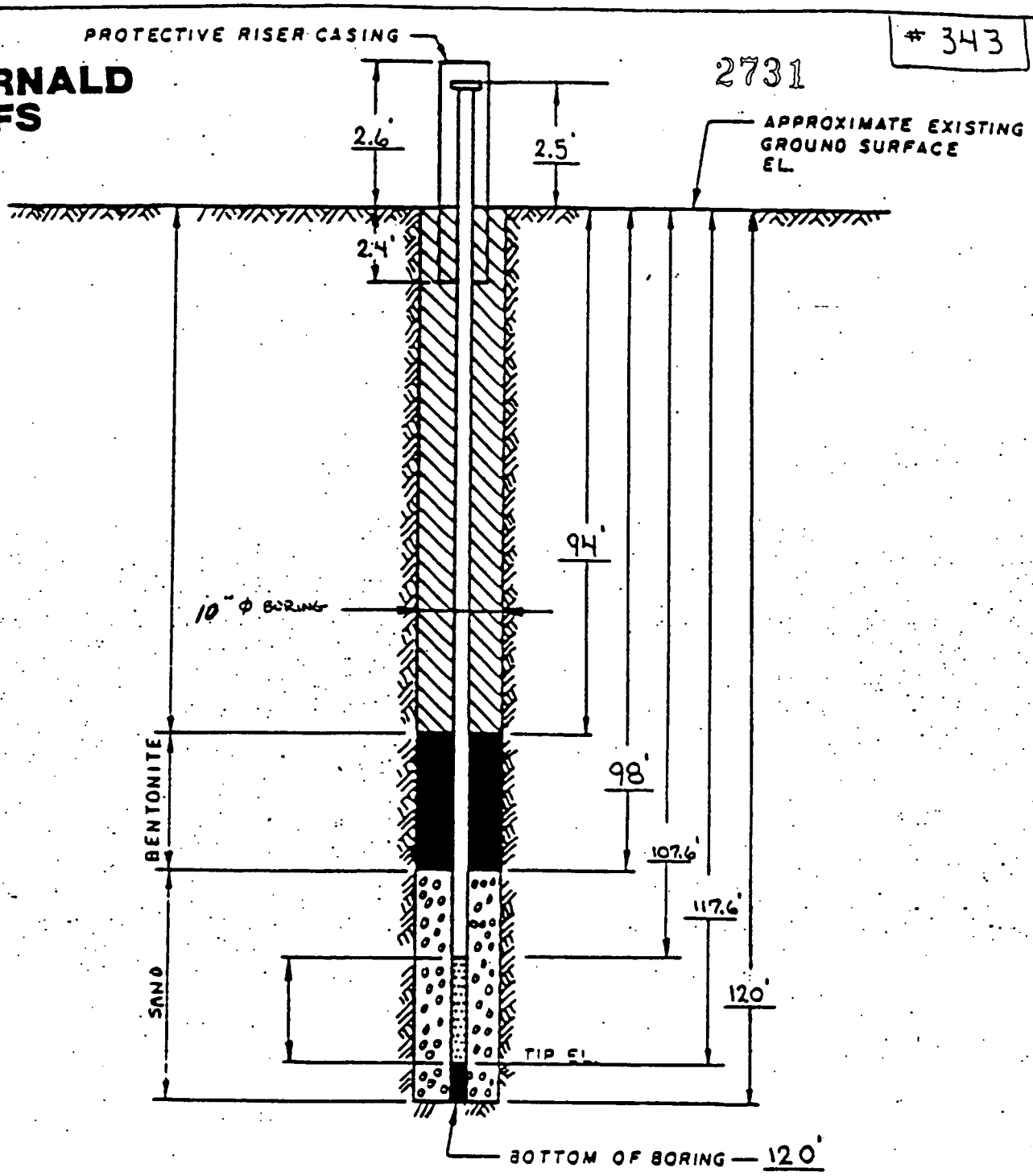
33

BOREHOLE - MONITOR WELL

343

FERNALD RI/FS

2731



NOTES:

1. RISER PIPE IS IN 10. SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS IN 1.0 PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

Note: Well was drilled to 126.5' to tag the "Blue clay" then allowed to collapse in to 120'.

INSTALLATION DETAILS
MONITORING WELL

PREPARED FOR

FMPC RI/FS

363

DRAWING NUMBER

CHECKED BY

APPROVED BY

PAC

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. B. Dunning DATE 12/11/87
PROJECT NO. 602 Task 3.2 CHECKED BY _____ DATE _____
BORING NO. 343
PIEZOMETER NO. NA DATE OF INSTALLATION 12/10/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer - Type
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0 TO 126.5'	SIZE 10" FROM 0' TO 125'
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel	RISER PIPE MATERIAL Stainless Steel
DIAMETER OF PERFORATED SECTION 4" Ø	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10' & 2½'
AVERAGE SIZE OF PERFORATIONS 0.01"	JOINING METHOD Flush Joint Threaded
TOTAL PERFORATED AREA 10'	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft.	OTHER PROTECTION LOCKING CAP WITH LOCK.
PROTECTIVE PIPE O.D. 10 Inches	

ITEM	DISTANCE ABOVE BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	+ 2.5'			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.4'			
BOREHOLE FILL MATERIALS:	(Surface)			
GROUT/SLURRY	TOP 0'	BOTTOM 94'	TOP	BOTTOM
BENTONITE	TOP 94'	BOTTOM 98'	TOP	BOTTOM
SAND	TOP 98'	BOTTOM 120'	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 107.6'	BOTTOM 117.6'	TOP	BOTTOM
PIEZOMETER TIP	120'			
BOTTOM OF BOREHOLE	120'			
GWL AFTER INSTALLATION	56.7'			

364

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

REMARKS This well was drilled to a total depth of 126.5' thus penetrating the "Blue Clay". It was allowed to collapse to 120' and the well was completed from that depth.

WELL 3064

COPY For Central files
Original has been lost
not entered from original #37 PAC
QC/DH/2.4.89
2731
FERNALD RI/FS
REVIEWED BY QA KG DATE AUG 16 1991
Lowell E Well 2-11-88
RIG #3 JPK 4/23/86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B364~~ B3064 BB 1551	COORDINATES: N180730.53 E138718.2	DATE: 12/14/87
ELEVATION: 588.2	GWL: Depth Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 12/14/87
DRILLING METHODS: Cable Tool		PAGE 1 OF 10

Key In	Initial	Date
1st Key In		
2nd Key In	DH	2/89
Hard Copy Verification		

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 1/2 ft.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	07716 1100 12/11	2 3 8	4	Soft brown 7.5YR 3/2 clay, organic rich, dry. 0.5 Soft brown 7.5YR 3/2 clay, some silt, dry 1.5	OH cl	NA	HNU = 0ppm γB = 160 cpm α = 2cpm No recovery 1st try.
2	07717 1115 12/11	3 10 8	10	Fill, hard brown 10YR 4/4 silty clay, some gravel, dry.	NA	NA	HNU = 0ppm γB = 140 cpm α = 2 cpm
3 4	07718 1120 12/11	10 11 18	8	Fill, hard brown 10YR 4/4 clay with some cobbles and slag, gravel, dry 4.5		NA	HNU = 0 ppm γB = 140 cpm α = 2 cpm
5	07719 1125 12/11	17 21 21	16	Hard, brown 10YR 3/4 clay with some silt and gravel, dry.	cl	>5	HNU = 0 ppm γB = 160 cpm α = 2 cpm
6 7	07720 1130 12/11	23 22 21	18	very stiff, yellowish brown 10YR 5/4 clay with some silt, trace gravel	cl	4	HNU = 0ppm γB = 120 cpm α = 2 cpm
8 9	07721 1055 12/14	4 8 10	11	very stiff, yellowish brown 10YR 4/4 mottled clay with some silt, trace sand and gravel, dry.	cl	2.5	HNU = 0ppm γB = 100 cpm α = 2cpm
10	07722 1135 12/14	5 6 11	17	very stiff yellowish brown 10YR 4/4 clay with some silt, trace sand and gravel, dry.	cl	4	HNU = 0ppm γB = 100cpm α = 2 cpm
11 12	07723 1150 12/14	6 7 10	18	very stiff yellowish brown 10YR 4/4 clay with some silt, gravel, trace sand, dry. 12.0	cl	2.5	HNU = 0ppm γB = 100cpm α = 2cpm
13	07724 1330 12/14	2 6 6	10	very stiff yellowish brown 10YR 4/4 silty clay, some sand, gravel, dry. 13.5	cl	2.5	HNU = 0ppm γB = 120 cpm α 2cpm
14	07725 1340 12/14	5 10 15	9	very stiff gray 2.5Y 4/0 clay, some silt and gravel, dry. 15.0	cl	3.0	HNU = 0 ppm γB = 120 cpm α = 2cpm

NOTES: Pennsylvania Drilling Co.
Bucyrus Erie 24-W drilling rig.
Driller: Dave Newman
Helper: Bob Johnson
Blows on sampler follow ASTM standard for 2in x 18in split spoon sampler.
Soil colors follow Munsell color charts. Approx. 700 gallons needed in drilling.

Background Dec. 14, 1987 HNU = 0 ppm γB = 140 cpm α = 2 cpm

366

402-11-86

UC/DH/2-4-88

FERNALD RI/FS

REVIEWED BY QA 16 DATE AUG 16 1991 2731

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2nd Key In	KU	8-12-88
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: ~~B369~~ B3064 BB 15	COORDINATES: Seep1	DATE: 12/14/87	
ELEVATION: Seep1	GWL: Depth	Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 2	OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15–16	07726 1355 12/14	5 6 5	4	stiff gray 10YR 5/1 silty clay, some gravel, sand, dry.	cl	1.5	HNU = 0ppm; γB = 130cpm; α = 2 cpm
17	07727 1405 12/14	3 5 8	6	very stiff gray 10YR 5/1 silty clay, some gravel, sand, dry.	cl	2.5	HNU = 0ppm; γB = 120cpm; α = 2 cpm
18–19	07728 1430 12/14	2 7 13	6	very stiff gray 10YR 5/1 silty clay, some gravel, sand, dry.	cl	4	HNU = 0ppm; γB = 120cpm; α = 2cpm
20–21	07729 1555 12/14	6 6 8	2	very stiff gray 10YR 5/1 silty clay, some gravel, cobbles, sand, dry. 21.0	cl	2.5	HNU = 0ppm; γB = 110cpm; α = 2cpm
22	07730 1610 12/14	3 7 16	9	very stiff gray 10YR 4/1 clay, trace gravel and silt.	cl	3	HNU = 0ppm; γB = 100cpm; α = 2cpm
23–24	07731 1640 12/14	4 7 13	13	very stiff gray 10YR 4/1 clay, some gravel, silt, dry. 24.0	cl	3.5	HNU = 0 ppm; γB = 120 cpm; α = 2cpm
25	07732 0830 12/15	9 19 22	11	very stiff gray 7.5YR 4/0 gravelly clay, some silt, dry.	cl	4	HNU = 0ppm; γB = 120cpm; α = 2 cpm
26	07733 0845 12/15	7 11 14	12	very stiff gray 7.5YR 4/0 gravelly clay, some silt, dry	cl	3.5	HNU = 0 ppm; γB = 100 cpm; α = 2 cpm
27–28	07734 0900 12/15	11 14 20	3	very stiff gray 7.5YR 4/0 gravelly clay, some silt, dry	cl	3	HNU = 0ppm; γB = 100 cpm; α = 2 cpm; No recovery 1st try, 3in. 2nd try.
29–30	07735 0950 12/15	7 10 15	9	very stiff gray 7.5YR 4/0 gravelly clay, some silt, dry	cl	2.5	HNU = 0ppm; γB = 100cpm; α = 2cpm

NOTES:

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B369~~ B304 BB 1-5-89	COORDINATES: See pl	DATE: 12/15/87
ELEVATION: See pl	GWL: Depth Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 3 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/6 ft	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
30	07736 1125 12/15	50 - -	2	gray 7.5YR 5/0 gravelly clay, some silt, dry 31.5	cl	Unk	HNU=0ppm / 50 blows/2 in. γB=100cpm / Insufficient sample for consistency. α=2cpm
32	07737 1150 12/15	9 31 40	16	very stiff gray 10YR 5/1 clay, some gravel, silt, dry. 32.5	cl	3.5	HNU=0ppm γB=100cpm α=2cpm
33				dense gray 10YR 5/1 sand, some silt, clay, dry. 33.0	sm	NA	
34	07738 1440 12/15	19 35 37	13	dense gray 10YR 5/1 gravelly sand, some silt, dry. 34.5	sm	NA	HNU=0ppm γB=100cpm α=2cpm
35							
36	07739 1445 12/15	12 22 27	14	med. dense gray 10YR 4/1 sand with some gravel, silt, dry.	sm	NA	HNU=0 ppm γB<100cpm α=2cpm
37							
38							
39							
40	07740 1545 12/15	40 40 32	14	dense gray 10YR 5/1 sand with some gravel, silt, dry.	sm	NA	HNU=0ppm γB=120cpm α=2cpm
41							
42							
43							
44							
45							

NOTES:

368

402-11-86

20DH/2.4.89

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2nd Key In		12-8-89
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FERNALD RI/FS

REVIEWED BY QA DATE AUG 16 1991

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3-2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B364~~ B3064 ~~BB-57~~	COORDINATES: See DI	DATE: 12/16/87
ELEVATION: See DI	GWL: Depth Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 4 OF 10

2731

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	07741 1620 12/15	27 32 30	14	med. dense gray 10YR5/1 sand with some gravel and silt, dry.	SM	NA	HNU=0 ppm γB=160 cpm α=2 cpm
46							
47							
48							
49				47			
50	07742 0840 12/16	22 35 37	9	dense gray 10YR 5/1 gravelly sand, some silt, trace clay, dry.	SW	NA	HNU=0 ppm γB=100 cpm α=2 cpm
51							
52							
53							
54							
55	07743 0915 12/16	97 for 6 in.	6	very dense gray 10YR 4/1 gravelly sand, some pebbles, some silt and clay, dry.	SW	NA	HNU=0 ppm γB=110 cpm α=2 cpm
56							
57							
58							
59							
60							

NOTES:

369

402-11-86

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B364~~ B3064 BB 1-5-91	COORDINATES: See pl	DATE:
ELEVATION: See pl	GWL: Depth Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 5 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
61	07744 11.40 12/16	22 50 39	10	dense gray 10YR 4/1 gravelly sand, some pebbles, some silt, trace clay, dry.	SW	NA	HNU = 0 ppm γB = 100 cpm α = 2 cpm
62							
63							
64							
65	07745 1345 12/16	33 32 35	7	dense gray 10YR 5/1 gravelly sand, some silt and clay, dry.	SW	NA	HNU = 0 ppm γB = 120 cpm α = 2 cpm
67							
68				68			
69							
70	07746 1550 12/16	13 14 14	8	med. dense gray 10YR 4/1 sand, some silt, trace gravel, moist?	SM	NA	HNU = 0 ppm γB = 140 cpm α = 2 cpm
71							
72							
73							
74							
75							

NOTES:

370

402-11-86

QC/DH/2-4-89

	Initial	Date
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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B369 B3064 BB 2-5-89	COORDINATES: Seep 1.	DATE: 12/17/87	
ELEVATION: Seep	GWL: Depth Date/Time	DATE STARTED: 12/11/87	
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:	
DRILLING METHODS: Cable tool.		PAGE 6 OF 10	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	07747	13		med. dense gray 10YR 4/1 sand with			
76	0230 12/17	26 28	8	some gravel and silt, trace clay, wet.	sm	NA	HNU=0ppm ⅆB=110cpm α=2cpm
77							
78							
79							
80	07748	7		med. dense gray 10YR 4/1 sand with			
81	0955 12/17	12 14	2	some gravel and pebbles, some silt and clay, wet.	sm	NA	HNU=0ppm ⅆB=140cpm α=2cpm
82							
83				83			
84							
85	07749	12		med. dense gray 10YR 4/1 fine grained			
86	1150 12/17	11 14	4	sand, some silt and clay, wet.	sp	NA	HNU=0ppm ⅆB=120cpm α=2cpm
87							
88							
89							
90							

NOTES:

2731

371

402-11-86

FERNALD RI/FS

REVIEWED BY QA 16 DATE AUG 16 1991

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VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602-3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364 B3064 BB 1-5-89	COORDINATES: seep1	DATE: 12/18/87
ELEVATION: seep1	GWL: Depth 72.25 Date/Time 12/17 0915	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 7 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	07750	10		med. dense gray 10YR 4/1 sandy gravel, some silt, uniform fine gravel. 91.0	SP	NA	HNU = 0 ppm
91	1355 12/17	12 21	18	gray 10YR 4/1 fine grained sand layer, some silt and clay. 91.3	SP		βB = 180 cpm α = 2 cpm
92				gray 10YR 4/1 sandy gravel, some pebbles, trace silt, wet.	SP		
93							
94							
95	07751	14		dense gray 10YR 4/1 sand and gravel, some silt and clay, some pebbles, wet.	gm	NA	HNU = 0 ppm
96	1620 12/17	23 38	13				βB = 120 cpm α = 2 cpm
97							
98				98			
99							
100	07752	6		med dense gray 10YR 5/1 fine grained sand, some silt and clay, 2 in. gray 10YR 4/1 sandy gravel lens at 101.3 ft., wet.	SP	NA	HNU = 0 ppm
101	1705 12/17	7 11	12				βB = 130 cpm α = 2 cpm
102							
103				103			
104							
105							

NOTES:

372

402-11-86

FERNALD RI/FS

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	Initial	Date
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2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B364~~ B304 B,B 1-7-88	COORDINATES: Seep	DATE: 12/ /87
ELEVATION: Seep	GWL: Depth 71.05 Date/Time 12/18 0745	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 8 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	07753 0810 12/18	2 3 3	4	very loose grayish brown 10YR 4/2 sandy gravel, trace silt, some ~~clay~~ pebbles; wet.	gp	NA	HNU = 0ppm γB = 120cpm α = 2cpm
106							
107				107.5			
108							
109							
110	07754 1115 12/18	2 4 5	16	loose gray 10YR 4/2 sand with some silt and trace gravel, uniformly fine grained sand, wet. 111.2	sp	NA	HNU = 0ppm γB = 110cpm α = 2cpm
111				gray 10YR 4/1 sandy gravel, some silt, wet, well graded.	gp		
112							
113							
114				114			
115	07755 1405 12/18	19 23 22	18	med dense grayish brown 10YR 5/2 fine grained sand, some silt, wet. 116.0	sp	NA	HNU = 0ppm γB = 100cpm α = 3cpm
116				gray 10YR 4/1 sandy gravel, some silt, well graded, wet.	gp		
117							
118							
119							Had problem with sand coming up casing after bailing.
120							

NOTES:

373

402-11-86

FERNALD RI/FS

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2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364 ~~B3069~~ B3069	COORDINATES: See pl	DATE: 12/19/87
ELEVATION: See pl BB 1-5-89	GWL: Depth 70.35 Date/Time 12/19 0755	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 10 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135	07759	3		med. dense gray 10YR 4/1 sand,	SM	NA	HNU = 0 ppm
136	1920 12/19	9 12	11	some silt and gravel, trace clay, wet.			βB = 100 cpm α = 2 cpm
137							
138							
139							
140				140.0			
141	07760 1110 12/19	7 8 12	12	stiff bluish green 2.5Y 4/0 clay, some silt, moist. At 140.6 ft. the clay is more greenish 5Y 4/1 and is a silty clay, moist.	~~SM~~ CL	2.0	HNU = 0 ppm βB = 120 cpm α = 2 cpm
142	ST 1 1430 12/19						Pushed Shelby tube at 141.5 ft, penetrated 1.1 ft, recovered 1.1 ft.
143				E.O.B. 141.5 ft. Shelby tube to 142.6 ft.			

NOTES:

374

402-11-86

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE AUG 16 1991

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2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B364 B364 BB 1-5-88	COORDINATES: Seept	DATE: 12/18/87	
ELEVATION: Seept	GWL: Depth	Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool		PAGE 9	OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	07756 1530 12/18	15 14 13	6	med. dense gray 10YR 4/1 sand and gravel, some silt, trace pebbles and clay, wet.	gm	NA	HNU = 0ppm BB = 110cpm α = 2cpm
121							
122							
123							
124							
125	07757 1630 12/18	4 8 9	2	loose gray 10YR 4/1 sand and gravel, some silt, trace clay, wet.	gm	NA	HNU = 0ppm BB = 130cpm α = 2cpm
126							
127							
128							
129				129			
130	07758 1720 12/18	6 7 10	12	loose gray 10YR 4/1 sand, some silt and clay, trace gravel, wet.	sm	NA	HNU = 0 ppm BB = 120cpm α = 2cpm
131							
132							
133							
134							
135							

NOTES:

375

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07716	12/11/87 1100	2 3 8	4	SOFT BROWN (7-5YR, 3/2) CLAY, ORGANIC, RICH - DRY. SOFT BROWN (7-5YR, 3/2) CLAY, SOME SILT - DRY.	OH CL	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 160 cpm
3.0	07717	12/11/87 1115	3 10 8	10	FILL, HARD BROWN (10YR, 4/4) SILTY CLAY, SOME GRAVEL, DRY.			Hnu= 0 ppm α = 2 cpm βΓ = 140 cpm
4.5	07718	12/11/87 1120	10 11 18	8	FILL, HARD BROWN (10YR, 4/4) CLAY WITH SOME COBBLES AND SLAG, GRAVEL, DRY.			Hnu= 0 ppm α = 2 cpm βΓ = 140 cpm
6.0	07719	12/11/87 1125	17 21 21	16	HARD, BROWN (10YR, 3/4) CLAY WITH SOME SILT AND GRAVEL, DRY.	CL	>5	Hnu= 0 ppm α = 2 cpm βΓ = 160 cpm
7.5	07720	12/11/87 1130	23 22 21	18	VERY STIFF, YELLOWISH BROWN (10YR, 5/4) CLAY WITH SOME SILT, TRACE GRAVEL.	CL	4	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
9.0	07721	12/14/87 1055	4 8 10	11	VERY STIFF, YELLOWISH BROWN (10YR, 4/4) MOTTLED CLAY WITH SOME SILT, TRACE SAND AND GRAVEL, DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
10.5	07722	12/14/87 1135	5 6 11	17	VERY STIFF, YELLOWISH BROWN (10YR, 4/4) CLAY WITH SOME SILT, TRACE SAND AND GRAVEL, DRY.	CL	4	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
12.0	07723	12/14/87 1150	6 7 10	18	VERY STIFF, YELLOWISH BROWN (10YR, 4/4) CLAY WITH SOME SILT, GRAVEL, TRACE SAND - DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
13.5	07724	12/14/87 1330	2 6 6	10	VERY STIFF, YELLOWISH BROWN (10YR, 4/4) SILTY CLAY, SOME SAND, GRAVEL - DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
15.0	07725	12/14/87 1340	5 10 15	9	VERY STIFF, GRAY (2.5Y, 4/0) CLAY, SOME SILT AND GRAVEL, DRY.	CL	3.0	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm

NOTES:
PENNSYLVANIA DRILLING COMPANY. BUCYRUS ERIE 24-W DRILLING RIG. DRILLER: DAVE NEWMAN. HELPER: BOB JOHNSON. BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2IN X 18IN SPLIT SPOON SAMPLER. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROXIMATELY 700 GALLO

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07726	12/14/87 1355	5 6 5	4	STIFF GRAY, (10YR, 5/1) SILTY CLAY, SOME GRAVEL, SAND - DRY.	CL	1.5	Hnu= 0 ppm α = 2 cpm βΓ = 130 cpm
18.0	07727	12/14/87 1405	3 5 8	6	VERY STIFF, GRAY (10YR, 5/1) SILTY CLAY, SOME GRAVEL, SAND, DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
19.5	07728	12/14/87 1430	2 7 13	6	VERY STIFF, GRAY (10YR, 5/1) SILTY CLAY, SOME GRAVEL, SAND - DRY.	CL	4	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
21.0	07729	12/14/87 1555	6 6 8	2	VERY STIFF, GRAY (10YR, 5/1) SILTY CLAY, SOME GRAVEL, COBBLES, SAND - DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 110 cpm
22.5	07730	12/14/87 1610	3 7 10	9	VERY STIFF, GRAY (10YR, 4/1) CLAY, TRACE GRAVEL AND SILT.	CL	3.0	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
24.0	07731	12/14/87 1640	4 7 13	13	VERY STIFF GRAY 10YR 4/1 CLAY, SOME GRAVEL, SILT, DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
25.5	07732	12/15/87 0830	9 19 22	11	VERY STIFF, GRAY (7.5YR, 4/0) GRAVELLY CLAY, SOME SILT, DRY.	CL	4	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
27.0	07733	12/15/87 0845	7 11 14	12	VERY STIFF, GRAY (7.5YR, 4/0) GRAVELLY CLAY, SOME SILT, DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
28.5	07734	12/15/87 0900	11 14 20	3	VERY STIFF GRAY 7.5YR 4/0 GRAVELLY CLAY, SOME SILT, DRY.	CL	3	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
30.0	07735	12/15/87 0950	7 10 15	9	VERY STIFF GRAY (7.5YR, 4/0) GRAVELLY CLAY, SOME SILT, DRY.	CL	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07736	12/15/87 1125	50	2	GRAY (7.5YR, 5/0) GRAVELLY CLAY, SOME SILT, DRY.	CL		Hnu= 0 ppm α = 2 cpm BΓ = 100 cpm
33.0	07737	12/15/87 1150	9 31 40	16	VERY STIFF, GRAY (10YR, 5/1) CLAY, SOME GRAVEL, SILT, DRY. DENSE GRAY (10YR, 5/1) SAND, SOME SILT, CLAY, DRY.	CL SM	3.5 N/A	Hnu= 0 ppm α = 2 cpm BΓ = 100 cpm
34.5	07738	12/15/87 1440	19 35 37	13	DENSE GRAY (10YR, 5/1) GRAVELLY SAND, SOME SILT, DRY.	SW	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 100 cpm
35.0								
36.5	07739	12/15/87 1445	12 22 27	14	MEDIUM DENSE GRAY (10YR, 4/1) SAND WITH SOME GRAVEL, SILT, DRY	SM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 100 cpm
40.0								
41.5	07740	12/15/87 1545	40 40 32	14	DENSE GRAY (10YR, 5/1) SAND WITH SOME GRAVEL, SILT, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 120 cpm
45.0								

NOTES:

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	07741	12/15/87	1620	27 32 30	14	MEDIUM DENSE GRAY (10YR, 5/1) SAND WITH SOME GRAVEL AND SILT, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 160 cpm
50.0									
51.5	07742	12/16/87	0840	22 35 37	9	DENSE GRAY (10YR, 5/1) GRAVELLY SAND, SOME SILT, TRACE CLAY, DRY.	SW	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
55.0									
56.5	07743	12/16/87	0915	97	6	VERY DENSE GRAY (10YR, 4/1) GRAVELLY SAND, SOME PEBBLES, SOME SILT AND CLAY, DRY.	SW	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 110 cpm
60.0									

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07744	12/16/87 1140	22 50 39	10	DENSE GRAY (10YR, 4/1) GRAVELLY SAND, SOME PEBBLES, SOME SILT, TRACE CLAY, DRY.	SW	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 100 cpm
65.0								
66.5	07745	12/16/87 1345	33 32 35	7	DENSE, GRAY (10YR, 5/1) GRAVELLY SAND, SOME SILT AND CLAY, DRY	SW	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 120 cpm
70.0								
71.5	07746	12/16/87 1550	13 14 14	8	MEDIUM, DENSE GRAY (10YR, 4/1) SAND, SOME SILT, TRACE GRAVEL, MOIST.	SM	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 140 cpm
75.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07747	12/17/87 0830	13 26 28	8	MEDIUM, DENSE GRAY (10YR, 4/1) SAND WITH SOME GRAVEL AND SILT, TRACE CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 110 cpm
80.0								
81.5	07748	12/17/87 0955	7 12 14	2	MEDIUM, DENSE GRAY (10YR, 4/1) SAND WITH SOME GRAVEL AND PEBBLES, SOME SILT AND CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 140 cpm
85.0								
86.5	07749	12/17/87 1150	12 11 14	4	MEDIUM DENSE GRAY (10YR, 4/1) FINE GRAINED SAND, SOME SILT AND CLAY, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
90.0								

NOTES:

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	07750	12/17/87	1355	10 12 21	18	MEDIUM DENSE GRAY (10YR, 4/1) SANDY GRAVEL, SOME SILT, UNIFORM FINE GRAVEL. GRAY (10YR, 4/1) FINE GRAINED SAND LAYER, SOME SILT AND CLAY. GRAY (10YR, 4/1) SAND GRAVEL, SOME PEBBLES, TRACE SILT, WET.	GP SP GP	N/A N/A N/A	Hnu= 0 ppm α = 2 cpm βΓ = 180 cpm
95.0									
96.5	07751	12/17/87	1620	14 28 38	13	DENSE GRAY (10YR, 4/1) SAND AND GRAVEL, SOME SILT AND CLAY, SOME PEBBLES, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
100.0									
101.5	07752	12/17/87	1705	6 7 11	12	MEDIUM DENSE GRAY (10YR, 5/1) FINE GRAINED SAND, SOME SILT AND CLAY 2IN. GRAY (10YR, 4/1) SANDY GRAVEL LENS AT 101.3 FT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 130 cpm
105.0									

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	07753 12/18/87 0810		2 3 3	4	VERY LOOSE GRAYISH BORWN (10YR, 4/2) SANDY GRAVEL, TRACE SILT, SOME PEBBLES, WET.	GP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
110.0								
111.5	07754 12/18/87 1115		2 4 5	16	LOOSE GRAY (10YR, 4/2) SAND WITH SOME SILT AND TRACE GRAVEL, UNIFORMLY FINE GRAINED SAND, WET. YRAY (10YR, 4/1) SANDY GRAVEL, SOME SILT, WET, WELL GRADED.	SP GP	N/A N/A	Hnu= 0 ppm α = 2 cpm βΓ = 110 cpm
115.0								
116.5	07755 12/18/87 1405		19 23 22	18	MEDIUM DENSE GRAYISH BROWN (10YRS, 5/2) FINE GRAINED SAND, SOME SILT, WET. GRAY (10YR, 4/1) SANDY GRAVEL, SOME SILT, WELL GRADED, WET.	SP GP	N/A N/A	Hnu= 0 ppm α = 3 cpm βΓ = 100 cpm
120.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	07756 12/18/87 1530		15 14 13	6	MEDIUM DENSE GRAY (10YR, 4/1) SAND AND GRAVEL, SOME SILT, TRACE PEBBLES AND CLAY, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 110 cpm
125.0								
126.5	07757 12/18/87 1630		4 8 9	2	LOOSE GRAY (10YR, 4/1) SAND AND GRAVE, SOME SILT, TRACE CLAY, WET.	GM	N/A	Hnu= 0 ppm α = 3 cpm βΓ = 130 cpm
130.0								
131.5	07758 12/18/87 1720		6 7 10	12	LOOSE GRAY (10YR, 4/1) SAND, SOME SILT AND CLAY, TRACE GRAVEL, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 120 cpm
135.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3064	COORDINATES: NORTH 480,730.53 EAST 1,382,184.22	DATE: 12/11/87
GROUND ELEVATION: 588.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED:
DRILLING METHODS: CABLE-TOOL		PAGE 10 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
136.5	07759	12/19/87	0920	3 9 12		11		MEDIUM DENSE GRAY (10YR, 4/1) SAND, SOME SILT AND GRAVEL, TRACE CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 100 cpm
140.0											
141.5	07760	12/19/87	1110	7 8 12		12		STIFF, BLUISH GREEN (2.5Y, 4/0) CLAY, SOME SILT, MOIST. AT 140.6 FT. THE CLAY IS MORE GREENISH (5Y, 4/1) AND IS A SILTY CLAY, MOIST.. PUSHED SHELBY TUBE AT 141.5 FT, PENETRATED 1.1FT, RECOVERED 1.1 FT.	CL	2.0	Hnu= 0 ppm α = 2 cpm BΓ = 120 cpm

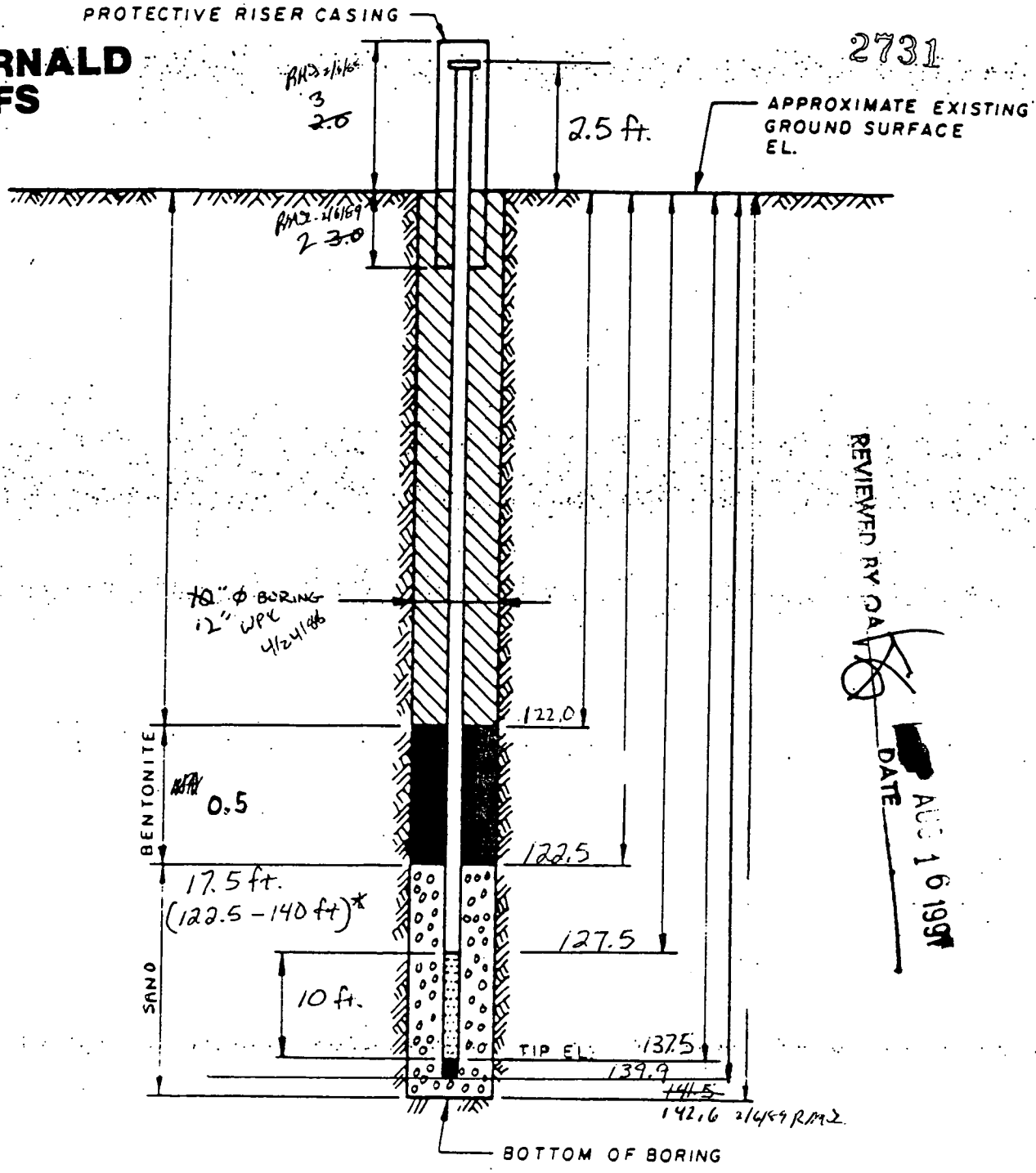
BOTTOM OF BORING 141.5

NOTES:

QC/DH/2-4-89 WELL ~~364~~ 3064 BB 1-5-89 #39

2731

FERNALD RI/FS



REVIEWED BY DATE AUG 16 1989

DRAWING NUMBER

CHECKED BY

APPROVED BY

N

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 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 72.25 ft.
5. WATER LEVEL READING ON 12/23/87 0915

INSTALLATION DETAILS
MONITORING WELL ~~364~~

PREPARED FOR 3064 BB 1-5-89

386

* Bottom 1.5 ft. of borehole caved in, sand is from 122.5 to 140 ft.

QC/DH/2-4-89

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

FERNALD RI/FS

REVIEWED BY QA DATE AUG 1 6 1991

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. T. Sullivan DATE 12/23/87
PROJECT NO. 602.3.2 CHECKED BY R Galbraith DATE 2/6/89
BORING NO. ~~364~~ 3064 RR 1-5-89
PIEZOMETER NO. ~~364~~ 3064 DATE OF INSTALLATION finished 1-10-88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED: NA
FLUID WATER FROM 0 TO 65 ft.
FLUID NA FROM NA TO NA

TYPE OF BIT FLATHEAD
CASING SIZE (S) USED: NA
SIZE 10" ID FROM 0 TO 141.5 ft.
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4 in.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 FT

RISER PIPE MATERIAL Stainless steel (316)
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4 in.
LENGTH OF PIPE SECTIONS 10 ft.
JOINING METHOD Screw. FLUSH JOINT THREADS.

PROTECTION SYSTEM

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

OTHER PROTECTION LOCKING CAP AND LOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.5		58.7	
GROUND SURFACE	0.0		588.2	
BOTTOM OF PROTECTIVE PIPE	2.0 RMG 2/6/89		586.2	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0	BOTTOM 122.5	TOP 586.2	BOTTOM 465.7
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP 122.5	BOTTOM 141.5	TOP 465.7	BOTTOM 446.7
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 127.5	BOTTOM 137.5	TOP 460.7	BOTTOM 450.7
PIEZOMETER TIP	139.9		448.3	
BOTTOM OF BOREHOLE	~~141.5~~ 142.6 RMG 2/6/89		445.6	
GWL AFTER INSTALLATION	72.25 (12/23, 0915) TOC - WPK 4/24/88		variable	
	71.7 1-10-88 1515 TOC			

387

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

REMARKS While out corrections were made by T. Sullivan at the time this form was completed. WPK 4/24/88

MONITORING WELL INSTALLATION RECORD
11/21/91

OJECT NAME: Fernald RI/FS
OJECT NO. : 602.3.2
RING NO. : 3064
.L NUMBER: 3064

FIELD ENG./GEO.: T. SULLIVAN DATE: 12/23/87
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 480730.53, 1382184.2
DATE OF INSTAL.:

2731

OLE DRILLING

ING METHOD: Cable Tool
LING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 65
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 141.5
SIZE: N/A FROM: N/A TO: N/A

.L DESCRIPTION

YPE: MONITORING WELL
IAMETER OF PERFORATED SECTION:
ERFORATION TYPE: Screen
VG. SIZE OF PERFORATIONS: 0.010 (In.)
OTAL PERFORATED AREA: 10 Ft.
OTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

ISER JOINING METHOD: SCREW FLUSH JOINT THREADS

TECTION SYSTEM

ISER PROTECTIVE PIPE LENGTH: 5 Ft.
ROTECTIVE PIPE O.D.: 10 3 In.
* LOCKING CAP AND LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
OP OF RISER PIPE	2.5 Ft.		590.34	
ROUND SURFACE	0.0		588.2	
OTTOM OF PROTECTIVE PIPE	3.0 Ft.			
OREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	2.0	122.5	N/A	N/A
Sand	122.5	141.5	N/A	N/A
ERFORATED SECTION	127.5	137.5	N/A	N/A
TIP	139.9		N/A	
M OF BOREHOLE	141.5		N/A	
E AFTER INSTALLATION	72.25		N/A	

THE WELL FLUSHED AFTER INSTALLATION? : No
A SENSITIVITY TEST PERFORMED ON THE WELL : No

MARKS -- COMMENT AREA

ARKS : WHITE OUT CORRECTIONS WERE MADE BY T. SULLIVAN AT THE TIME THIS FORM WAS COMPLETED.
MENTS:

WELL 3066

FMC

FERNALD RI/FS

EAR NW 2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 366	COORDINATES:	DATE: 9-16-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth, Date/Time	DATE COMPLETED: 9-19-87
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
62.5				FOR DESCRIPTION OF SOILS FROM 0 – 62.0 ft SEE VISUAL CLASSIFICATION OF SOILS FROM WELL 266.			
				62.0			
63.5	ST 7041	NA	24				SHELBY TUBE.
65							
66.5	7035 7036	6 23 50	14	HARD, GRAY SILT, SOME CLAY, - MOIST	ML		SAMPLE SCANNED – BACKGROUND READINGS.
							ADDED 20 GALLONS WATER.
				68.5			
70							
71.5	7037 7038	15 25 40	18	HARD GRAY SILTY CLAY - DRY	CL	2.25 TONS/FT²	SAMPLE SCANNED – BACKGROUND READINGS

NOTES: SEE LOG FROM WELL # 266 FOR DESCRIPTION OF FIRST 62'.

RIG - CYCLONE 42

DRILLER - HARRY CYMOS

ASSISTANT - TIM HARRIS

BACKGROUND READINGS

HNU - ZERO

ALPHA - 0 COUNTS/MIN.

BETA/GAMMA - 40-80 COUNTS/MIN.

390

402-11-86

YML

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 366	COORDINATES:		DATE: 9-16-87
ELEVATION: 578.2 (Concrete)	GWL: Depth	Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED: 9-19-87
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
70.5	7039 7040	8 15 19	16	HARD GRAY SILTY CLAY-MOIST	CL	1.5	SAMPLE SCANNED - BACKGROUND READINGS.
80				79.5			ADDED 25 GALLONS WATER.
81.5	7042 7043	11 22 31	18	HARD GRAY CLAY, TRACE SILT, - DRY	CL	3.0	SAMPLE SCANNED - BACKGROUND READINGS.
85				84.0			
87.5							
89	7044 7045	6 15 14	18	MEDIUM DENSE GRAY FINE SAND - WET 88.5	SP	.20	SAMPLE SCANNED - BACKGROUND READINGS.
				GRAY CLAY, SOME SAND, TRACE SILT 89.3	CL		

NOTES: SEE LOG FROM WELL #266 FOR DESCRIPTION OF FIRST 62'.

RIG - CYCLONE 42
DRILLER - HARRY DYATES
ASSISTANT - TIM HARRIS

BACKGROUND READINGS

HNU - 2 E120
ALPHA - 0 COUNTS/MIN.
BETA/GAMMA - 40-80 COUNTS/MIN.

391

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 3/6	COORDINATES:		DATE: 9-17-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: D. OATLEY	Depth	Date/Time	DATE COMPLETED: 9-19-87
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 7:30 9-17-87
91.5	7046 7047	7 9 11	18	MEDIUM DENSE DARK GRAY FINE GRAINED SAND, TRACE CLAY AND SILT - WET. 91.4	SP	.20	SAMPLE SCANNED - BACKGROUND READINGS.
				GRAY CLAY, TRACE SAND AND SILT 92	CL		ADDED 25 GALLONS WATER.
95				DARK GRAY FINE GRAINE SAND. 94.5	SP		
96.5	7048	30 50REF	8	~~DRY~~ HARD GRAY CLAY, SOME SILT, TRACE SAND - DRY	CL	2.5	SAMPLE SCANNED - BACKGROUND READINGS.
100				99			ADDED 20 GALLONS WATER.
101.5	7049	9 14 25	13	HARD GRAY SILT, SOME CLAY, TRACE SAND - DRY	ML	.75	SAMPLE SCANNED - BACKGROUND READINGS
							ADDED 20 GALLONS WATER.

NOTES: SEE LOG FROM WELL #266 FOR FIRST 62'.

392

RIG - CYCLONE 42
DRILLER - HARRY DYMES
ASSISTANT - TIM HARRIS

BACKGROUND READINGS

HNU - @ ZERO
ALPHA - 0 COUNTS/MIN
BETA/GAMMA - 40-80 COUNTS/MIN.

402-11-88

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 366	COORDINATES:	DATE: 9-17-87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 9-19-87	
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
106.5	7050 7051	27 50 REF. 50	16	HARD GRAY SILTY CLAY, TRACE SAND - DRY	CL	3	SAMPLE SCANNED - BACKGROUND READINGS
110							ADDED 25 GALLONS WATER.
111.5	7052 7053	11 24 43	18	HARD DRY SILTY CLAY	CL	2.5	SAMPLE SCANNED - BACKGROUND READINGS
113.5	ST 7054	NA	23				SHELBY TUBE
115							ADDED 20 GALLONS WATER.
116.5	7055	11 16 23	12	HARD GRAY SILTY CLAY - DRY	CL	2.5	SAMPLE SCANNED - BACKGROUND READINGS
							7:30 9-18-87

NOTES: SEE LOG FROM WELL #266 FOR FIRST 62'.

RIG - CYCLONE 42
DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS

BACKGROUND READINGS
HNU - ZERO
ALPHA - 0 COUNTS/MIN.
BETA/GAMMA - 40-80 COUNTS/MIN.

393

402-11-88

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 366	COORDINATES:		DATE: 9-18-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED: 9-19-87
DRILLING METHODS: CABLE TOOL			PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	7056	12	18	HARD GRAY CLAY, TRACE SILT - MOIST	CL	2.0	SAMPLE SCANNED - BACKGROUND READINGS
	7057	16 21		DENSE GRAY SAND, SOME CLAY - MOIST	SP	1.0	
121.5				DENSE DARK GRAY SAND, SOME CLAY, TRACE GRAVEL - MOIST	SW	0.5	
125							
	7058	16 25	18	VERY DENSE GRAY SAND, TRACE GRAVEL, TRACE CLAY - WET, MEDIUM GRAIN SIZE.	SW	0.2	SAMPLE SCANNED - BACKGROUND READINGS
126.5	7059	50					WELL MAKING LARGE AMOUNTS OF WATER - 55' WATER IN CASING.
130							
	7060	17	18	VERY DENSE GRAY COARSE SAND, SOME GRAVEL - WET	SW	0.3	SAMPLE SCANNED - BACKGROUND READINGS
131.5	7061	38 46					ADDED 25 GALLONS WATER.

NOTES: SEE LOG FROM WELL # 266 FOR FIRST 62'.

394

RIG - CYCLONE 42
DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS
SCREEN SET FROM 125-135'.

BACKGROUND
HNU - ZERO
ALPHA - 0 COUNTS/MIN.
BETA/GAMMA - 40-80 COUNTS/MIN.

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 366	COORDINATES:	DATE: 9-18-87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-14-87	
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 9-19-87	
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 7	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136.5	7062	11 17 31	8	VERY DENSE GRAY SAND - WET MEDIUM GRAIN SIZE	SP	0.2	FIRST SPLIT SPOON EMPTY - PUT IN TRAP. SAMPLE SCANNED - BACKGROUND READINGS.
140				139			
141.5	7063 7064	9 18 19	18	HARD ~~GRAY~~ DARK GRAY SANDY CLAY, TRACE SILT - MOIST	CL	1.0	SAMPLE SCANNED - BACKGROUND READINGS
145							
146.5	–	17 50 50	0				~~AS~~ TWO ATTEMPTED SPLIT SPOONS WERE EMPTY.
148							
149.5	7065 7066	21 31 35	15	GRAY SANDY CLAY - MOIST 148.5 HARD, GRAY CLAY, SOME SILT - MOIST	CL	.75	SAMPLE SCANNED - BACKGROUND READINGS.

NOTES: SEE LOG FROM WELL #266 FOR FIRST 62'.

395

216 - CYCLONE 42

DRILLER - HARRY DYKES

ASSISTANT - TIM HARRIS

BACKGROUND

HNU - ZERO

ALPHA - 0 COUNTS/MIN.

BETA/GAMMA - 40-80 COUNTS/MIN.

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 607	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 366	COORDINATES:	DATE: 9-19-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 9-14-87
ENGINEER/GEOLOGIST: D. OAHLEY	Depth Date/Time	DATE COMPLETED: 9-19-87
DRILLING METHODS: CABLE TOOL		PAGE 7 OF 7

DEPTH (FT) 150	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
152	ST-7067	NA	20	HARD, GRAY SILTY CLAY, MOIST. SAMPLE TD 152 ft.			SHELBY TUBE DESCRIPTION based on previous sample and classification of soils observed at ends of tube

NOTES: SEE LOG FROM WELL #266 FOR FIRST 62'.

396

RIG - CYCLONE 42
DRILLER - HARRY DYKES
ASSISTANT - TIM HARRIS

~~BACKGROUND~~

HOLE TD 150' - SHELBY TAKEN FROM 150 TO 152' - APPARENTLY IN SILTAND CLAY.

402-11-86

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5								
63.5	07041 09/16/87 0950			24	FOR DESCRIPTION OF SOILS FROM 0-62.0 FT SEE VISUAL CLASSIFICATION OF SOILS FROM WELL 266.			
65.0								
66.5	07036 07035 09/16/87 1050		6 23 50	14	HARD GRAY SILT, SOME CLAY, MOIST.	ML	N/A	
70.0								
71.5	07038 07037 09/16/87 1300		15 25 40	18	HARD GRAY SILTY CLAY - DRY.	CL	2.25	
75.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SEE LOG FROM WELL #266 FOR DESCRIPTION OF FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. BACKGROUND READINGS - HNU - ZERO. ALPHA - 0 COUNTS/MIN. BETA/GAMMA - 40-80 COUNTS/MIN.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07039 07040 09/16/87 1340		8 15 19	16	HARD GRAY SILTY CLAY - MOIST.	CL	1.5	
80.5								
81.5	07043 07042 09/16/87 1500		11 22 31	18	HARD GRAY CLAY, TRACE SILT - DRY.	CL	3.0	
87.5								
89.0	07044 07045 09/16/87 1545		6 15 14	18	MEDIUM DENSE GRAY FINE SAND - WET. GRAY CLAY, SOME SAND, TRACE SILT.	SP CL	0.2	
90.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SEE LOG FROM WELL #266 FOR DESCRIPTION OF FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. BACKGROUND READINGS - HNU-ZERO, ALPHA-0 COUNTS/MIN. BETA/GAMMA - 40-80 COUNTS/MIN.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS	SYMBOL	TSF	REMARKS
91.5	07047 07046 09/17/87 0830	7 9 11		18	MEDIUM DENSE DARK GRAY FINE GRAINED SAND, TRACE CLAY AND SILT - WET. GRAY CLAY, TRACE SAND AND SILT.	SP CL		0.2	
95.0									
96.5	07048 09/17/87 0930	30 50		8	HARD DRY CLAY,M SOME SILT, TRACE SAND - DRY.	CL		2.5	
100.0									
101.5	07049 09/17/87 1130	9 14 25		13	HARD GRAY SILT, SOME CLAY, TRACE SAND - DRY.	ML		.75	
105.0									

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. ADDED 20 GALLONS WATER. SEE LOG FROM WELL #266 FOR FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. BACKGROUND READINGS - HNU - 0 ZERO, ALPHA - 0 COUNTS/MIN, BETA/GAMMA - 40-80 COUNTS/

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	07050 07051 09/17/87 1230		27 50 50	16	HARD GRAY SILTY CLAY, TRACE SAND - DRY.	CL	3.0	
110.0								
111.5	07053 07052 09/17/87 1400		11 24 43	18	HARD DRY SILTY CLAY.	CL	2.5	
113.5	07054 09/17/87 1500			23				
115.0								
116.5	07055 09/17/87 1545		11 16 23	12	HARD GRAY SILTY CLAY - DRY.	CL	2.5	
120.0								

NOTES:
SAMPLE SCANNED BACKGROUND READINGS. 7:30 9-18-87. SEE LO FROM WELL #266 FOR FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. BACKGROUND READINGS - HNU - ZERO, ALPHA - 0 COUNTS/MIN. BETA/GAMMA - 40-80 COUNTS/MIN.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	07056 07057 09/18/87 0830		12 16 26	18	HARD GRAY CLAY, TRACE SILT - MOIST. DENSE GRAY SAND, SOME CLAY - MOIST. DENSE DARK GRAY SAND, SOME CLAY, TRACE GRAVEL - MOIST.	CL SP SW	2.0 1.0 0.5	
125.0								
126.5	07059 07058 09/18/87 0920		16 25 50	18	VERY DENSE GRAY SAND, TRACE GRAVEL, TRACE CLAY, WET, MEDIUM GRAIN SIZE.	SW	0.2	
130.0								
131.5	07060 07061 09/18/87 1030		17 38 46	18	VERY DENSE GRAY COARSE SAND, SOME GRAVEL - WET.	SW	0.3	
135.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. ADDED 25 GALLONS WATER. GSEE LOG FROM WELL #266 FOR FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. SCREEN SET FROM 125-135. BACKGROUND - HNU - ZERO, ALPHA - 0 COUNTS/MIN., BETA/GAMM

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 7

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
136.5	07062	09/18/87 1440	11 17 31	8	VERY DENSE GRAY SAND - WET, MEDIUM GRAIN SIZE.	SP	0.2	
140.0								
141.5	07064 07063	09/18/87 1615	9 18 19	18	HARD DARK GRAY SANDY CLAY, TRACE SILT - MOIST.	CL	1.0	
148.0								
149.5	07066 07065	09/19/87 0840	21 31 35	15	GRAY SANDY CLAY - MOIST. HARD, GRAY CLAY, SOME SILT - MOIST.	CL	.75	
150.0								

NOTES:
SAMPLE SCANNED - BACKGROUND READINGS. SEE LOG FROM WELL #266 FOR FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. BACKGROUND - HNU - ZERO, ALPHA - 0 COUNTS/MIN., BETA/GAMMA - 40-80 COUNTS/MIN.

VISUAL CLASSIFICATION OF SOILS

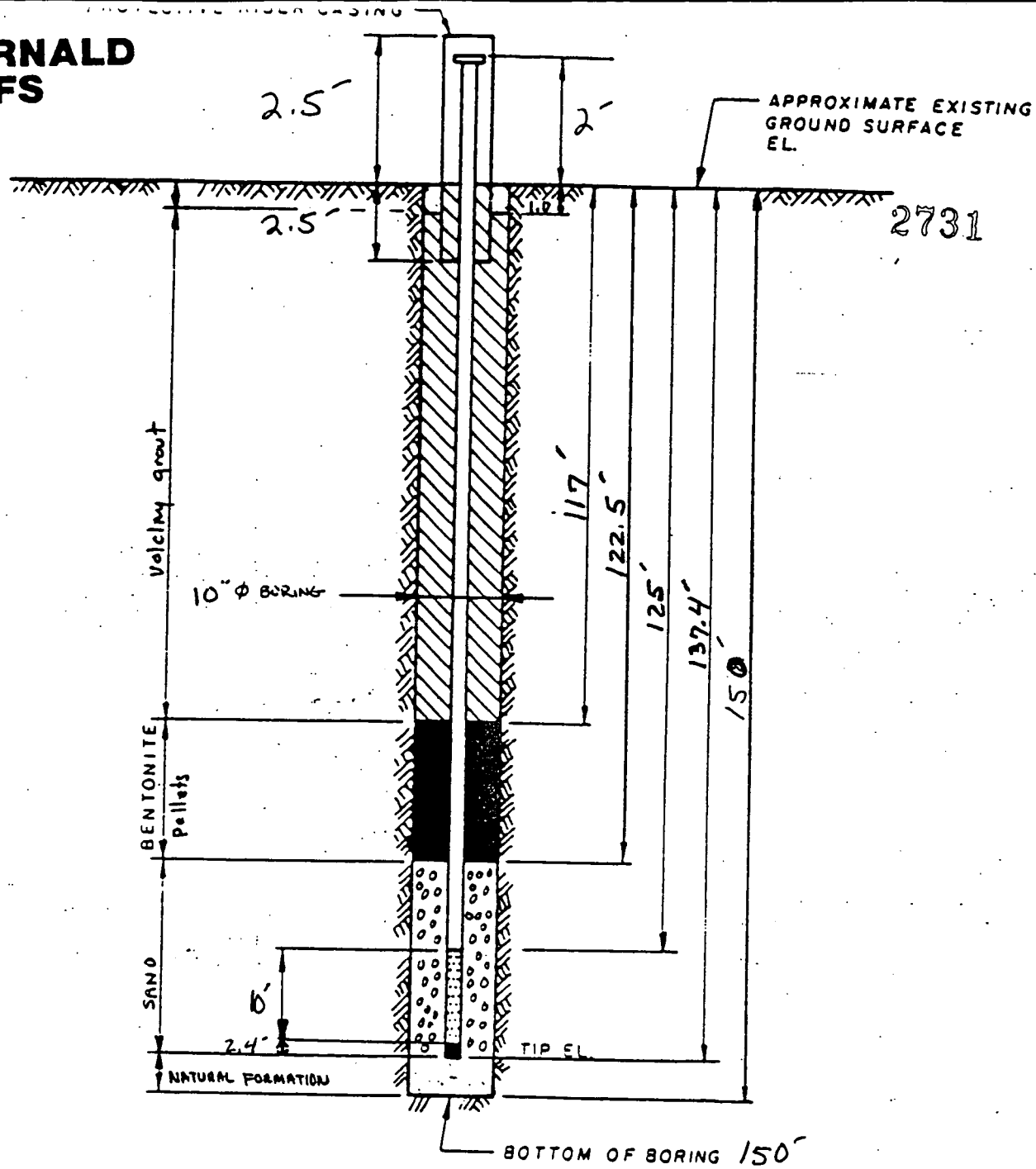
PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS 2731	
BORING NUMBER: 3066	COORDINATES: NORTH 483,951.29 EAST 1,376,706.24	DATE: 09/16/87
GROUND ELEVATION: 578.2	GWL: Depth N/A Date/Time N/A	DATE STARTED: 09/16/87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth N/A Date/Time N/A	DATE COMPLETED: 09/22/87
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF 7

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
152.0	07067	09/19/87	1250		20	HARD, GRAY SILTY CLAY, MOIST. SAMPLE TD 152 FT.			

BOTTOM OF BORING 152

NOTES:
SHELBY TUBE. DESCRIPTION BASED ON PREVIOUS SAMPLE AND CLASSIFICATION OF SOILS OBSERVED AT ENDS OF TUBE. SEE LOG FROM WELL #266 FOR FIRST 62. RIG - CYCLONE 42. DRILLER - HARRY DYKES. ASSISTANT - TIM HARRIS. HOLE TD 150 - SHELBY TAKEN FROM 150 TO 152

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED. FLUSH-JOINTED.
2. SCREEN IS 4 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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 366

PREPARED FOR

FMPC RI/FS

DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
DRAWN BY	DB O

404

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

2731

PROJECT NAME FERNALD RI/FS
PROJECT NO. 602
BORING NO. 366
PIEZOMETER NO. 366

FIELD ENG./GEO. D. OAKLEY DATE 9-22-87
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 9-22-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 5' TO 132'
FLUID — FROM — TO —

TYPE OF BIT FLAT HEAD HAMMER
CASING SIZE (S) USED: TEMPORARY
SIZE 10" FROM 0 TO 150'
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE 316 STAINLESS STEEL MONITORING WELL
DIAMETER OF PERFORATED SECTION 4" ID
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA 15'

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4"
LENGTH OF PIPE SECTIONS 10 FT.
JOINING METHOD THREAD AND COUPLE
(FLUSH JOINT THREADED)

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.
PROTECTIVE PIPE O.D. 10 INCHES

OTHER PROTECTION LOCKABLE CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0 FT.			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT.			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY VOLCLAY	TOP 1'	BOTTOM 117'	TOP	BOTTOM
BENTONITE PELLETS	TOP 117'	BOTTOM 122.5'	TOP	BOTTOM
SAND	TOP 122.5'	BOTTOM 137.4'	TOP	BOTTOM
FORMATION	TOP 137.4'	BOTTOM 152	TOP	BOTTOM
PERFORATED SECTION	TOP 125'	BOTTOM 135'	TOP	BOTTOM
PIEZOMETER TIP	137.4			
BOTTOM OF BOREHOLE	152			
GWL AFTER INSTALLATION				

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

405

REMARKS SHELBY TUBE TAKEN FROM 150'-152'

WELL TO BE DEVELOPED LATER.

409-11-86

WELL 3067

QC/DH/2.4.89

	Initial	Date
1st Key In		
2nd Key In	RR	8/16/88
Final Copy Verification		

PAL

FERNALD RI/FS

COPY

2731

32

VISUAL CLASSIFICATION OF SOILS

WPK 4/23/88

RIG # 3

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B36T~~ B306708	COORDINATES: N 479760.13 E 1382998.18	DATE: Nov 21, 1987
ELEVATION: 595.15 top 1-5-88	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Willo	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 1 OF 10

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ Ft)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	11-20 1330 7427	8 14 18	13	Soft black 7½YR 3/0 sandy clay some silt, organic plant matter - moist ½	Oh	NA	HNU = 0 ppm
				rock - slag 1	NA	NA	βB = 60 cpm
				Fill: (hard yellowish brown silty clay, trace sand and gravel slag - dry 1½	NA	>5	α = 2 cpm
2	11-20 1335 7428	16 10 10	12	Fill: (hard yellowish brown 10YR 5/4 silty clay some sand and gravel slag - dry	NA	>5	HNU = 0 ppm βB = 60 cpm α = 2 cpm
3							
4	11-20 1340 7429	9 10 11	10	Fill: (hard yellowish brown 10YR 5/4 mottled gray 10YR 5/1 and brownish yellow 10YR 6/8 silty clay some sand and gravel slag - dry 4.6	NA NA	>5	HNU = 0 ppm βB = 80 cpm α = 20 cpm
5	11-20 1345 7430	10 10 12	11	hard yellowish brown 10YR 5/6 mottled gray 10YR 5/1 and red(?) silty clay some sand and gravel - dry	Cl	>5	HNU = 0 ppm βB = 70 cpm α = 20 cpm
6							
7	11-20 1350 7431	8 10 12	10	hard yellowish brown 10YR 5/6 mottled dark gray 10YR 4/1 silty clay some sand trace gravel and pebbles - dry	cl	>5	HNU = 0 ppm βB = 60 cpm α = 20 cpm
8	11-20 1645 7432	4 9 20	11	hard yellowish brown 10YR 5/6 mottled gray 10YR 5/1 silty clay some sand trace gravel - dry 8½	cl	>5	HNU = 0 ppm βB = 70 cpm α = 20 cpm
9				hard yellowish brown 10YR 5/6 gravelly clay some silt and sand - dry 9	cl		
10	11-20 1700 7433	6 15 21	11	hard yellowish brown 10YR 5/4 gravelly clay, some silt and sand, trace pebbles - dry	cl	>5	HNU = 0 ppm βB = 60 cpm α = 20 cpm
11	NS	NA	NA	11.5		NA	0935 pushed Shelby tube - No return 1.2 ft
12							
13	11-21 1015 7434	8 10 16	12	hard gray 10YR 5/1 gravelly clay some silt and sand, trace pebbles - dry	cl	>5	HNU = 0 ppm βB = 60 cpm α = 2 cpm
14	11-21 1040 7435	8 13 22	12	hard gray 10YR 5/1 gravelly clay some silt and sand - dry	cl	>5	HNU = 0 ppm βB = 70 cpm α = 2 cpm

407

NOTES:
Pennsylvania Drilling Co
Bucyrus Erie 24-W drilling rig
Driller Dave Neuman
Helper Bob Johnson
Blows on sampler follow ASTM standard for 2 in by 18 in split spoon sampler
Soil color description follow Munsell color chart

Background Nov 20, 1987
HNU = 0 ppm
βB = 60 cpm
α = 2 cpm

QC/DH/24.89

	Initial	Date
1st Key In		
2nd Key In		8/16/88
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PAC

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 BB 1-5-89	COORDINATES: see p1	DATE: Nov 21, 1987
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Howell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable Tool		PAGE 2 OF 10

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (density and consistency based on relative soil texture)
16	11-21 1160 7436	2 10 13	3	hard gray 10YR 6/1 gravelly clay, some silt, sand, trace pebbles - dry	cl	UNKOWN NA	No return first try, second try got 3 inches HNU = 0 ppm γβ = 60 cpm α = 2 cpm
17 18	11-21 1120 7437	4 9 13	10	hard gray 10YR 6/1 silty clay, trace sand and gravel, dry	cl	4.5	HNU = 0 ppm γβ = 70 cpm α = 2 cpm
19	11-21 1140 7438	6 9 13	18	very stiff gray 10YR 6/1 silty clay, some sand, trace gravel, dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
20 21	NS	NA	NA			NA	HNU = 0 ppm γβ = 70 cpm α = 1 cpm Pushed Shelby tube 1.3 feet got 0.2 return did not keep sample
22	11-21 1430 7439	3 6 10	11	very stiff gray 10YR 5/1 silty clay, some sand, trace gravel - dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
23 24	11-21 1450 7440	8 6 10	14	very stiff gray 10YR 5/1 gravelly clay some silt and sand - dry	cl	3.5	HNU = 0 ppm γβ = 80 cpm α = 3 cpm
25	11-21 1500 7441	3 5 7	14	very stiff gray 10YR 5/1 gravelly clay some silt, trace sand - dry	cl	3.2	HNU = 0 ppm γβ = 70 cpm α = 2 cpm
26 27	11-21 1515 7442	3 8 34	2	rock, very stiff gray 10YR 6/1 gravelly clay some silt and sand - dry	NA	NA	HNU = 0 ppm γβ = 80 cpm α = 2 cpm
28	11-21 1530 7443	13 13 17	12	hard gray 10YR 6/1 gravelly clay some sand, silt and pebbles, trace pebbles - dry	cl	<5	HNU = 0 ppm γβ = 60 cpm α = 1 cpm
29	11-21 1600 7444	7 10 28	12	very stiff gray 10YR 5/1 gravelly clay, some sand, silt and pebbles dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 0 cpm

NOTES:

408

402-11-86

QC/DH/2.4.89

PHC

FERNALD RI/FS

2731

	Initial	Date
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 60232	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 BB 1-5-89	COORDINATES: see p1	DATE: Nov 22, 1987
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 3 OF 10

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1½ ft	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	11-22 730 7445	8 10 15	10	very stiff gray 10YR 5/1 gravelly clay ~~sandy~~ silt and ~~sand~~, trace pebbles dry 31½ 10YR5/8	cl	3.5	HNU=0ppm βB=70cpm α=2cpm
32 33	11-22 810 7446	3 16 27	8	dense yellowish brown sand, some silt and clay, trace gravel - dry	sp	NA	HNU=0ppm βB=60cpm α=0cpm
34	11-22 900 7447	8 12 13	12	dense brownish yellow 10YR 5/6 sand some silt and clay, trace gravel dry	sp	NA	HNU=0ppm βB=60cpm α=0cpm
35							
36	11-22 920 7448	8 18 19	12	dense brownish yellow 10YR 5/6 sand and fine ~~sand~~ gravel - some silt, trace clay and pebbles - dry	sp	NA	HNU=0ppm βB=60cpm α=0cpm
37							
38							
39							
40							
41	12-1 945 7449	32 38 50	18	dense yellowish brown 10YR 6/8 sand and gravel, some silt and clay, dry	sm	NA	HNU=0ppm βB=800cpm α=2cpm
42							
43							
44							

NOTES:

409

402-11-86

QC/ DH/2.4.84

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2731

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 7602.32	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3167	COORDINATES: see p1	DATE: 12/1/87
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 4 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ ft)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	12-1 1340 7450	26 36 37	12	dense yellowish brown 10YR 6/8 sand and fine gravel, some silt, clay and med to coarse gravel, dry.	SM	NA	HNU = 0ppm γB = 80cpm α = 2cpm
47							
48							
49							
50	12-1 1550 7451	20 23 30	8	med. dense, yellow brown 10YR 6/8 sand and gravel, some silt, clay and med. to coarse gravel, brown silty fine sand lens @ 50.5 ft., dry.	SM	NA	HNU = 0ppm γB = 60cpm α = 2cpm
51							
52							
53							
54							
55	12-1 1630 7452	16 30 42	11	dense brown 10YR 6/4 sand and gravel, some silt, dry. 56.0	SM	NA	HNU = 0ppm γB = 80 cpm α = 2cpm
56				brown-gray 10YR 6/3 med. sand, some silt, clay, gravel, dry.	SM		
57							
58							
59							

NOTES:

410

402-11-86

QC/DH/2.4.89

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2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3067	COORDINATES: See p1	DATE: 12/2/87
ELEVATION: See p1	GWL: Depth – Date/Time –	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille/T. Sullivan	Depth – Date/Time –	DATE COMPLETED: 12/6/87
DRILLING METHODS:		PAGE 5 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60	07453 12-2 0820	11 33 42	12	dense brown gray 10YR 5/4 sand with some gravel and pebbles, some silt and clay, dry.	SM	NA	HNU = 0ppm γB = 80cpm α = 2 cpm
61							
62							
63							
64							
65	07454 12-2 1130	75 for 6in-	6	very dense brown 10YR5/3 sand and gravel, some silt and clay, trace pebbles, dry.	SM	NA	HNU = 0ppm γB = 60cpm α = 2 cpm
66							
67							
68							
69							
70	07700 12-2 1420	16 33 29	9	med. dense, brown-gray 10YR 5/3 sand and gravel, some pebbles, silt and clay, dry.	SM	NA	HNU = 0ppm γB = 60cpm α = 2cpm
71							
72							
73							
74							
75							

NOTES:

411

402-11-86

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RI/FS

QC/DW/24.89

2731

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2nd Key In		8/16/88
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B3067~~ B3069 ~~88 1/1/89~~	COORDINATES: see p1	DATE: 12/2/87
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille/T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS:		PAGE 6 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75	07701 12-2 1520	16 13 18	6	med. dense, dark brown gray 10YR 4/1. Sand with trace gravel, some silt, clay, moist.	SM	NA	HNU = 0ppm γB = 60cpm α = 2cpm
76							
77							
78							
79							
80	07702 12-2 1710	11 15 11	10	med dense, gray 10YR 4/1, sand and gravel, with some silt, pebbles, and clay, wet.	SM	NA	HNU = 0ppm γB = 60cpm α = 2cpm
81							
82							
83							
84				84.0 very dense gray 10YR 4/1 fine sand, some silt and clay - wet.	SW		
85	7703 12-3 1140	48 72	10	85.5 very dense gray 10YR 4/1 sand and gravel some silt and clay - wet	SM	NA	HNU = 0ppm γB = 80cpm α = 2cpm
86							
87							
88							
89							
90							

NOTES:

412

402-11-86

QC/DH/2-4-89

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FERNALD RI/FS

2731

	Initial	Date
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2nd Key In	BB	8/16/88
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B369~~ B3067 BB 1-5-89	COORDINATES: see p1	DATE: 12-3-87
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 11-20-87
ENGINEER/GEOLOGIST: L. Wille / T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable Tool		PAGE 7 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ ft)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	7707 12-3 1400	7 7 14	15	medium dense gray 10YR 4/1 sand with some gravel, silt and clay, some gravel lens, with some silt, pebbles sand and clay @ 91 ft - wet	SM	NA	HNU = 0 ppm γB = 80 cpm α = 2 cpm
92							
93							
94							
95	7705 12-3 1620	32 63	18	very dense gray 10YR 4/1 sand with some ~~some~~ silt, gravel and clay - wet	SM	NA	HNU = 0 ppm γB = 100 cpm α = 2 cpm
96							
97							
98							
99							
100	7706 12-4 0900	5 5 11	10	medium dense, gray 10YR 4/1 sand with some gravel, silt and clay - wet	SM	NA	HNU = 0 ppm γB = 80 cpm α = 2 cpm
101				medium dense gray 10YR 4/1 sandy gravel, some silt and clay, trace pebbles	gm		
102							
103							
104							

NOTES:

413

402-11-88

QC/DH/24-89

PAC

FERNALD RI/FS

2731

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2nd Key In	BC	8/16/89
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367 B3067 BB 1-5-89	COORDINATES: see p1	DATE: 12-4-87
ELEVATION: see p1	GWL: Depth 77.3 Date/Time 12/4 0800	DATE STARTED: 11-20-87
ENGINEER/GEOLOGIST: L. Wille / T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable Tool		PAGE 8 OF 10

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (1/2 ft)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	7707 12-4 1315	20 50 35	13	very dense gray 10YR 4/1 sandy gravel with some silt and clay - wet	gm	NA	HNU = 0 ppm RB = 80 cpm α = 2 cpm
107							
108							
109							
				109 1/2			
110	7708 12-4 1415	4 5 16	11	loose gray 10YR 4/1 sand with some gravel and pebbles, some silt and clay, wet	SM	NA	HNU = 0 ppm RB = 80 cpm α = 2 cpm NO RETURN 1st Try, 11 in second try blowcounts (1st try)
112							
113							
114							
115				115			
116	7709 12-4 1600	33 50 57	12	very dense gray 10YR 4/1 gravelly sand with some silt and clay - wet	gm	NA	HNU = 0 ppm RB = 80 cpm α = 2 cpm
				115 1/2			
				very dense gray 10YR 4/1 sand with some gravel, silt and clay - wet	gm		
117							
118							
119							

NOTES:

414

402-11-86

FERNALD RI/FS

2731

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2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 BB 1-5-89	COORDINATES: see p1	DATE: 12-5-87
ELEVATION: see p1	GWL: Depth 77.0 Date/Time 12/5 0740	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Willey/T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 9 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	7710 12-5 0845	7 13 21	18	med. dense gray 10YR 4/1 sand with some silt, clay, ~~and~~ gravel and pebbles, wet.	gm	NA	HNU=0 ppm γB=100 cpm α= 2 cpm
121							
122							
123							
124							
125	7711 12-5 1500	17 56 66	7	very dense gray 10YR 4/1 sand and gravel, some silt, clay, and pebbles, wet.	gm	NA	HNU=0 ppm γB=80 cpm α= 2 cpm
126							
127							
128							
129							
130	7712 12-5 1555	4 7 12	6	med. dense gray 10YR 4/1 sand and gravel, some pebbles, silt, and clay, wet.	gm	NA	HNU=0 ppm γB=80 cpm α= 2 cpm
131							
132							
133							
134							
135							

NOTES:

415

402-11-86

FERNALD RI/FS

QA/DH/2-4-89

2731

	Initial	Date
1st Key In		
2nd Key In		8/16/88
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367 B3067 BB 1-5-88	COORDINATES: see p1	DATE: 12/5/87 - 12/6/87
ELEVATION: see p1	GWL: Depth 76.0 Date/Time 12/6 0735	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille / T. Sullivan	Depth 76.0 Date/Time 12/6 1010	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 10 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135	7713 12-5 1710	7 6 9	2	loose, gray 10YR 4/1 sand and gravel, some pebbles, silt, and clay, wet.	gm	NA	HNU=0ppm γB=100cpm α=2 cpm
136							
137							
138							
139							
140	7714 12-6 0930	11 9 10	3	loose gray 10YR 4/1 sand with some gravel, silt, and clay, some pebbles present, wet.	gm	NA	HNU=0 ppm γB=100 cpm α=2 cpm
142				E.O.B. 141.5 ft.			

NOTES:

416

402-11-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	07427 11/20/87 1330	8 14 18	13	SOFT, BLACK 7 1/2YR 2/0 SAND CLAY, SOME SILT, ORGANIC PLANT MOTTLED - MOIST. ROCK - SLUG. FILL (HARD) YELLOWISH BROWN SILTY CLAY, TRACE SAND AND GRAVEL SLUG - DRY.	OH	N/A >5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
3.0	07428 11/20/87 1335	16 10 10	12	FILL: (HARD YELLOWISH BROWN 10YR 5/4 SILTY CLAY, SOME SAND AND GRAVEL SLOG - DRY.		>5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
4.5	07429 11/20/87 1340	9 10 11	10	FILL (HARD YELLOWISH BROWN 10YR 6/4 MOTTLED GRAY 10YR 5/1 AND BROWNISH YELLOW 10YR 6/0 SILTY CLAY SOME SAND AND GRAVEL SLUG		>5	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
6.0	07430 11/20/87 1345	10 10 12	11	HARD YELLOWISH BROWN 10YR 5/6 MOTTLED GRAY 10YR 5/1 AND RED(?) SILTY CLAY SOME SAND AND GRAVEL - DRY.	CL	>5	Hnu= 0 ppm α = 8 cpm βΓ = 70 cpm
7.5	07431 11/20/87 1350	8 10 12	10	HARD YELLOWISH BROWN 10YR, 5/6 MOTTLED DARK GRAY 10YR 4/1 SILTY CLAY SOME SAND TRACE GRAVEL AND PEBBLES - DRY.	CL	>5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
9.0	07432 11/20/87 1645	4 9 20	11	HARD YELLOWISH BROWN 10YR 5/6 MOTTLED GRAY 10YR 5/1 SILTY CLAY SOME SAND TRACE GRAVEL - DRY. HARD YELLOWISH BROWN 10YR 5/6 GRAVELLY CLAY SOME SILT AND SAND - DRY.	CL CL	>5 >5	Hnu= 0 ppm α = 2 cpm βΓ = 70 cpm
10.5	07433 11/20/87 1700	6 15 21	11	HARD YELLOWISH BROWN 10YR 5/4 GRAVELLY CLAY. SOME SILT AND SAND, TRACE PEBBLES - DRY.	CL	>5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
12.0							
13.5	07434 11/21/87 1015	8 10 16	12	HARD GRAY 10YR 5/1 GRAVELLY CLAY SOME SILT AND SAND, TRACE PEBBLES - DRY.	CL	>5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
15.0	07435 11/21/87 1040	8 13 22	12	HARD GRAY 10YR 5/1 GRAVELLY CLAY SOME SILT AND SAND - DRY.	CL	>5	Hnu= 0 ppm α = 2 cpm βΓ = 70 cpm

NOTES:
PENNSYLVANIA DRILLING CO. BUCYRUS ERIE 24-W DRILLING RIG. DRILLER: DAVE NEUMAN. HELPER: BOB JOHNSON. BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2 IN BY 18 IN SPLIT SPOON SAMPLER. SOIL COLOR DESCRIPTION FOLLOW MUNSELL COLOR CHARTS. BACKGROUND, NOV

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

2731

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	07436	11/21/87 1100	2 10 13	3	HARD GRAY 10YR 6/1 GRAVELLY CLAY, SOME SILT, SAND TRACE PEBBLES - DRY.	CL		Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
18.0	07437	11/21/87 1120	4 9 13	10	HARD GRAY 10YR 6/1 SILTY CLAY, TRACE SAND AND GRAVEL - DRY.	CL	4.5	Hnu= 0 ppm α = 2 cpm Bγ = 70 cpm
19.5	07438	11/21/87 1140	6 9 13	18	VERY STIFF GRAY 10YR 6/1 SILTY CLAY, SOME SAND, TRACE GRAVEL, DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
21.0								
22.5	07439	11/21/87 1430	3 6 10	11	VERY STIFF GRAY 10YR 5/1 SILTY CLAY, SOME SAND, TRACE GRAVEL - DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
24.0	07440	11/21/87 1450	8 6 10	14	VERY STIFF GRAY 10YR 6/1 GRAVELLY CLAY SOME SILT AND SAND - DRY.	CL	3.5	Hnu= 0 ppm α = 3 cpm Bγ = 80 cpm
25.5	07441	11/21/87 1500	3 5 7	14	VERY STIFF GRAY 10YR 5/1 GRAVELLY CLAY SOME SILT, TRACE SAND - DRY.	CL	3.2	Hnu= 0 ppm α = 2 cpm Bγ = 70 cpm
27.0	07442	11/21/87 1515	3 8 39	2	ROCK, VERY STIFF GRAY 10YR 6/1 GRAVELLY CLAY SOME SILT AND SAND -DRY.			Hnu= 0 ppm α = 2 cpm Bγ = 70 cpm
28.5	07443	11/21/87 1530	13 13 17	12	HARD GRAY 10YR 6/1 GRAVELLY CLAY SOME SAND, SILT AND PEBBLES, TRACE PEBBLES - DRY.	CL	<5	Hnu= 0 ppm α = 1 cpm Bγ = 60 cpm
30.0	07444	11/21/87 1600	7 10 28	12	VERY STIFF GRAY 10YR 5/1 GRAVELLY CLAY, SOME SAND, SILT AND PEBBLES - DRY.	CL	3.5	Hnu= 0 ppm α = 0 cpm Bγ = 60 cpm

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

2731

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	07445	11/22/87 0730	8 10 15	10	VERY STIFF GRAY 10YR 6/1 GRAVELLY CLAY, SOME SILT AND SAND, TRACE PEBBLES, DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm βΓ = 70 cpm
33.0	07446	11/22/87 0810	3 16 27	8	DENSE YELLOWISH BROWN SAND, SOME SILT AND CLAY, TRACE GRAVEL - DRY.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
34.5	07447	11/22/87 0900	8 12 13	12	DENSE BROWNISH YELLOW 6/6 SAND SOME SILT AND CLAY, TRACE GRAVEL - DRY.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
35.0								
36.5	07448	11/22/87 0920	8 18 19	12	DENSE BROWNISH YELLOW 10YR 6/6 SAND AND FINE GRAVEL - SOME SILT, TRACE CLAY AND PEBBLES - DRY.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
40.0								
41.5	07449	12/01/87 0945	32 38 50	18	DENSE YELLOWISH BROWN 10YR 6/8 SAND AND GRAVEL, SOME SILT AND CLAY, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
45.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	07450	12/01/87 1340	26 36 37	12	DENSE YELLOWISH BROWN 10YR 6/8 SAND AND FINE GRAVEL, SOME SILT, CLAY AND MED TO COARSE GRAVEL, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
50.0								
51.5	07451	12/01/87 1550	20 23 30	8	MED. DENSE, YELLOW BROWN 10YR 6/8 SAND AND GRAVEL, SOME SILT, CLAY AND MED. TO COARSE GRAVEL, BROWN SILTY FINE SAND LENS AT	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
55.0								
56.5	07452	12/01/87 1630	16 30 42	11	DENSE BROWN 10YR 6/4 SAND AND GRAVEL, SOME SILT, DRY. BROWN-GRAY 10YR 6/3 MED. SAND, SOME SILT, CLAY, GRAVEL, DRY.	SM SM	N/A N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
60.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	07453 12/02/87 0820	11 33 42	12		DENSE BROWN GRAY 10YR 5/4 SAND WITH SOME GRAVEL AND PEBBLES, SOME SILT AND CLAY, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
65.0								
66.5	07454 12/02/87 1130	75	6		VERY DENSE BROWN 10YR 5/3 SAND AND GRAVEL, SOME SILT AND CLAY, TRACE PEBBLES, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
70.0								
71.5	07700 12/02/87 1420	16 33 29	9		MED. DENSE, BROWN-GRAY 10YR 5/3 SAND AND GRAVEL, SOME PEBBLES, SILT AND CLAY, DRY.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
75.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	07701	12/02/87 1520	16 13 18	6	MED. DENSE, DARK BROWN GRAY 10YR 4/1 SAND WITH TRACE GRAVEL, SOME SILT, CLAY, MOIST.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
80.0								
81.5	07702	12/02/87 1710	11 15 11	10	MED. DENSE, GRAY 10YR 4/1, SAND AND GRAVEL, WITH SOME SILT, PEBBLES, AND CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
85.0								
86.5	07703	12/03/87 1140	48 72	10	VERY DENSE GRAY 10YR 4/1 FINE SAND, SOME SILT AND CLAY - WET. VERY DENSE GRAY 10YR 4/1 SAND AND GRAVEL SOME SILT AND CLAY - WET.	SW SM	N/A N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
90.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	07704	12/03/87 1400	7 7 14	15	MEDIUM DENSE GRAY 10YR 4/1 SAND WITH SOME GRAVEL, SILT AND CLAY, SOARSE GRAVEL LENS WITH SOME SILT, PEBBLES SAND AND CLAY	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
95.0								
96.5	07705	12/03/87 1620	32 63	18	VERY DENSE GRAY 10YR 4/1 SAND WITH SOME SILT, GRAVEL AND CLAY - WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
100.0								
101.5	07706	12/04/87 0900	5 5 11	10	MEDIUM DENSE, GRAY 10YR 4/1 SAND WITH SOME GRAVEL, SILT AND CLAY - WET. MEDIUM DENSE GRAY 10YR 4/1 SANDY GRAVEL, SOME SILT AND CLAY, TRACE PEBBLES.	SM GM	N/A N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
105.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	07707	12/04/87	1315	20 50 35	13	VERY DENSE GRAY 10YR 4/1 SANDY GRAVEL WITH SOME SILT AND CLAY - WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 80 cpm
110.0									
111.5	07708	12/04/87	1415	4 5 16	11	LOOSE GRAY 10YR 4/1 SAND WITH SOME GRAVEL AND PEBBLES, SOME SILT AND CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 80 cpm
115.0									
116.5	07709	12/04/87	1600	33 50 57	12	VERY DENSE GRAY 10YR 4/1 GRAVELLY SAND WITH SOME SILT AND CLAY - WET. VERY DENSE GRAY 10YR 4/1 SAND WITH SOME GRAVEL, SILT AND CLAY - WET.	GM GM	N/A N/A	Hnu= 0 ppm α = 2 cpm BΓ = 80 cpm
120.0									

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	07710	12/05/87	0845	7 13 21	18	MED. DENSE GRAY 10YR 4/1 SAND WITH SOME SILT, CLAY, GRAVEL AND PEBBLES, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
125.0									
126.5	07711	12/05/87	1500	17 56 66	7	VERY DENSE GRAY 10YR 4/1 SAND AND GRAVEL, SOME SILT, CLAY, AND PEBBLES, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
130.0									
131.5	07712	12/05/87	1555	4 7 12	6	MED. DENSE GRAY 10YR 4/1 SAND AND GRAVEL, SOME PEBBLES, SILT, AND CLAY, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 80 cpm
135.0									

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3067	COORDINATES: NORTH 479,760.13 EAST 1,382,988.18	DATE: 11/20/87
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: LOWELL WILLE	Depth N/A Date/Time N/A	DATE COMPLETED: 12/07/87
DRILLING METHODS: CABLE-TOOL		PAGE 10 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
136.5	07713	12/05/87	1710	7 6 9	2	LOOSE GRAY 10YR 4/1 SAND AND GRAVEL, SOME PEBBLES, SILT, AND CLAY, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm
140.0									
141.5	07714	12/06/87	0930	11 9 10	3	LOOSE GRAY 10YR 4/1 SAND WITH SOME GRAVEL, SILT, AND CLAY, SOME PEBBLES PRESENT, WET.	GM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 100 cpm

BOTTOM OF BORING 141.5

NOTES:

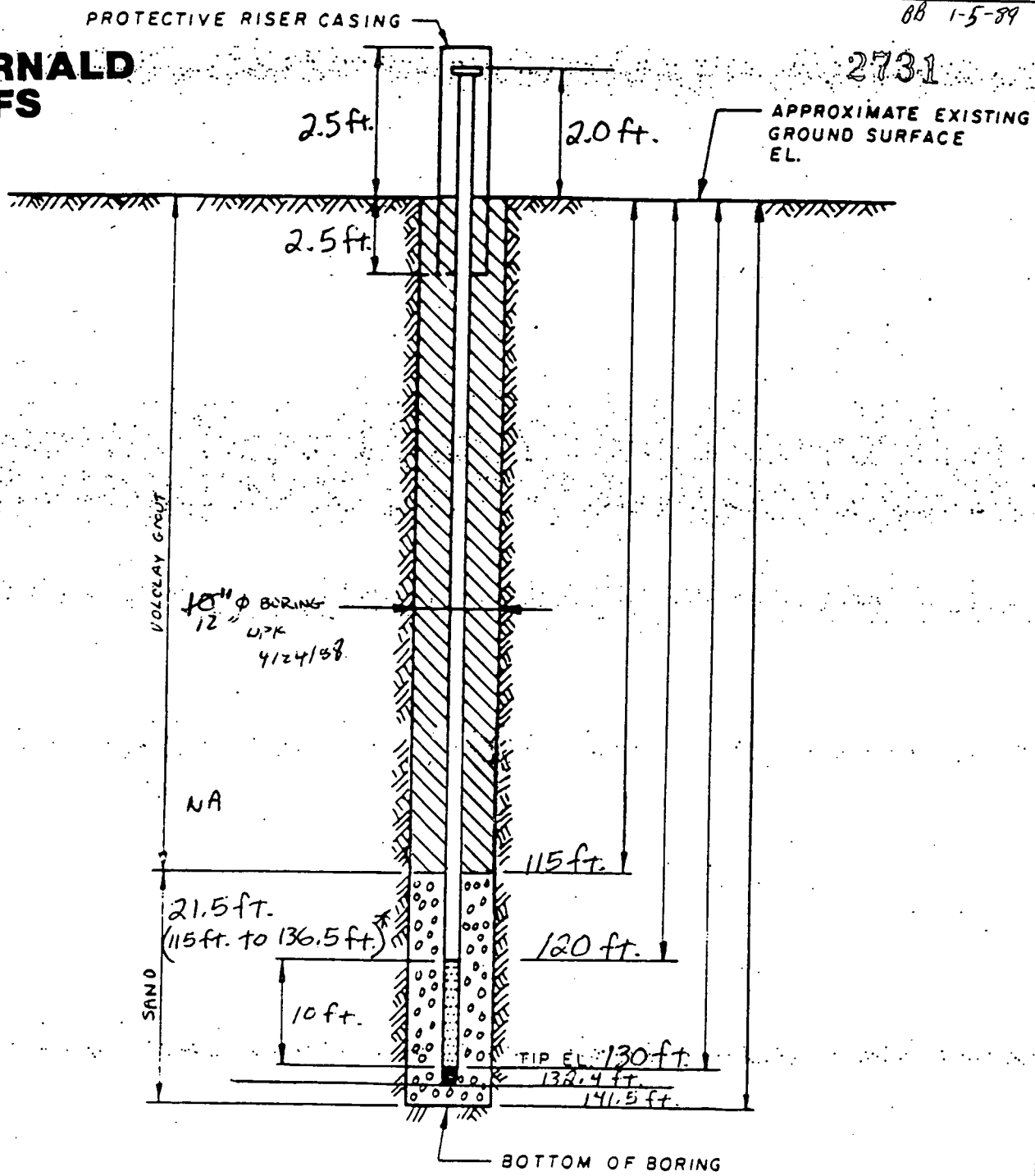
it has been modified with white out by L. Williams WPK 4/24/88

367 3067

BB 1-5-89

2731

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. S.S. PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL 75.75 ft. below ground surface
5. WATER LEVEL READING ON 12/10/87 0725 (77.75 ft. below T.O.C.)

INSTALLATION DETAILS
MONITORING WELL 367

PREPARED FOR 3067
BB 1-5-89

427

*Bottom 5 ft. of hole caved in, sand is placed above 136.5 ft.

QC/DH/2.4.89

2731

	Initial	Date
1st Key In		
2nd Key In		1/19/89
Hard Copy Verification		

ERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. L. Willey / T. Sullivan DATE 12/10/87
PROJECT NO. 602.3.2 CHECKED BY R Galbraith DATE 2/7/87
BORING NO. ~~B367~~ B3067 BB 1-5-89
PIEZOMETER NO. ~~367~~ 3067 DATE OF INSTALLATION 12/7-9/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID WATER FROM ____ TO ____
FLUID ____ FROM ____ TO ____

TYPE OF BIT FLATHEAD HAMMER
CASING SIZE (S) USED:
SIZE 10 FROM 0 TO 141.5'
SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4 in.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL PERFORATED AREA 3 in²/ft.

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4 in.
LENGTH OF PIPE SECTIONS 10 ft.
JOINING METHOD Screw thread flush joint RMB 2/2/89

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.
PROTECTIVE PIPE Ø.D. 10" (nom)

OTHER PROTECTION LOCKING CAP WITH LOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (FT) MSL	
TOP OF RISER PIPE	2.0		595.15	
GROUND SURFACE	0.0		593.15	
BOTTOM OF PROTECTIVE PIPE	2.5		590.6	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 115	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 115	BOTTOM 136½	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 120	BOTTOM 130	TOP	BOTTOM
PIEZOMETER TIP	132.4			
BOTTOM OF BOREHOLE	141.5			
GWL AFTER INSTALLATION	75.9 0759 12/8/87	75.75 0730 12/10/87	428	

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

REMARKS Cave in from 136.5 to 141.5 RB 4-2-91

MONITORING WELL INSTALLATION RECORD
11/21/91

ROJECT NAME: Fernald RI/FS FIELD ENG./GEO.: L. WILLE/T. SULLIVANDATE: 2/10/87
ROJECT NO. : 602.3.2 CHECKED BY : Not Noted DATE: N/A
ORING NO. : 3067 N,E COORDINATES: 479760.13, 1382988.1
ELL NUMBER: 3067 DATE OF INSTAL.: 12/07/87

2731

OREHOLE DRILLING

LLING METHOD: Cable Tool
LLING FLUID(S) USED: (Units N/A)
LUID: WATER FROM: N/ATO: N/A
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 141.5
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.010 (In.)
TOTAL PERFORATED AREA: 3 In.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: SCREW

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10 In.
* LOCKING CAP WITH LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		595.15	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	115	N/A	N/A
Sand	115	136 1/2	N/A	N/A
PERFORATED SECTION	120	130	N/A	N/A
TIP	132.4		N/A	
OM OF BOREHOLE	141.5		N/A	
AFTER INSTALLATION	75.9		N/A	

S THE WELL FLUSHED AFTER INSTALLATION? : No
S A SENSITIVITY TEST PERFORMED ON THE WELL : No

EMARKS -- COMMENT AREA

MMENTS:

429

WELL 3069

FERNALD RI/FS

COPY

2731

	Initial	Date
1st Key In		
2nd Key In		8/18/86
Hard Copy Verification		

UPK 4/25/88 RKA 2/4/89

R16 #4

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~369~~ 3069 ~~BB~~ 1-5-89	COORDINATES: 476422.17 1380713.62	DATE: 4/5/88
ELEVATION: ~~[illegible]~~ 576.19 TOW	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 10

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	08739	3 4 6	14	St.H. Dark Yellowish Brown (10YR 4/6) S.Hy Clay, trace sand, trace fine gravel. Moist. 1.0	CL	1.5	t: 1145 Hnu: 0ppm α: 2cpm γ/β: 60cpm
				St.H Brownish Yellow (10YR 6/6) S.Hy Clay, trace sand, trace fine gravel. Moist. 1.5			
2.5	08740	4 13 13	17	Very St.H. Yellowish Brown (10YR 5/6) Clay, some silt. Moist. 3.0	CL	2.2	t: 1152 Hnu: 0ppm α: 2cpm γ/β: 60cpm
	08741	10 11 18	18	Very St.H, light Yellowish Brown (10YR 6/4) Clay, some silt, trace sand. Moist 4.5	CL	3.0	t: 1158 Hnu: 0ppm α: 2cpm γ/β: 60cpm
5.0	08742	18 23 25	18	Very St.H. Brownish Yellow (10YR 6/6) Silt, some very fine sand and clay. Moist. 6.5	ML	2.5	t: 1202 Hnu: 0ppm α: 2cpm γ/β: 60cpm
	08743	35 30 31	18	Hard, Brown (10YR 5/3), Clay, some silt, trace sand and gravel. Moist 7.5	CL	>4.5	t: 1210 Hnu: 0ppm α: 2cpm γ/β: 60cpm
7.5	08744	5 10 16	16	Hard, Gray (7.5YR 5/0) Clay, some fine to coarse gravel, trace sand and silt. Moist with Brown (Iron Oxide) stained fracture surfaces.	CL	>4.5	t: 1635 Hnu: 0ppm α: 2cpm γ/β: 60cpm
10.0	08745 08746 08747	8 9 10	14	Hard, Gray (7.5YR 5/0) Clay, some fine to coarse gravel, trace sand, trace silt. Moist with Brown stained fracture surfaces.	CL	>4.5	t: 1655 Hnu: 0ppm α: 2cpm γ/β: 60cpm
	08748	8 12 18	18	Hard, Gray (7.5YR 5/0) Clay, some fine to coarse gravel, trace sand, trace silt, moist.	CL	>4.5	t: 1735 Hnu: 0ppm α: 2cpm γ/β: 60cpm
12.5	08749	8 19 25	16	Hard, Gray (7.5YR 5/0) Clay, some fine to coarse gravel, trace sand, trace silt. moist. 13.4	CL	>4.5	t: 0746 4/6/88 Hnu: 0ppm α: 2cpm γ/β: 50cpm
15.0	08750	20 20 29	15	Dense, Yellowish Brown (10YR 5/6) Fine to medium sand, some silt, trace fine gravel, moist interbedded with sandy silt.	SM/ML		t: 0803 Hnu: 0ppm α: 2cpm γ/β: 50cpm

NOTES:

Contractor: Pennsylvania Drilling
Driller: Joe Barile
Helper: Tod Brooks/John Rhodes
Rig: 72 Speedstar

Water Used During Drilling = 800 gallons
Soil Sampling as per ASTM 431
Color Descriptions as per Munsell
Field Measurements: Hnu, α, γ/β

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key Ts		
2nd Key Ts		8/18/88
Hard Copy Verification		

PAC RKA 2/4/89

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 3069 3069 BB 1-5	COORDINATES: See p)	DATE: 4/6/88
ELEVATION: See p)	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 10

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	08751	17 18 13	16	Dense, Yellow Brown (10YR 5/6) fine to coarse sand, trace silt. Moist 16.2	SP		t = 0825 Hnu = 0ppm α = 1cpm γ/β = 50cpm
				Hard, Gray (7.5YR 5/0) Clay with some gravel. Moist.	CL	4.0	
17.5	08752	8 12 13	12	Hard, Gray (7.5YR 5/0) Clay, trace gravel. Moist. 18.2	CL	>4.5	t = 0840 Hnu = 0ppm α = 2cpm γ/β = 50cpm
	08753	31 50/5"	11	Very Stiff, Yellowish Brown (10YR 5/6) very fine sandy Silt. Moist. 19.7	ML	3.0	t = 0855 Hnu = 0ppm α = 2cpm γ/β = 50cpm
20.0	08754	13 17 21	14	Dense, Brownish Yellow (10YR 6/6) Sand, fining upward, some gravel, trace silt. Moist 21.0	SW		t = 0802 4/7/88 Hnu = 0ppm α = 1cpm γ/β = 40cpm
	08755	26 50/5.5"	11	Very Dense, Brownish Yellow (10YR 6/6) Sand fine to coarse, poorly sorted, some fine to coarse gravel, trace silt. Moist	SP		t = 0940 Hnu = 0ppm α = 2cpm γ/β = 60cpm
22.5							
25.0	08756	10 50/5.5"	11	Very Dense, Yellowish Brown (10YR 5/6) Sand, fine to coarse, poorly sorted, some fine gravel, trace silt. Moist.	SP		t = 1117 Hnu = 0ppm α = 2cpm γ/β = 50cpm
27.5							
30.0							

NOTES:

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Verify Copy Verification		

VPAC RKA 2/4/8 RR 8/18/88

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~369~~ 3069 BB 1-5-89	COORDINATES: see p1	DATE: 4/7/88
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 10

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	08757	14 27 36	16	Very Dense, Brownish Yellow (10YR 6/6) Sand, fine to coarse, poorly sorted, some fine gravel, trace silt. Moist 35.1	SP		t: 1155 Hnu: 0ppm α: 2cpm γ/β: 40cpm
32.5							
35.0	08758	27 47 50/5"	16	Very Dense, Yellowish Brown (10YR 5/8) fine sand, well sorted, some silt, trace gravel. Moist	SM		t: 1412 Hnu: 0ppm α: 2cpm γ/β: 60cpm
37.5							
40.0	08759	27 47 46	18	Very Dense, Yellowish Brown (10YR 5/8) fine sand, some silt, trace gravel. Moist 41.0	SM		t: 1437 Hnu: 0ppm α: 2cpm γ/β: 60cpm
42.5				Very Dense, Brownish Yellow (10YR 6/8) fine sand, some coarse gravel, some silt, Moist.			
45.0							

NOTES:

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC RKA 2/4/89 8/18/88

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~369~~ 3069 BB 1-5-89	COORDINATES: See p1	DATE: 4/7/88
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 10

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45	08760	30 50/2"	4	Very Dense, Yellowish Brown (10YR 5/4), Gravelly Sand, poorly sorted, some silt. Moist.	SP		t = 1651 Hau = 0ppm α = 2cpm γ/β = 50cpm
47.5							
50.0	08761	37 28 40	16	Very Dense, Brownish Yellow (10YR 6/6) Sand, poorly sorted, some gravel, trace silt. Moist.	SP		t = 1733 Hau = 0ppm α = 2cpm γ/β = 40cpm
52.5				53			
55.0	08762	13 21 33	12	Very Dense, Dark Yellowish Brown (10YR 4/6) Sand, Fine to medium, some gravel, trace silt. Moist.	SW		t = 0834 4/8/88 Hau = 0ppm α = 2cpm γ/β = 60cpm
57.5				58			
60.0							

NOTES:

434

402-11-88

FERNALD RI/FS

2731

	Initial	Date
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2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 3069 3069 BB 1-5-89	COORDINATES: see p1	DATE: 4/8/88
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 10

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0	08763	18 32 30	15	Very Dense, Dark Yellowish Brown (10YR 4/4) Sand, fine to coarse, poorly sorted, trace fine gravel, trace silt. Wet	SP		t: 1135 Hm: 0ppm α: 2cpm β/γ: 50cpm
62.5							Blow sand previous to sample.
65.0	08764	50/4"	4	Very Dense, Yellowish Brown (10YR 5/4), Silty Sand with some fine gravel. wet.	SM		t: 1208 Hm: 0ppm α: 2cpm β/γ: 50cpm
67.5							
70.0	08765	37 33 38	17	Very Dense, Dark Yellowish Brown (10YR 4/4) Sand, fine to coarse, poorly sorted, trace fine gravel, trace silt. Wet.	SP		t: 1329 Hm: 0ppm α: 2cpm β/γ: 50cpm
72.5							
75.0							

NOTES:

402-11-86

FERNALD RI/FS

2731

	Initial	Date
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2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS.	
BORING NUMBER: ~~369~~ 3069 BB 1-5-89	COORDINATES: see p1	DATE: 4/8/88
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 10

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75.0	08766	50/5.5" 50/5"	8	Very Dense, Dark Yellowish Brown (10YR 4/4), Gravelly Sand, poorly sorted, trace silt. Wet.	SP		t: 1515 Hnu: 0ppm α: 2cpm γ/β: 40cpm
77.5							
80.0	08767	13 16 21	14	Dense, Dark Yellowish Brown (10YR 4/6) Sand, fine to coarse, poorly sorted, trace gravel, trace silt. Wet.	SP		t: 1558 Hnu: 0ppm α: 2cpm γ/β: 50cpm
82.5							
85.0	08768	38 50/5"	10	Very Dense, Yellowish Brown (10YR 5/6), Gravelly Sand, poorly sorted, trace silt. Wet.	SP		t: 1705 Hnu: 0ppm α: 2cpm γ/β: 40cpm
87.5							
90.0							

NOTES:

436

402-11-86

FERNALD RI/FS

2731

	Initial	Date
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2nd Key In		
Rapid Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~369~~ 3069 GB 1-5-89	COORDINATES: See pi	DATE: 4/9/88
ELEVATION: See pi	GWL: Depth – Date/Time –	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth – Date/Time –	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 7 OF 10

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
90	08769	11 17 26	16	Dense Yellowish Brown (10YR 5/4) Sand, poorly sorted, some gravel, trace silt. Wet.	SP		t = 0837 Hnu = 0ppm α: 2cpm γ/β: 50cpm
92.5							
95.0	08770	40 50/5"	10	Very Dense, Dark Yellowish Brown (10YR 4/6), Gravelly Sand, poorly sorted fine sand to fine gravel, trace silt. Wet.	SP		t: 1000 Hnu: 0ppm α: 2cpm γ/β: 50cpm
97.5							
100.0	08771	8 13 15	8	Medium Dense, Dark Yellowish Brown (10YR 4/6) Gravelly Sand, poorly sorted fine sand to fine gravel, trace silt. Wet.	SP		t: 1050 Hnu: 0ppm α: 2cpm γ/β: 50cpm
102.5							
105.0							

NOTES:

437

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		8/18/8
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~369~~ 3069 BG 1-5-89	COORDINATES: see p1	DATE: 4/9/88
ELEVATION: see p1	GWL: Depth – Date/Time –	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth – Date/Time –	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 8 OF 10

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
105	08772	30 50/5	10	Very Dense, Dark Yellowish Brown (10YR 4/4) Sand, fine to coarse, poorly sorted, trace gravel, trace silt. wet	SP		t: 1301 Hnu: 0ppm α: 2cpm β/γ: 40cpm
107.5							
110.0	08773	11 13 18	6	Dense, Dark Yellowish Brown (10YR 4/4), Gravelly Sand, fine sand to coarse gravel, poorly sorted, trace silt. wet.	SP		t: 1352 Hnu: 0ppm α: 2cpm β/γ: 70cpm
112.5							
115.0	08774	22 27 24	15	Very Dense, Dark Yellowish Brown (10YR 4/4), Sand, poorly sorted. Some fine to coarse gravel, trace silt. wet.	SP		t: 1533 Hnu: 0ppm α: 2cpm β/γ: 50cpm
117.5							
120.0							

NOTES:

438

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 3069	COORDINATES: See P1	DATE: 4/9/88
ELEVATION: See P1	GWL: Depth — Date/Time —	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth — Date/Time —	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 9 OF 10

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	08775	2 9 16	9	Medium Dense, Yellowish Brown (10YR 5/4) Sand, fine to coarse, poorly sorted, some fine gravel, trace silt. wet.	SP		t: 1616 Hnu: 0ppm α: 2cpm β/γ: 60cpm
122.5							
125.0	08776	5 11 17	12	Medium Dense, Gray (7.5YR 5/0) Sand, fine to coarse, poorly sorted, trace fine gravel. wet.	SP		t: 1725 Hnu: 0ppm α: 2cpm β/γ: 40cpm
127.5							
130.0	08777	6 9 15	6	Medium Dense, Gray (7.5YR 5/0), Gravelly Sand, fine sand to coarse gravel, poorly sorted, trace silt. wet	SP		t: 0852 4/10/88 Hnu: 0ppm α: 2cpm β/γ: 50cpm
132.5							
135.0							

NOTES:

439

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 369 3069 BB 1-5-89	COORDINATES: 200 P1	DATE: 4/10/88
ELEVATION: see P1	GWL: Depth – Date/Time	DATE STARTED: 4/5/88
ENGINEER/GEOLOGIST: DAVIES	Depth – Date/Time	DATE COMPLETED: 4/12/88
DRILLING METHODS: CABLE TOOL		PAGE 10 OF 10

DEPTH (Ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135	08978	25 25 19	16	Dense, Brown (10YR 5/3) Sand poorly sorted, trace gravel, trace silt wet	SP		t: 1035 Hax: 0ppm α: 2cpm β/γ: 50cpm
				END OF BORING (136.5) DPK 4/24/88			
137.5							
140.2							

NOTES

440

402-11-86

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08739 04/05/88 1145	3 4 6	14	STIFF, DARY YELLOWISH BROWN (10YR 4/6) SILTY CLAY, TRACE SAND, TRACE FINE GRAVEL, MOIST. STIFF BROWNISH YELLOW (10YR 6/6) SILTY CLAY, TRACE SAND, TRACE FINE GRAVEL, MOIST.	CL	1.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
3.0							
4.5	08741 04/05/88 1158	10 11 18	18	VERY STIFF, LIGHT YELLOWISH BROWN (10YR 6/4) CLAY, SOME SILT, TRACE SAND, MOIST.	CL	3.0	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
6.0	08742 04/05/88 1202	18 23 25	18	VERY STIFF, BROWNISH YELLOW (10YR, 6/6) SILT, SOME VERY FINE SAND AND CLAY, MOIST.	ML	2.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
6.0	08740 04/05/88 1152	4 13 13	17	VERY STIFF, YELLOWISH BROWN (10YR 5/6) CLAY, SOME SILT, MOIST.	CL	2.2	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
7.5	08743 04/05/88 1210	35 30 31	18	HARD BROWN (10YR, 5/3), CLAY, SOME SILT, TRACE SAND AND GRAVEL, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
9.0	08744 04/05/88 1635	5 10 16	16	HARD, GRAY (7.5 YR 5/0) CLAY, SOME FINE TO COARSE GRAVEL, TRACE SAND AND SILT, MOIST WITH BROWN (IRON OXIDE) STAINED FRA	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
10.5	08745 08747 04/05/88 1655	8 9 10	14	HARD, GRAY (7.5 YR 5/0) CLAY, SOME FINE TO COARSE GRAVEL, TRACE SAND, TRACE SILT. MOIST WITH BROWN STAINED FRACTURE SURF	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
12.0	08748 04/05/88 1735	8 12 18	18	HARD, GRAY (7.5 YR 5/0) CLAY, SOME FINE TO COARSE GRAVEL, TRACE SAND, TRACE SILT, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
13.5	08749 04/06/88 0746	8 19 25	16	HARD, GRAY (7.5YR 5/0) CLAY, SOME FINE TO COARSE GRAVEL, TRACE SAND, TRACE SILT, MOIST.	CL	>4.5	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
15.0	08750 04/06/88 0803	20 20 29	15	DENSE, YELLOWISH BROWN(10YR 5/6) FINE TO MEDIUM SAND, SOME SILT, TRACE FINE GRAVEL, MOIST INTERBEDDED WITH SANDY SILT.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm

NOTES:
CONTRACTOR: PENNSYLVANIA DRILLING. DRILLER: JOE BARILE. HELPER: TED BROOKS/JOHN RHODES. RIG: 72 SPEEDSTAR. WATER USED DURING DRILLING = 800 GALLONS. SOILS SAMPLING AS PER ASTM. COLOR DESCRIPTIONS AS PER MUNSELL. FIELD MEASUREMENTS: HNU, ALPHA,

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08751 04/06/88 0825		17 18 13	16	DENSE, YELLOW BROWN (10YR 5/6) FINE TO COARSE SAND, TRACE SILT, MOIST. HARD, GRAY (7.5YR 5/0) CLAY WITH SOME GRAVEL, MOIST.	SP CL	N/A 4.0	Hnu= 0 ppm α = 1 cpm Bγ = 50 cpm
18.0	08752 04/06/88 0840		8 12 13	12	HARD, GRAY (7.5YR 5/0) CLAY WITH SOME GRAVEL, MOIST. HARD, GRAY (7.5YR 5/0) CLAY, TRACE GRAVEL, MOIST.	CL CL	>4.5 >4.5	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
19.0	08753 04/06/88 0855		31 50	11	VERY STIFF, YELLOWISH BROWN (10YR 5/6) VERY STIFF FINE SANDY SILT, MOIST.	ML	3.0	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
19.5								
21.0	08754 04/07/88 0802		13 17 21	14	DENSE BROWNISH YELLOW (10YR 6/6) SAND, FINING UPWARD, SOME GRAVEL, TRACE SILT, MOIST.	SW	N/A	Hnu= 0 ppm α = 1 cpm Bγ = 40 cpm
22.0	08755 04/07/88 0940		26 50	11	VERY DENSE, BROWNISH YELLOW (10YR 6/6) SAND, FINE TO COARSE, POORLY SORTED, SOME FINE TO COARSE GRAVEL, TRACE SILT, MOIST.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
25.0								
26.5	08756 04/07/88 1117		10 50	11	VERY DENSE, YELLOWISH BROWN (10YR, 5/6) SAND, FINE TO COARSE, POORLY SORTED, SOME FINE GRAVEL, TRACE SILT, MOIST.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
30.0								

NOTES:
SOIL SAMPLING AS PER ASTM. COLOR DESCRIPTIONS AS PER MUNSELL.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	08757	04/07/88 1155	14 27 36	16	VERY DENSE, BROWNISH YELLOW (10YR 6/6) SAND, FINE TO COARSE, POORLY SORTED, SOME FINE GRAVEL, TRACE SILT, MOIST.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
35.0								
36.5	08758	04/07/88 1412	27 47 50	16	VERY DENSE, YELLOWISH BROWN (10YR 5/8) FINE SAND, WELL SORTED, SOME SILT, TRACE GRAVEL, MOIST.	SM	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
40.5	08746	04/05/88 1655	8 9 10	14	HARD, GRAY (7.5 YR 5/0) CLAY, SOME FINE TO COARSE GRAVEL, TRACE SAND, TRACE SILT. MOIST WITH BROWN STAINED FRACTURE SURF	CL	>4.5	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
41.5	08759	04/07/88 1437	27 47 46	18	VERY DENSE, YELLOWISH BROWN (10YR 5/8) FINE SAND, SOME SILT, TRACE GRAVEL, MOIST. VERY DENSE, BROWNISH YELLOW (10YR 6/8) FINE SAND, SOME COARSE GRAVEL, SOME SILT, MOIST.	SM	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
45.0								

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
45.7	08760	04/07/88 1651	30 50		4	VERY DENSE, YELLOWISH BROWN (10YR 5/4), GRAVELLY SAND, POORLY SORTED, SOME SILT, MOIST.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
50.0									
51.5	08761	04/07/88 1733	37 28 40		16	VERY DENSE, BROWNISH YELLOW (10YR 6/6) SAND, POORLY SORTED, SOME GRAVEL, TRACE SILT, MOIST.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
55.0									
56.5	08762	04/08/88 0834	13 21 33		12	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6) SAND, FINE TO MEDIUM, SOME GRAVEL, TRACE SILT, MOIST.	SW	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
60.0									

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
61.5	08763	04/08/88	1135	18 32 30		15		VERY DENSE, DARK YELLOWISH BROWN (10YR 4/4) SAND, FINE TO COARSE, POORLY SORTED, TRACE FINE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
65.0											
65.4	08764	04/08/88	1208	50		4		VERY DENSE, YELLOWISH BROWN, (10YR 5/4), SILTY SAND WITH SOME FINE GRAVEL, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
70.0											
71.5	08765	04/08/88	1329	37 33 38		17		VERY DENSE, DARK YELLOWISH BROWN (10YR 4/4) SAND, FINE TO COARSE, POORLY SORTED, TRACE FINE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
75.0											

NOTES:

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
75.8	08766	04/08/88 1515	50 50	8	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/4), GRAVELLY SAND, POORLY SORTED, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
80.0								
81.5	08767	04/08/88 1558	13 16 21	14	DENSE, DARK YELLOWISH BROWN (10YR 4/6) SAND, FINE TO COARSE, POORLY SORTED, TRACE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
85.0								
85.9	08768	04/08/88 1705	38 50	10	VERY DENSE, YELLOWISH BROWN (10YR 5/6) GRAVELLY SAND, POORLY SORTED, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
90.0								

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	08769	04/09/88	0837	11 17 26	16	DENSE, YELLOWISH BROWN (10YR 5/4) SAND, POORLY SORTED, SOME GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
95.0									
95.9	08770	04/09/88	1000	40 50	10	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/6), GRAVELLY SAND, POORLY SORTED, FINE SAND TO FINE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
100.0									
101.5	08771	04/09/88	1050	8 13 15	8	MEDIUM DENSE, DARK YELLOWISH BROWN (10YR Qo 4/6) GRAVELLY SAND, POORLY SORTED FINE SAND TO FINE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
105.0									

NOTES:

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
105.9	08772	04/09/88 1301	30 50	10	VERY DENSE, DARK YELLOWISH BROWN (10YR 4/4) SAND, FINE TO COUARSE, POORLY SORTED, TRACE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 40 cpm
110.0								
111.5	08773	04/09/88 1352	11 13 18	6	DEMSE, DARK YELLOWISH BROWN (10YR 4/4) GRAVELLY SAND, FINE SAND TO COARSE GRAVEL, POORLY SORTED, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 70 cpm
115.0								
116.5	08774	04/09/88 1533	22 27 24	15	VERY DENSE, DARK YELLOWISH BROWN (10YR 4.4), SAND, POORLY SORTED, SOME FINE TO COARSE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 50 cpm
120.0								

NOTES:

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	08775	04/09/88 1616	2 9 16	9	MEDIUM DENSE, YELLOWISH BROWN (10YR 5/4) SAND, FINE TO COARSE, POORLY SORTED, SOME FINE GRAVEL, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 60 cpm
125.0								
126.5	08776	04/09/88 1725	5 11 17	12	MEDIUM DENSE, GRAY (7.5YR 5/0) SAND, FINE TO COARSE, POORLY SORTED, TRACE FINE GRAVEL, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 40 cpm
130.0								
131.5	08777	04/10/88 0852	6 9 15	6	MEDIUM DENSE, GRAY (7.5YR 5/0) GRAVELLY SAND, FINE SAND TO COARSE GRAVEL, POORLY SORTED, TRACE SILT, WET.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm
135.0								

NOTES:

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3069	COORDINATES: NORTH 476,422.17 EAST 1,380,713.62	DATE: 04/05/88
GROUND ELEVATION:	GWL: Depth N/A Date/Time N/A	DATE STARTED: 04/05/88
ENGINEER/GEOLOGIST: B. DAVIES	Depth N/A Date/Time N/A	DATE COMPLETED: 04/12/88
DRILLING METHODS: CABLE-TOOL		PAGE 10 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY	INCHES		USCS SYMBOL	TSF	REMARKS
136.5	08778	04/10/88	1035	25 25 19		16		DENSE, BROWN (10 5/3) SAND, POORLY SORTED, TRACE GRAVEL, TRACE SILT, WET. END OF BORING 136.5.	SP	N/A	Hnu= 0 ppm α = 2 cpm βΓ = 50 cpm

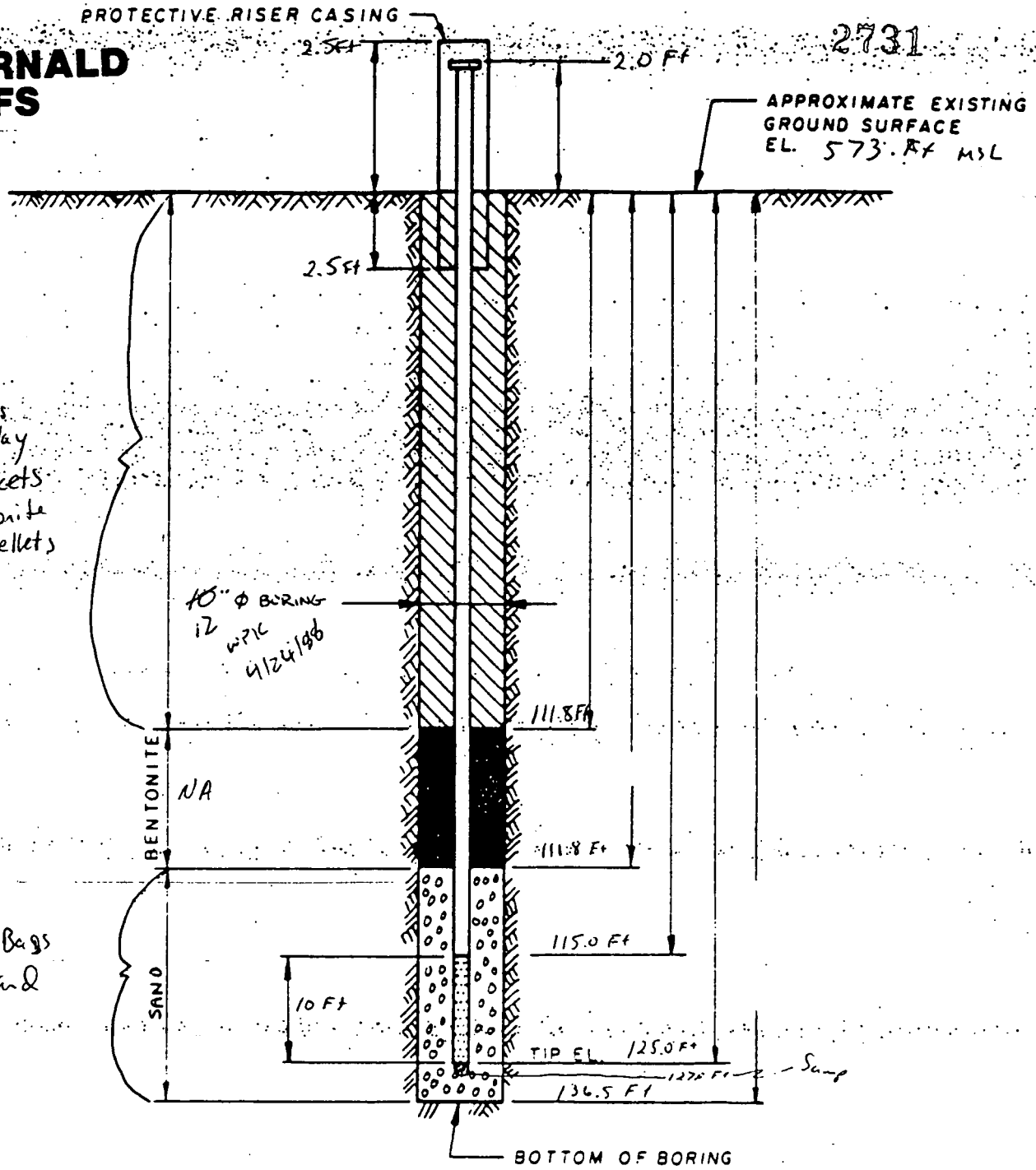
BOTTOM OF BORING 136.5

NOTES:

RKA 2/4/89

2731

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED FLUSH-JOINTED.
2. SCREEN IS 4 IN I.D S.S. PIPE CONTINUOUS SLOT SCREEN (0.0 0 IN. SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL ~~369~~ 3069

PREPARED FOR BB 1-5-89

451

DRAWING NUMBER
CHECKED BY
APPROVED BY
DRAWN BY

FERNALD
RI/FS

2731

	Initial	Date
1st Key In		
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RKA 2/4/89

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS
PROJECT NO. 602.3.2
BORING NO. ~~369~~ 3069 BB 1-5-89
PIEZOMETER NO. ~~369~~ 3069

FIELD ENG./GEO. DAVIES DATE 4/12/88
CHECKED BY R Coalbraith DATE 2/7/89
DATE OF INSTALLATION 4/12/88

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0 TO 136.5 Ft
FLUID ____ FROM ____ TO ____

TYPE OF BIT Steel Hammer
CASING SIZE (S) USED:
SIZE 10 in FROM 0 TO 135.0 Ft
SIZE ____ FROM ____ TO ____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 Ft

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 10, 5, 2 Ft.
JOINING METHOD Screw ~~weld~~ tight

PROTECTION SYSTEM

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

OTHER PROTECTION locking cap and padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION (ft)	
TOP OF RISER PIPE	~~0.0~~ 2.0		576.19	
GROUND SURFACE	0.0		574.19	
BOTTOM OF PROTECTIVE PIPE	2.5		571.6	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 111.8	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 111.8	BOTTOM 136.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 115.0	BOTTOM 125.0	TOP	BOTTOM
PIEZOMETER TIP	127.0			
BOTTOM OF BOREHOLE	136.5			
GWL AFTER INSTALLATION	NA			

452

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

REMARKS Natural cavity to 131.0 Ft

MONITORING WELL INSTALLATION RECORD
11/21/91

2731

ROJECT NAME: Fernald RI/FS
ROJECT NO. : 602.3.2
ORING NO. : 3069
ELL NUMBER: 3069

FIELD ENG./GEO.: DAVIES — DATE: 04/12/88
CHECKED BY : Not Noted — DATE: N/A
N,E COORDINATES: 476422.17, 1380713.6
DATE OF INSTAL.: 04/12/88

OLE DRILLING

LLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: H20 FROM: 0 TO: 136.5
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 135.0
SIZE: N/A FROM: N/A TO: N/A

ELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.010 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: 5 Ft.
3RD PIPE SECTION: 2 Ft.
COMMENTS

RISER JOINING METHOD: SCREW WRENCH TIGHT

ROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
• LOCKING CAP AND PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE		ELEVATION MSL	
TOP OF RISER PIPE	2.0 Ft.		576.19	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.			
BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	111.8	N/A	N/A
Sand	111.8	136.5	N/A	N/A
FORATED SECTION	115.0	125.0	N/A	N/A
TIP	127.0		N/A	
TOM OF BOREHOLE	136.5		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

AS THE WELL FLUSHED AFTER INSTALLATION? : No
AS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

EMARKS : NATURAL CAVE IN TO 131.0 FT.
OMMENTS:

WELL 3070

FERNALD RI/FS

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2731

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2nd Key In		
Final Verification		

DLG 2.4.89 DAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3070	COORDINATES:	DATE: 2/10/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 1 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS	
1	08035 1320 2/10	1 2 3	13	stiff, yellow-brown 10YR 3/6 silt and clay, abundant organic material, roots, dry. (0.4)	cl	1.75	HNU=0 ppm dB=60cpm α=0cpm	
				stiff, yellow-brown 10YR 3/6 clay and silt, some organic material, dry.	cl			
2 3	08036 1325 2/10	2 4 4	12	stiff, yellow-brown 10YR 3/6 clay with some silt, trace organic material	cl	1.5	HNU=0ppm dB=60cpm α=0cpm	
4	08037 1330 2/10	4 4 4	2	(very soft) yellow-brown 10YR 3/4 silt and clay, wet.	cl	Unk.	HNU=0ppm dB=60cpm α=0cpm	Insufficient recovery for consistency.
5	08038 1335 2/10	3 4 4	8	soft, yellow-brown 10YR 3/4 silt and clay, wet. (4.7)	cl	0.5	HNU=0 ppm dB=100cpm α=0cpm	Cobble smashed in spoon.
6				medium stiff, yellow-brown 10YR 4/4 clay with some silt, sand, and gravel, moist. (6.0)	cl	0.75		
7	08039 1340 2/10	3 5 8	18	very loose, yellow-brown 10YR 3/4 sand, some silt, clay, and gravel, wet. (6.5)	Sm	NA	HNU=0ppm dB=80cpm α=0cpm	Abundant red sand and gravel 6.0-6.5
8	08040 1450 2/10	7 6 10	13	stiff, yellow-brown 10YR 4/4 gravelly clay, some sand and silt, moist. (7.5)	cl	1.25	HNU=0ppm dB=80cpm α=0cpm	Cobble in spoon
9				very soft, yellow-brown 10YR 4/4 silty clay, some gravel, trace sand, moist. (8.0)	cl	<0.25 3.5		
10	08041 1505 2/10	6 15 23	13	very stiff, yellow-brown 10YR 4/4 clay with some sand and gravel, moist.	cl	4.25	HNU=0ppm dB=80cpm α=0cpm	Pushed shelby tube 0.5ft., no recovery, bent tube.
				very stiff, yellow-brown 10YR 4/4 clay with some gravel, moist.	cl			
11 12	08042 1610 2/10	12 17 23	16	hard, yellow-brown 10YR 3/3 clay, some gravel and pebbles, dry. (11.0)	cl	>5	HNU=0ppm dB=60cpm α=0cpm	
				hard, gray 10YR 4/1 clay, some gravel, dry. (12.0)	cl			
13	08043 1645 2/10	3 9 11	14	very stiff, gray-green 5Y 4/1 clay with some fine gravel, wood fragments present, dry.	cl	3.5	HNU=0ppm dB=80cpm α=2cpm	
14	08044 1705 2/10	4 9 14	14	very stiff, gray 10YR 4/1 clay with some gravel, trace silt, dry. (gravelly clay at 14.9-15.0)	cl	3.25	HNU=0ppm dB=80cpm α=0cpm	

NOTES:

Pennsylvania Drilling Co.
Bucyrus Erie 24-W Drilling Rig
Driller: Dave Newman
Helper: Joe Barile/Bob Johnson
Blows on sampler taken ASTM standard for 2in x 18in split spoon.
Soil Colors follow Munsell color charts. Approx. 350 gallons used in drilling.

455

Background: HNU=0 ppm dB=60-100 cpm α=0-2 cpm 2/10/88

402-11-86

FERNALD RI/FS

DLG 2/4/89
2731

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2nd Key In		8/18/88
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3010	COORDINATES:	DATE: 2/10/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 2 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15							
16	08045 1720 2/10	5 7 9	10	hard, gray 10YR 4/1 clay with trace gravel and silt, dry.	cl	4.25	HNU=0ppm γB=80cpm α=0cpm
17	08046 0845 2/11	7 9 13	18	very stiff, gray 10YR 4/1 clay, some gravel and silt, dry.	cl	2.25	HNU=0 ppm γB=80cpm α=0 cpm
18				very stiff, gray 10YR 5/1 clay, some silt, trace gravel, dry. 18.5	cl	2.50	HNU=0 ppm γB=60cpm α=0 cpm
19	08047 0900 2/11	4 10 14	14	very stiff, gray 10YR 5/1 clay and silt, some gravel, dry. 19.5	cl/ml	3.50	
20	08048 0950 2/11	NA Shelby	NA Tube	very stiff, gray 10YR 4/1 clay, some gravel, dry. 21.0	cl	>5	HNU=0ppm γB=60cpm α=0cpm / Shelby tube pushed 1.0 ft., 0.9 ft. recovered. Tube was dented.
21							
22	08049 1115 2/16	6 8 12	7	stiff, gray-green 5Y 4/1 clay, some gravel, trace silt, dry. 22.5	cl	2.0	HNU=0ppm γB=80cpm α=0cpm
23	08050 1130 2/16	7 10 12	14	stiff, gray-green 5Y 4/1 gravelly clay, trace silt, dry. 22.9	cl	2.0	HNU=0ppm γB=100cpm α=Unknown / Alpha meter not functioning.
24				very stiff, gray-green 5Y 4/1 clay, some gravel and pebbles, dry.	cl	2.5	
25	08051 1145 2/16	6 8 12	7	very stiff, gray-green 5Y 4/1 clay, some gravel and pebbles, dry.	cl	3.5	HNU=0ppm γB=60cpm α=Unknown / No recovery 1st try, 7in. 2nd try.
26	08052 1250 2/16	5 10 13	13	hard, gray-green 5Y 4/1 clay, some gravel and pebbles, dry.	cl	4.25	HNU=0ppm γB=80cpm α=Unknown
27							
28	08053 1305 2/16	8 13 19	18	hard, gray-green 5Y 4/1 clay, some gravel, trace silt, dry.	cl	4.25	HNU=0ppm γB=80cpm α=Unknown
29	08054 1330 2/16	4 8 15	14	very stiff, gray-green 5Y 4/1 clay, some gravel, trace silt, dry.	cl	3.5	HNU=0ppm γB=140cpm α=Unknown

NOTES:

FERNALD RI/FS

DLC 2/4/89

	Initial	Date
1st Keyer		
2nd Keyer		8/16/02
Hard Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3010	COORDINATES:	DATE: 2/16/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 3 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
31	08055 1440 2/16	8 10 17	5	very stiff, gray-green 5y 4/1 clay, some gravel and pebbles, trace silt, dry.	cl	3.25	HNU=0ppm ⊿B=80cpm α=Unknown
32	08056 1455 2/16	12 7 13	13	very stiff, gray-green 5y 5/1 clay, some gravel, some silt, dry.	cl	3.5	HNU=0ppm ⊿B=60cpm α=Unknown
33				very stiff, gray-green 5y 4/1 clay, some gravel, some silt, dry. 33.5	cl	2.5	
34	08057 1525 2/16	15 17 19	14	dense, gray 10YR 4/1 gravelly sand, some silt, dry.	SW	NA	HNU=0ppm ⊿B=80cpm α=Unknown
35	08058 1540 2/16	15 27 32	7	very dense, gray 10YR 5/1 gravelly sand, some silt, dry.	SW	NA	HNU=0ppm ⊿B=110cpm α=Unknown; Cobble smashed in spoon.
36							
37							
38							
39							
40							
41	08059 1620 2/16	37 25 38	15	very dense, gray 10YR 4/1 gravelly sand, some pebbles, some silt, dry.	SW	NA	HNU=0ppm ⊿B=60cpm α=Unknown
42							
43							
44							

NOTES:

Base of till at 33.5 ft.

457

FERNALD RI/FS

DLG 2/4/89

	Initial	Date
1st Key In		
2nd Key In		
Hand Copy Verification		

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.32	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B370~~ B3070 BB 1-5-89	COORDINATES:	DATE: 2/16/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 4 OF 11

2731

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
46	08060 0905 2/17	27 32 29	12	very dense, gray 10YR 4/1 gravelly sand, some silt, some pebbles, dry.	SW	NA	HNU = 0ppm μB = 80cpm α = Unknown
47							
48				48.0			
49							
50	08061 1035 2/17	7 13 21	11	dense, gray 10YR 4/1 medium sand, trace gravel, some silt, dry.	Sm	NA	HNU = 0ppm μB = 100cpm α = Unknown
51							
52							
53							
54							
55	08062 1305 2/17	6 22 50	14	very dense, gray 10YR 3/1 fine sand, some silt, trace gravel, dry.	Sm	NA	HNU = 0ppm μB = 60cpm α = Unknown
56							
57							
58							
59							

NOTES:

458

FERNALD RI/FS

DLG 2/4/89

2731

	Initial	Date
1st Key In		
2nd Key In		
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B 3070	COORDINATES:	DATE: 2/17/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 5 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	08063 1340 2/17	8 13 30	13	dense, gray 10YR 4/1 fine sand, some silt, dry.	sm	NA	HNU = 0ppm γB = 80 cpm α = Unknown
62							
63							
64							
65				very dense, gray 10YR 4/1 fine sand, some silt, dry. 65.2	sm		
66	08064 1520 2/17	8 48 50	15	very dense, gray 10YR 4/1 sand and gravel, some pebbles, some silt, trace clay, dry.	gm	NA	HNU = 0 ppm γB = 60 cpm α = Unknown
67							
68							
69							
70	08065 1635 2/17	17 21 39	14	very dense, gray 10YR 5/1 sand and gravel, some pebbles, some silt, trace clay, dry.	gm	NA	HNU = 0ppm γB = 60 cpm α = Unknown
71							
72							
73				73.0			
74							

NOTES:

459

402-11-86

FERNALD RI/FS

DLG 2/4/89 2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B 3070	COORDINATES:	DATE: 2/18/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 6 OF 18

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	08066 0815 2/18	10 11 18	11	med. dense, gray 10YR 4/1 fine to medium sand, some silt, trace gravel, wet.	sm	NA	HNU=0ppm YB+α=no meters
77							
78							
79							
80				med. dense, gray 10YR 4/1 medium sand, some silt, wet. 80.3	sm		
81	08067 0855 2/18	8 9 11	10	med. dense, gray 10YR 4/1 sandy gravel, some pebbles, some silt, wet. 80.6	gp	NA	HNU=0ppm YB, α=no meters.
82				med. dense, gray 10YR 3/1 coarse sand, some gravel, some silt, wet.	sp		
83							
84							
85	08068 1030 2/18	8 14 22	13	dense, gray 10YR 4/1 medium to coarse sand, some gravel, some silt, trace clay, wet.	sp	NA	HNU=0 ppm YB, α=No meters.
86							
87							
88				88.0			
89							

NOTES:

460

402-11-86

FERNALD RI/FS

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PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B370~~ B3070	COORDINATES:	DATE: 2/18/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 7 OF 11

2731

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	08069 1400 2/18	4 7 10	13	med. dense, gray 10YR 4/1 fine gravel and coarse sand, some silt, wet. 90.3 90.6	gm sm	NA	HNU=0ppm ⊥B, α=No meters. Cobble smashed in spoon.
92				med. dense, gray 10YR 3/1 fine sand, some silt, wet.	SW		
93				med. dense, gray 10YR 4/1 gravelly sand; fine to coarse sand, some silt, some pebbles, trace clay, wet. 94.0			
95	08070 1305 2/18	8 24 34	18	very dense, gray 10YR 4/1 fine to coarse sand, some gravel, some silt, wet. 96.0	sm	NA	HNU=0ppm ⊥B=60cpm α=0cpm
97				very dense, gray 10YR 5/1 gravel, some sand, some pebbles, some silt, trace clay, wet. 99.0	gm		
100	08071 1350 2/18	5 6 8	11	med. dense, gray 10YR 4/1 coarse sand, some gravel, some silt, wet.	sm	NA	HNU=0ppm ⊥B=80cpm α=0cpm
102							
103							
104							

NOTES:

461

FERNALD RI/FS

DLG 2/4/89

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B370~~ B3070 BB 1-5-89	COORDINATES:	DATE: 2/18/88
ELEVATION:	GWL: Depth 76.05 Date/Time 2/19/88 0840	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth · Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 8 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
106	08072 1555 2/18	5 10 16	13	med. dense, gray 10YR 3/1 coarse sand, some fine gravel, some silt, wet.	SM	NA	HNU= 0ppm γB= 60cpm α= 2cpm
107							
108							
109							
110				med. dense, gray 10YR 4/1 coarse sand, some fine gravel, trace silt, wet. 110.3	SM		
111	08073 1635 2/18	5 10 14	12	med. dense, gray 10YR 4/1 fine sand, some silt, trace fine gravel, wet. (1" fine gravel lens at 111.0).	SM	NA	HNU= 0ppm γB= 60cpm α= 2 cpm
112							
113							
114							
115	08074 0905 2/19	5 21 43	18	very dense, gray 10YR 4/1 fine to coarse sand, some fine gravel, some pebbles, some silt, trace clay, wet.	SM	NA	HNU= 0ppm γB= 60 cpm α= 4 cpm
116							
117							
118							
119							

NOTES:

462

402-11-86

FERNALD RI/FS

DLG 2/4/89

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B370~~ B3070 CB 1-89	COORDINATES:	DATE: 2/19/88
ELEVATION:	GWL: Depth 75.8 Date/Time 2/20/88 0800	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 9 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 REMARKS
121	08075 0950 2/19	1 4 5	17	loose, gray 10YR4/1 fine to medium sand, some silt, trace coarse sand, trace silt, wet. 120.5	sm gm	NA	HNU=0ppm γB=60cpm α=2cpm
122				loose, gray 10YR4/1 sand and gravel; fine to coarse sand, fine gravel with some pebbles, some silt, wet. 124.0			
125	08076 1450 2/19	27 34 46	18	very dense, gray 10YR 4/1 fine to medium sand, some silt, trace clay, wet. 125.3	sm	NA	HNU=0ppm γB=60cpm α=0cpm
126				very dense, gray 10YR 3/1 sandy gravel; fine to coarse sand, fine gravel with some pebbles, some silt, wet. 128.0	gp		
130	08077 08077 2/20	7 24 52	11	very dense, gray 10YR 3/1 medium sand, some silt, wet. 131.2	sm	NA	HNU=0ppm γB=60cpm α=2cpm; Cobble, caught in mouth of spoon
132				very dense, gray 10YR 4/1 gravelly sand; fine to coarse sand, some pebbles, some silt, wet. 134.0	sw		

NOTES:

463

402-11-86

2731

DLG 2/4/89

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2nd Key In		
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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B370~~ B3070 BB 1-5-89	COORDINATES:	DATE: 2/20/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 10 OF 14

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136	08078 0900 2/20	13 16 17	16	dense, gray 10YR 5/1 gravelly sand; fine to coarse sand, some clay, some silt, some pebbles, wet. (135.3)	gc sm	NA	HNU=0ppm RB=60cpm α=2cpm
137				dense, gray 10YR 3/1 fine to coarse sand, some silt, trace gravel, wet.			
138							
139							
140	08079 1105 2/20	4 9 22	18	dense, gray 10YR 4/1 fine to coarse sand, some silt, trace fine gravel, wet.	sm	NA	HNU=0ppm RB=60cpm α=2cpm
141							
142							
143				(143.0)			
144							
145	08080 1335 2/20	11 43 54	8	very dense, gray 10YR 4/1 sandy gravel; fine gravel to pebbles, medium to coarse sand, trace silt, wet.	gp	NA	HNU=0ppm RB=60cpm α=2cpm
146							
147							
148							
149				(149.0)			

NOTES:

402-11-86

FERNALD RI/FS

2731

DLG 2/4/89

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3010	COORDINATES:	DATE: 2/20/88
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 2/10/88
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 2/20/88
DRILLING METHODS: Cable Tool		PAGE 11 OF 11

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	08081 1600 2/20	14 17 17	7	dense, gray 10YR 4/1 coarse sand, some gravel and pebbles, trace silt, wet.	SW	NA	HNU=0 ppm γB=60 cpm α=2 cpm
152				End of boring 151.5 ft.			

NOTES:

465

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE / DATE / TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	08035 02/10/88 1320	1 2 3	13	STIFF, YELLOW-BROWN 10YR 3/6 SILT AND CLAY, ABUNDANT ORGANIC MATERIAL, ROOTS, DRY. STIFF, YELLOW-BROWN 10YR 3/6 CLAY AND SILT, SOME ORGANIC MATERIAL, DRY.	CL CL	1.75	Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm
3.0	08036 02/10/88 1325	2 4 4	12	STIFF, YELLOW-BROWN 10YR 3/6 CLAY WITH SOME SILT, TRACE ORGANIC MATERIAL.	CL	1.5	Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm
4.5	08037 02/10/88 1330	4 4 4	2	(VERY SOFT) YELLOW-BROWN 10YR 3/4 SILT AND CLAY, WET.	CL		Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm
6.0	08038 02/10/88 1335	3 4 4	8	SOFT, YELLOW-BROWN 10YR 3/4 SILT AND CLAY, WET. MEDIUM STIFF, YELLOW-BROWN 10YR 4/4 CLAY WITH SOME SILT, SAND, AND GRAVEL, MOIST. COBBLE SMASHED IN SPOON.	CL CL	0.5 0.75	Hnu= 0 ppm α = 0 cpm BΓ = 100 cpm
7.5	08039 02/10/88 1340	3 5 8	18	VERY LOOSE, YELLOW-BROWN 10YR 3/4 SAND, SOME SILT, CLAY AND GRAVEL, WET. STIFF, YELLOW-BROWN 10YR 4/4 GRAVELLY CLAY, SOME SAND AND SILT, MOIST.	SM CL	N/A 1.25	Hnu= 0 ppm α = 0 cpm BΓ = 80 cpm
9.0	08040 02/10/88 1450	7 6 10	13	VERY SOFT, YELLOW-BROWN 10YR 4/4 SILTY CLAY, SOME GRAVEL, TRACE SAND, MOIST. VERY STIFF, YELLOW-BROWN 10YR 4/4 CLAY WITH SOME SAND AND GRAVEL, MOIST.	CL CL	<0.2 3.5	Hnu= 0 ppm α = 0 cpm BΓ = 80 cpm
10.5	08041 02/10/88 1505	6 15 23	13	VERY STIFF, YELLOW-BROWN 10YR4/4 CLAY WITH SOME GRAVEL, MOIST.	CL	4.25	Hnu= 0 ppm α = 0 cpm BΓ = 80 cpm
12.0	08042 02/10/88 1610	12 17 23	16	HARD, YELLOW-BROWN 10YR 3/3 CLAY, SOME GRAVEL AND PEBBLES, DRY HARD, GRAY 10YR 4/1 CLAY, SOME GRAVEL, DRY.	CL CL	>5	Hnu= 0 ppm α = 0 cpm BΓ = 60 cpm
13.5	08043 02/10/88 1645	3 9 11	14	VERY STIFF, GRAY-GREEN 5YR 4/1 CLAY WITH SOME FINE GRAVEL, WOOD FRAGMENTS PRESENT, DRY.	CL	3.5	Hnu= 0 ppm α = 2 cpm BΓ = 80 cpm
15.0	08044 02/10/88 1705	4 9 14	14	VERY STIFF, GRAY 10YR 4/1 CLAY WITH SOME GRAVEL, TRACE SILT, DRY. (GRAVELLY CLAY AT 14.9 - 15.0).	CL	3.25	Hnu= 0 ppm α = 0 cpm BΓ = 80 cpm

NOTES:
PENNSYLVANIA DRILLING CO. BUCYRUS ERIE 24-W DRILLING RIG. DRILLER: DAVE NEWMAN. HELPER: JOE BARILE/BOB JOHNSON.
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2 IN X 18 IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS.
APPROX. 350 GALLONS US

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	08045	02/10/88 1720	5 7 9	10	HARD, GRAY 10YR 4/1 CLAY WITH TRACE GRAVEL AND SILT, DRY.	CL	4.25	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
18.0	08046	02/11/88 0845	7 9 13	18	VERY STIFF, GRAY 10YR 4/1 CLAY, SOME GRAVEL AND SILT, DRY.	CL	2.25	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
19.5	08047	02/11/88 0900	4 10 14	14	VERY STIFF, GRAY 10YR 5/1 CLAY, SOME SILT, TRACE GRAVEL, DRY. VERY STIFF, GRAY 10YR 5/1 CLAY AND SILT, SOME GRAVEL, DRY.	CL CL	2.50 3.5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
21.0	08048	02/11/88 1050			VERY STIFF, GRAY 10YR 4/1 CLAY, SOME GRAVEL, DRY. SHELBY TUBE.	CL	>5	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
22.5	08049	02/16/88 1115	6 8 12	7	STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL, TRACE SILT, DRY.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
24.0	08050	02/16/88 1130	7 10 12	14	STIFF, GRAY-GREEN 5Y 4/1 GRAVELLY CLAY, TRACE SILT, DRY. VERY STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL AND PEBBLES, DRY.	CL CL	2.0 2.5	Hnu= 0 ppm βΓ = 100 cpm
25.5	08051	02/16/88 1145	6 8 12	7	VERY STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL AND PEBBLES, DRY.	CL	3.5	Hnu= 0 ppm βΓ = 60 cpm
27.0	08052	02/16/88 1250	5 10 13	13	HARD, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL AND PEBBLES, DRY.	CL	4.25	Hnu= 0 ppm βΓ = 80 cpm
28.5	08053	02/16/88 1305	8 13 19	18	HARD, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL, TRACE SILT, DRY.	CL	4.25	Hnu= 0 ppm βΓ = 80 cpm
30.0	08054	02/16/88 1330	4 8 15	14	VERY STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL, TRACE SILT, DRY.	CL	3.5	Hnu= 0 ppm βΓ = 140 cpm

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	08055	02/16/88 1440	8 10 17	5	VERY STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL AND PEBBLES, TRACE SILT, DRY.	CL	3.25	Hnu= 0 ppm BΓ = 80 cpm
33.0	08056	02/16/88 1455	12 7 13	13	VERY STIFF, GRAY-GREEN 5Y 5/1 CLAY, SOME GRAVEL, SOME SILT, DRY.	CL	3.5	Hnu= 0 ppm BΓ = 60 cpm
34.5	08057	02/16/88 1525	15 17 19	14	VERY STIFF, GRAY-GREEN 5Y 4/1 CLAY, SOME GRAVEL, SOME SILT, DRY. DENSE, GRAY 10YR 4/1 GRAVELLY SAND, SOME SILT, DRY.	CL SW	2.5 N/A	Hnu= 0 ppm BΓ = 80 cpm
36.0	08058	02/16/88 1540	15 27 32	7	VERY DENSE, GRAY 10YR 5/1 GRAVELLY SAND, SOME SILT, DRY.	SW	N/A	Hnu= 0 ppm BΓ = 110 cpm
40.0								
41.5	08059	02/16/88 1620	37 25 38	15	VERY DENSE, GRAY 10YR 4/1 GRAVELLY SAND, SOME PEBBLES, SOME SILT, DRY.	SW	N/A	Hnu= 0 ppm BΓ = 60 cpm
45.0								

NOTES:
BASE OF TILL AT 33.5 FT.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	08060	02/17/88	0905	27 32 29	12	VERY DENSE, GRAY 10YR 4/1 GRAVELLY SAND, SOME SILT, SOME PEBBLES, DRY.	SW	N/A	Hnu= 0 ppm BΓ = 80 cpm
50.0									
51.5	08061	02/17/88	1035	7 13 21	11	DENSE, GRAY 10YR 4/1 MEDIUM SAND, TRACE GRAVEL, SOME SILT, DRY	SM	N/A	Hnu= 0 ppm BΓ = 100 cpm
55.0									
56.5	08062	02/17/88	1305	6 22 50	14	VERY DENSE, GRAY 10YR 3/1 FINE SAND, SOME SILT, TRACE GRAVEL, DRY.	SM	N/A	Hnu= 0 ppm BΓ = 60 cpm
60.0									

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	08063	02/17/88	1340	8 13 30	13	DENSE, GRAY 10YR 4/1 FINE SAND, SOME SILT, DRY.	SM	N/A	Hnu= 0 ppm BΓ = 80 cpm
65.0									
66.5	08064	02/17/88	1520	8 48 50	15	VERY DENSE, GRAY 10YR 4/1 FINE SAND, SOME SILT, DRY. VERY DENSE, GRAY 10YR 4/1 SAND AND GRAVEL, SOME PEBBLES, SOME SILT, TRACE CLAY, DRY.	SM GM	N/A N/A	Hnu= 0 ppm BΓ = 60 cpm
70.0									
71.5	08065	02/17/88	1635	17 21 39	14	VERY DENSE, GRAY 10YR 5/1 SAND AND GRAVEL, SOME PEBBLES, SOME SILT, TRACE CLAY, DRY.	GM	N/A	Hnu= 0 ppm BΓ = 60 cpm
75.0									

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	08066	02/18/88 0815	10 11 18	11	MED. DENSE, GRAY 10YR 4/1 FINE TO MEDIUM SAND, SOME SILT, TRACE GRAVEL, WET.	SM	N/A	Hnu= 0 ppm
80.0								
81.5	08067	02/18/88 0855	8 9 11	10	MED. DENSE, GRAY 10YR 4/1 MEDIUM SAND, SOME SILT, WET. MED. DENSE, GRAY 10YR 4/1 SANDY GRAVEL, SOME PEBBLES, SOME SILT, WET. MED. DENSE, GRAY 10YR 3/1 COARSE SAND, SOME GRAVEL, SOME SILT, WET.	SM GP SP	N/A N/A N/A	Hnu= 0 ppm
85.0								
86.5	08068	02/18/88 1030	8 14 22	13	DENSE, GRAY 10YR 4/1 MEDIUM TO COARSE SAND, SOME GRAVEL, SOME SILT, TRACE CLAY, WET.	SP	N/A	Hnu= 0 ppm
90.0								

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	08069	02/18/88	1100	4 7 10	13	MED. DENSE, GRAY 10YR 4/1 FINE GRAVEL AND COARSE SAND, SOME SILT, WET. MED. DENSE, GRAY 10YR 3/1 FINE SAND, SOME SILT, WET. M	GM SM SW	N/A N/A N/A	Hnu= 0 ppm
95.0									
96.5	08070	02/18/88	1305	8 24 34	18	VERY DENSE, GRAY 10YR 4/1 FINE TO COARSE SAND, SOME GRAVEL, SOME SILT, WET. VERY DENSE, GRAY 10YR 5/1 GRAVEL, SOME SAND, SOME PEBBLES, SOME SILT, TRACE CLAY, WET.	SM GM	N/A N/A	Hnu= 0 ppm α = 0 cpm Bγ = 60 cpm
100.0									
101.5	08071	02/18/88	1350	5 6 8	11	MED. DENSE, GRAY 10YR 4/1 COARSE SAND, SOME GRAVEL, SOME SILT, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 80 cpm
105.0									

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	08072	02/18/88	1555	5 10 16	13	MED. DENSE, GRAY 10YR 3/1 COARSE SAND, SOME FINE GRAVEL, SOME SILT, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm BΓ = 60 cpm
110.0									
111.5	08073	02/18/88	1635	5 10 14	12	MED. DENSE, GRAY 10YR 4/1 COARSE SAND, SOME FINE GRAVEL, TRACE SILT, WET. MED. DENSE, GRAY 10YR 4/1 FINE SAND, SOME SILT, TRACE FINE GRAVEL, WET. (1" FINE GRAVEL LENS AT 111.0).	SM SM	N/A N/A	Hnu= 0 ppm α = 2 cpm BΓ = 60 cpm
115.0									
116.5	08074	02/19/88	0905	5 21 43	18	VERY DENSE, GRAY 10YR 4/1 FINE TO COARSE SAND, SOME FINE GRAVEL, SOME PEBBLES, SOME SILT, TRACE CLAY, WET.	SM	N/A	Hnu= 0 ppm α = 4 cpm BΓ = 60 cpm
120.0									

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	08075	02/19/88 0950	1 4 5	17	LOOSE, GRAY 10YR 4/1 FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND, TRACE SILT, WET. LOOSE, GRAY 10YR 4/1 SAND AND GRAVEL; FINE TO COARSE SAND, FINE GRAVEL WITH SOME PEBBLES, SOME SILT, WET.	SM GM	N/A N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
126.5	08076	02/19/88 1450	27 34 46	18	VERY DENSE, GRAY 10YR 4/1 FINE TO MEDIUM SAND, SOME SILT, TRACE CLAY, WET. VERY DENSE, GRAY 10YR 3/1 SANDY GRAVEL; FINE TO COARSE SAND, FINE GRAVEL WITH SOME PEBBLES, SOME SILT, WET.	SM GP	N/A N/A	Hnu= 0 ppm α = 0 cpm Bγ = 60 cpm
130.0								
131.5	08077	02/20/88 0820	7 24 52	11	VERY DENSE, GRAY 10YR 3/1 MEDIUM SAND, SOME SILT, WET. VERY DENSE, GRAY 10YR 4/1 GRAVELLY SAND; FINE TO COARSE SAND, SOME PEBBLES, SOME SILT, WET.	SM SW	N/A N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
135.0								

NOTES:
COBBLE CAUGHT IN MOUTH OF SPOON. BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 10 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
136.5	08078 02/20/88 0900		13 16 17	16	DENSE, GRAY 10YR 5/1 GRAVELLY SAND; FINE TO COARSE SAND, SOME CLAY, SOME SILT, SOME PEBBLES, WET. DENSE, GRAY 10YR 3/1 FINE TO COARSE SAND, SOME SILT, TRACE GRAVEL, WET.	GC SM	N/A N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
140.0								
141.5	08079 02/20/88 1105		4 9 22	18	DENSE, GRAY 10YR 4/1 FINE TO COARSE SAND, SOME SILT, TRACE FINE GRAVEL, WET.	SM	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
145.0								
146.5	08080 02/20/88 1335		11 43 54	8	VERY DENSE, GRAY 10YR 4/1 SANDY GRAVEL; FINE GRAVEL TO PEBBLES, MEDIUM TO COARSE SAND, TRACE SILT, WET.	GP	N/A	Hnu= 0 ppm α = 2 cpm Bγ = 60 cpm
150.0								

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3070	COORDINATES: NORTH 476,762.23 EAST 1,382,026.06	DATE: 02/10/88
GROUND ELEVATION: 591.4	GWL: Depth N/A Date/Time N/A	DATE STARTED: 02/10/88
ENGINEER/GEOLOGIST: T. SULLIVAN	Depth N/A Date/Time N/A	DATE COMPLETED: 02/23/88
DRILLING METHODS: CABLE-TOOL		PAGE 11 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
151.5	08081	02/20/88	1600	14 19 17	7	DENSE, GRAY 10YR 4/1 COARSE SAND, SOME GRAVEL AND PEBBLES, TRACE SILT, WET.	SW	N/A	Hnu= 0 ppm α = 2 cpm βγ = 60 cpm

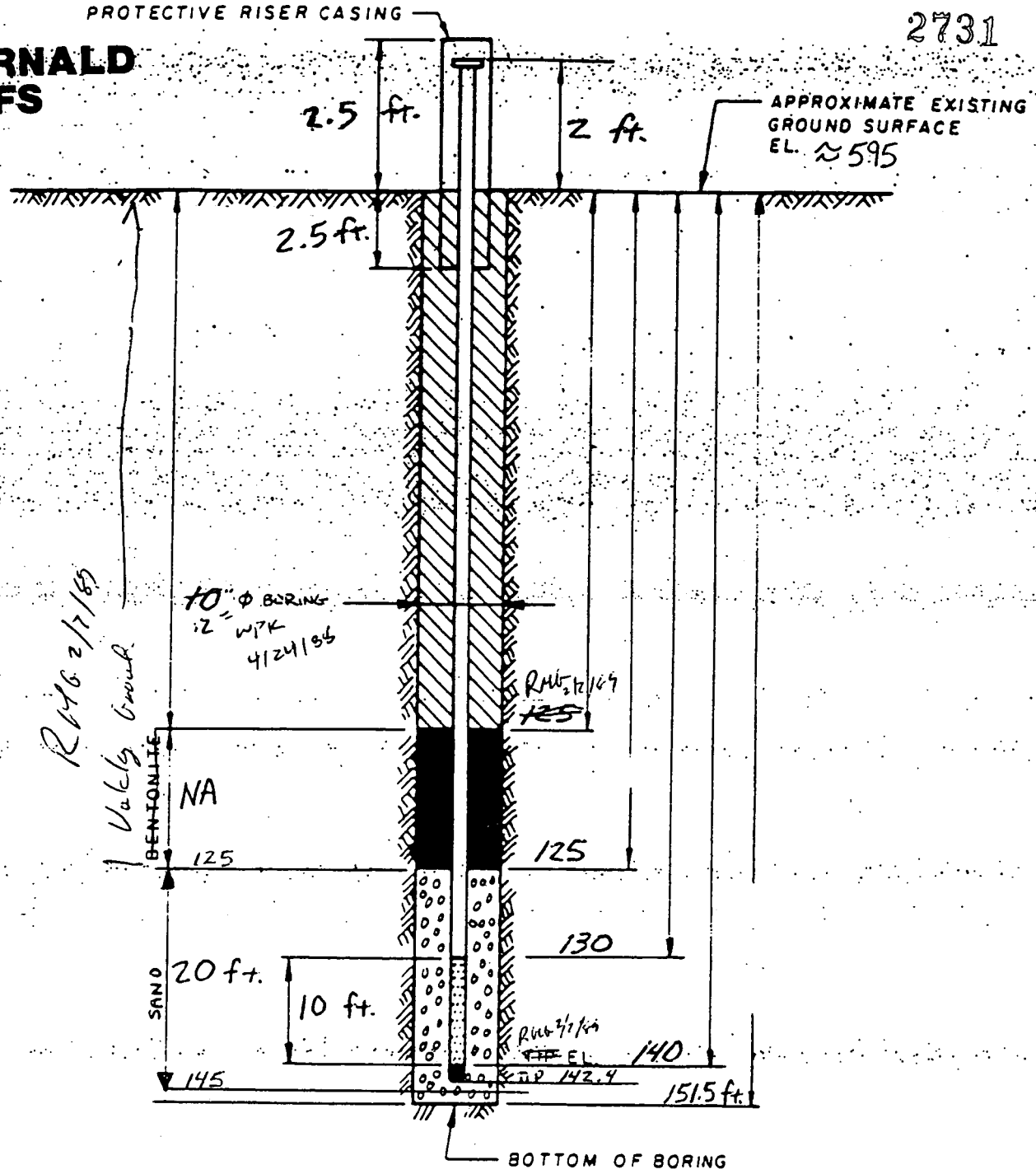
BOTTOM OF BORING 151.5

NOTES:
BLOWS ON SAMPLER FOLLOW ASTM STANDARD FOR 2INX18IN SPLIT SPOON. SOIL COLORS FOLLOW MUNSELL COLOR CHARTS. APPROX. 350 GALLONS USED IN DRILLING.

DLO 2/4/89

2731

FERNALD RI/FS



NOTES:

1. RISER PIPE IS 4 IN. I.D. SCHEDULE 40 PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 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 73.65 ft. below grd. surface.
5. WATER LEVEL READING ON 2/24/88, 08:50

INSTALLATION DETAILS
MONITORING WELL ~~370~~ 3070

PREPARED FOR BB 1-5-89

477

*Natural material cave-in 145 to 151.5 ft.

DRAWING NUMBER

CHECKED BY

APPROVED BY

DLG 2/4/89

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

PAC

'ERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. T. Sullivan DATE 2/23/88
PROJECT NO. 602.3.2 CHECKED BY R Galbraith DATE 2/7/89
BORING NO. 3070
PIEZOMETER NO. 3070 DATE OF INSTALLATION 2/23/88

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 90 ft.
FLUID — FROM — TO —

TYPE OF BIT Hammer
CASING SIZE (S) USED:
SIZE 10in. ID FROM 0 TO 150 ft.
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4in.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.010in.
TOTAL ~~PERFORATED AREA~~ SCREEN LENGTH 10 ft.

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4in.
LENGTH OF PIPE SECTIONS 10ft., 2 ft.
JOINING METHOD Screw flush joint threads.

OTECTION SYSTEM

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

OTHER PROTECTION Locking cap and 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	TOP 0	BOTTOM 125	TOP	BOTTOM
BENTONITE (None used)	TOP —	BOTTOM —	TOP	BOTTOM
SAND	TOP 125	BOTTOM 145	TOP	BOTTOM
GRAVEL (None used)	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 130	BOTTOM 140	TOP	BOTTOM
PIEZOMETER TIP	142.4			
BOTTOM OF BOREHOLE	151.5			
GWL AFTER INSTALLATION	73.65 FOC WPK 4/24/89			

478

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

EMARKS Natural material cave-in from 151.5 up to 145 ft., sand pack placed above 145 ft.

MONITORING WELL INSTALLATION RECORD
11/21/91

2731

OJECT NAME: Fernald RI/FS
OJECT NO. : 602.3.2
RING NO. : 3070
LL NUMBER: 3070

FIELD ENG./GEO.: T. SULLIVAN
CHECKED BY : Not Noted
N,E COORDINATES: 476762.23, 1382026.0
DATE OF INSTAL.: 02/23/88

DATE: 02/23/88
DATE: N/A

LE DRILLING

LLING METHOD: Cable Tool
RILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 90
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 150
SIZE: N/A FROM: N/A TO: N/A

.L DESCRIPTION

TYPE: MONITORING WELL
IAMETER OF PERFORATED SECTION:
ERFORATION TYPE: Screen
VG. SIZE OF PERFORATIONS: 0.010 (In.)
OTAL PERFORATED AREA: 10 Ft.
OTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: 2 Ft.
3RD PIPE SECTION: Not Noted
COMMENTS

ISER JOINING METHOD: SCREW FLUSH JOINT THREADS

TECTION SYSTEM

ISER PROTECTIVE PIPE LENGTH: 5 Ft.
ROTECTIVE PIPE O.D.: 10 3 In.
* LOCKING CAP AND LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
OP OF RISER PIPE	2.0 Ft.	593.94
ROUND SURFACE	0.0	591.4
OTTOM OF PROTECTIVE PIPE	2.5 Ft.	

OREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	125	N/A	N/A
Sand	125	145	N/A	N/A
ORATED SECTION	130	140	N/A	N/A
TIP	142.4		N/A	
OM OF BOREHOLE	151.5		N/A	
WL AFTER INSTALLATION	73.65		N/A	

THE WELL FLUSHED AFTER INSTALLATION? : No
A SENSITIVITY TEST PERFORMED ON THE WELL : No

MARKS -- COMMENT AREA

ARKS : NATURAL MATERIAL CAVE-IN FROM 151.5 UP TO 145 FT., SAND PACK PLACED ABOVE 145 FT.
MENTS:

WELL 3106

REVIEWED BY QA K.G DATE AUG 21 1991

	Initial	Date
Field Check	WPH	2-9-89
1st Key In	[illegible]	[illegible]
2nd Key In	[illegible]	6-7-89
Hard Copy Verification		

FERNALD RI/FS

COPY RECEIVED 6/23/89

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 3106	COORDINATES: N 476094.40 E 1379589.66	DATE: 01-18-89
ELEVATION: ~~B 4-11-91 ~~ 539.1 ft	GWL: Depth 19.6 Date/Time 1-24-89 0800	DATE STARTED: 01-18-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth 19.8 Date/Time 1-26-89 0800	DATE COMPLETED: 01-25-89
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 9

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	10560 1500 01-18	3 5 7	10.0	MEDIUM STIFF, BROWN (10YR 3/2) SILTY CLAY, ROOTLETS, TRACE SAND, DAMP	CL	1.0	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
2 3	10561 1506 01-18	2 5 7	4.0	MEDIUM STIFF, BROWN (10YR 3/2) SILTY CLAY, TRACE SAND, DAMP	CL	1.0	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
4	10562 1508 01-18	4 7 12	6.0	MEDIUM STIFF, BROWN (10YR 3/2) SILTY CLAY, TRACE SAND, DAMP	CL	1.0	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
5 6	10563 1511 01-18	9 16 22	14.0	STIFF, BROWN (10YR 3/2) SILTY CLAY, TRACE SAND, DAMP	CL	2.0	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
7	10564 1516 01-18	23 25 32	18.0	VERY STIFF, BROWN (10YR 4/3) SILTY CLAY, TRACE COARSE GRAVEL (1.5-2.0 IN), DAMP	CL	2.5	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
8 9	10565 1645 01-18	4 9 12	9.0	VERY STIFF, BROWN (10YR 3/2) SILTY CLAY, WET	CL	2.5	Hnu = 0 PPM α = 0 CPM Bγ = 30-50 CPM
				VERY STIFF, BROWN (10YR 3/2) SILTY CLAY, WET "BASE OF TILL" 9.5	CL	2.5	Hnu = 0 PPM
10	10566 1650 01-18	3 6 7	18.0	LOOSE, YELLOW-BROWN (10YR 5/4) POORLY GRADED SAND, DRY	SP	N/A	α = 0 CPM Bγ = 40 CPM
11							
12							
13							
14							

2731

481

NOTES: CONTRACTOR: PENDRILL
RIG: CYCLONE 42
DRILLER: JOE BRING
ASSISTANT: LARRY BOOTH

SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: Hnu = 0 PPM LEL α = 0 CPM LEL Bγ = 20-40 CPM
LEL O_2 = 0 PPM 20.6% O_2

SDM
JAN 30 1990

WATER USED DURING DRILLING AND CONNECTED ACTIVITIES: ~~400~~ 1640 GALLONS

2731

FERNALD RI/FS

REVIEWED BY QA K6 DATE AUG 21 1991

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 3106	COORDINATES: Sept	DATE: 01-19-89
ELEVATION: ~540.0	GWL: Depth 26.0 ft Date/Time 1-19-89 @1705	DATE STARTED: 01-18-89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth 24.8 ft Date/Time 1-20-89 @0750	DATE COMPLETED: 01-21-89
DRILLING METHODS: CABLE TOOL	20.8 FT " 1-21-89 @	PAGE 2 OF 9

24.1 FT 1-22-89 0800
21.0 FT 1-23-89
20.8 FT 1-23-89 0800
1115
19.6 FT. 0800 1-24-89

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	10567 1005 01-19	14 13 17	14	MEDIUM DENSE, YELLOW-BROWN (10YR4/4) WELL GRADED GRAVELLY SAND, GRAVEL RANGING FROM (.25 - .75 IN.) DRY	SW	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
17							
18							
19							
20							
21	10568 1028 01-19	13 18 19	12	DENSE, YELLOW-BROWN (10YR4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25 - .75 IN) ~~DRY~~ WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
22							
23							
24							
25							
26	10569 1120 01-19	15 19 17	14	DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25 - .75 IN) WET	SW	N/A	HNU = 0 PPM α = 0 CPM Bβ = 40-60 CPM
27							
28							
29							

NOTES:

482

SDM
CKD JAN 20 1989

2731

FERNALD RI/FS

REVIEWED BY QA 1.6 DATE AUG 21 1991

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 32	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 3106	COORDINATES: Local	DATE: 1-19-89
ELEVATION: ~540.0	GWL: Depth 33.3* Date/Time 1-20-89 1700	DATE STARTED: 01-18-89
ENGINEER/GEOLOGIST: M. SWIERSKI	Depth Date/Time	DATE COMPLETED: 01-21-89
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 9

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	10570 1140 01-19	17 16 17	14	DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25-.75 IN) WET	SW	N/A	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
32							
33							
34							
35	10571 1556 01-19	16 34 22	12	VERY DENSE, BROWN, (10 YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25-.5 IN) AT 35.5 FT. WET.	SP	N/A	Hnu = 0 PPM α = 0 CPM Bγ = 20-40 CPM
36							
37							
38							
39							
40	10572 1615 01-19	16 18 20	17	DENSE, YELLOW-BROWN (10 YR 4/4), WELL-GRADED SANDY FINE GRAVEL, WET.	GW	N/A	Hnu = 0 PPM α = 0 PPM Bγ = 20-40 CPM
41							
42							
43							
44							

483

NOTES: * Measured water level at 1700. Hole was just bailed.

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JAN 20 1989

FERNALD RI/FS

REVIEWED BY QA K6 DATE AUG 21 1991

2731

	Initial	Date
1st Key In		
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Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: Local	DATE: 01-20-89
ELEVATION: ~540.0 FT	GWL: Depth Date/Time	DATE STARTED: 1-18-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 1-21-89
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 9

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	10573 0817 01-20	12 20 26	8	DENSE, DARK BROWN, (10YR 3/3), WELL GRADED GRAVELLY SAND, FINE TO COARSE, WET.	SW	N/A	H_{net} = 0 ppm α = 0 CPM $\beta\gamma$ = 20 CPM
47							
48							
49							
50	10574 0845 01-20	5 8 13	6	MEDIUM DENSE, BROWN, (10YR 4/3) WELL GRADED SAND, FINE TO COARSE, TRACE OF GRAVEL, WET	SW	N/A	H_{net} = 0 ppm α = 0 CPM $\beta\gamma$ = 16-20 CPM
51							
52							
53							
54							
55	10575 1010 01-20	8 21 17	15	DENSE, DARK BROWN, (10YR 3/3), WELL GRADED SAND, TRACE OF GRAVEL (.25-.5 IN), WET	SW	N/A	H_{net} = 0 ppm α = 0 CPM $\beta\gamma$ = 20-40 CPM
56							
57							
58							
59							

NOTES:

484

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FERNALD RI/FS

REVIEWED BY QA V.G. DATE AUG 21 1991

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: Sys	DATE: 01-20-89
ELEVATION: ~540.0 FT.	GWL: Depth Date/Time	DATE STARTED: 1-18-89
ENGINEER/GEOLOGIST: E. TEOLUNGEK	Depth ~~19.8~~ AGT Date/Time ~~1-26-89 0800~~	DATE COMPLETED: 1-21-89
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
61	10576 1130 01-20	7 11 13	8	MEDIUM DENSE, BROWN, (10 YR 4/3), WELL GRADED COARSE SAND, WET.	SW	N/A	Hnu = 0 PPM α = 0 CPM βγ = 20-40 CPM
62							
63							
64							
65	10577 1444 01-20	27 40 50	17	VERY DENSE, YELLOW-BROWN, (10 YR 4/4) SANDY, WELL GRADED GRAVEL, GRAVEL #4-.75 IN, WET	GW	N/A	Hnu = 0 PPM α = 0 CPM βγ = 20-40 CPM
66							
67							
68							
69							
70	10578 1530 01-20	20 40 50+ 4 IN	12	VERY DENSE, BROWN, (10 YR 3/3) POORLY GRADED SAND, SOME GRAVEL (.25-.50 IN) AT 71.0 FT TO 71.5 FT., WET	SP	N/A	Hnu = 0 PPM α = 0 CPM βγ = 20-40 CPM
71							
72							
73							
74							485

NOTES:

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FERNALD RI/FS

REVIEWED BY QA K.G. DATE AUG 21 1989 2731

	Initial	Date
1st Key In		
2nd Key In		7-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: Grid	DATE: 01-20 & 21-89
ELEVATION: ~540.0 FT	GWL: Depth Date/Time	DATE STARTED: 1-18-89
ENGINEER/GEOLOGIST: E. Trollinger	Depth Date/Time	DATE COMPLETED: 1-21-89
DRILLING METHODS: Cable Tool		PAGE 6 OF 9

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	10579 1639 01-20	18 32 38	12	VERY DENSE, BROWN, (10 YR 4/3), SANDY GRAVEL (.25-.50 IN) WELL GRADED, WET	GW	N/A	Hnu = 0 ppm α = 0 cpm βγ = 20-30 cpm
77							
78							
79							
80							
81	10580 ~~1640~~ 01-21	5 7 11	6	MEDIUM DENSE, BROWN, (10YR 4/4) SANDY GRAVEL (0.25-0.5 IN) WELL GRADED, WET	GW	N/A	Hnu = 0 ppm α = 0 cpm βγ = 20-40 cpm
82							
83							
84							
85							
86	10581 ~~1641~~ 01-21	14 30 22	14	DENSE, BROWN (10YR, 4/2) SANDY GRAVEL (0.25-0.75) WELL GRADED, WET	GW	N/A	Hnu = 3 ppm α = ~~30~~ 0 cpm βγ = 30-40 cpm
87							
88							
89							486

NOTES

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CHK'D JAN 23 1989

FERNALD RI/FS

2731

AUG 21 1989

REVIEWED BY QA K.G. DATE

	Initial	Date
1st Key In	JMT	5/28/89
2nd Key In	JH	6/8/89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: Surv	DATE: 01-21-89
ELEVATION: ~540.0 FT	GWL: Depth Date/Time	DATE STARTED: 1-18-89
ENGINEER/GEOLOGIST: J. TESORIERO	Depth Date/Time	DATE COMPLETED: 1-21-89
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
91	10582 1145 01-21	10 14 16	6	MEDIUM DENSE, BROWN (10YR, 4/2) WELL GRADED; COARSE SAND WITH SOME GRAVEL (0.25 - 0.75 IN) WET	SW	N/A	Hnu = 0 ppm α = 0 cpm βγ = 20-40 cpm
92							
93							
94							
95							
96	10583 1415 01-21	4 4 8	6	MEDIUM DENSE, BROWN (10YR, 4/2), POORLY GRADED, MEDIUM SAND TRACE GRAVEL (0.25 - 0.50 IN) WET	SP	N/A	Hnu = 3 ppm α = 0 cpm βγ = 20-50 cpm
97							
98							
99							
100							
101	10584 1530 01-21	10 13 10	10	MEDIUM DENSE, BROWN (10YR, 4/2) POORLY GRADED, MEDIUM SAND WET.	SP	N/A	Hnu = 0 ppm α = 0 cpm βγ = 30-40 cpm
102							
103							
104				BOTTOM OF BORING 3106 = 105 FT			487

NOTES:

SDM

CHKD JAN 2 7 1989

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	10560	01/18/89 1500	3 5 7	10.	MEDIUM STIFF, BROWN (10 YR 3/2) SILTY CLAY, ROOTLETS, TRACE SAND, DAMP.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
3.0	10561	01/18/89 1506	2 5 7	4.0	MEDIUM STIFF, BROWN (10 YR 3/2) SILTY CLAY, TRACE SAND, DAMP.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
4.5	10562	01/18/89 1508	4 7 12	6.0	MEDIUM STIFF, BROWN (10 YR 3/2) SILTY CLAY, TRACE SAND, DAMP.	CL	1.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
6.0	10563	01/18/89 1511	9 16 22	14.	STIFF, BROWN (10 YR 3/2) SILTY CLAY, TRACE SAND, DAMP.	CL	2.0	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
7.5	10564	01/18/89 1516	23 25 32	18.	VERY STIFF, BROWN (10 YR 4/3) SILTY CLAY, TRACE COARSE GRAVEL (1.5 - 2.0 IN), DAMP.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
9.0	10565	01/18/89 1645	4 9 12	9.0	VERY STIFF, BROWN (10 YR 3/2) SILTY CLAY, WET.	CL	2.5	Hnu= 0 ppm α = 0 cpm βΓ = 30-50 cpm
11.5	10566	01/18/89 1650	3 6 7	18.	VERY STIFF, BROWN (10 YR 3/2) SILTY CLAY, WET. "BASE OF TILL" LOOSE, YELLOW-BROWN (10 YR 5/4) POORLY GRADED SAND, DRY.	CL SP	2.5 N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
15.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	10567	01/19/89	1005	14 13 17	14	MEDIUM DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL RANGING FROM (.25 - .75 IN.) DRY.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
20.0									
21.5	10568	01/19/89	1028	13 18 19	12	DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25 - .75 IN) WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
25.0									
26.5	10569	01/19/89	1120	15 19 17	14	DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25 - .75 IN) WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
30.0									

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS — VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	10570	01/19/89	1140	17 16 17	14	DENSE, YELLOW-BROWN (10 YR 4/4) WELL GRADED GRAVELLY SAND, GRAVEL (.25 - .75 IN) WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 20-40 cpm
35.0									
36.5	10571	01/19/89	1556	16 34 22	12	VERY DENSE, BROWN, (10 YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 - .5 IN) AT 35.5 FT. WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 20-40 cpm
40.0									
41.5	10572	01/19/89	1615	16 18 20	17	DENSE, YELLOW-BROWN (10 YR 4/4), WELL-GRADED SANDY FINE GRAVEL, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 20-40 cpm
45.0									

NOTES:
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	10573	01/20/89 0817	12 20 26	8	DENSE, DARK BROWN, (10 YR 3/3), WELL GRADED GRAVELLY SAND, FINE TO COARSE, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20 cpm
50.0								
51.5	10574	01/20/89 0845	5 8 13	6	MEDIUM DENSE, BROWN, (10 YR 4/3) WELL GRADED SAND, FINE TO COARSE, TRACE OF GRAVEL, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 10-20 cpm
55.0								
56.5	10575	01/20/89 1010	8 21 17	15	DENSE, DARK BROWN, (10 YR 3/3), WELL GRADED SAND, TRACE OF GRAVEL (.25 - .5 IN), WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
60.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	10576	01/20/89	1130	7 11 13	8	MEDIUM DENSE, BROWN, (10 YR 4/3), WELL GRADED COARSE SAND, WET	SW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 20-40 cpm
65.0									
66.5	10577	01/20/89	1444	27 40 50	17	VERY DENSE, YELLOW-BROWN, (10 YR 4/4) SANDY, WELL GRADED GRAVEL, GRAVEL #4 - .75 IN, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 20-40 cpm
70.0									
71.5	10578	01/20/89	1530	20 40 50	12	VERY DENSE, BROWN, (10 YR 3/3) POORLY GRADED SAND, SOME GRAVEL (.25 - .50 IN) AT 71.0 FT. TO 71.5 FT., WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 20-40 cpm
75.0									

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	10579	01/20/89 1639	18 32 38	12	VERY DENSE, BROWN, (10 YR 4/3), SANDY GRAVEL (.25 - .50 IN) WELL GRADED, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-30 cpm
80.0								
81.5	10580	01/21/89 0850	5 7 11	6	MEDIUM DENSE, BROWN, (10 YR 4/4) SANDY GRAVEL (0.25 - 0.5 IN) WELL GRADED, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 20-40 cpm
85.0								
86.5	10581	01/21/89 1005	14 20 22	14	DENSE, BROWN (10 YR 4/2) SANDY GRAVEL (0.25 - 0.75) WELL GRADED, WET.	GW	N/A	Hnu= 3 ppm α = 0 cpm βΓ = 30-40 cpm
90.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3106	COORDINATES: NORTH 476,094.40 EAST 1,379,589.66	DATE: 01/18/89
GROUND ELEVATION: 539.1	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/89
ENGINEER/GEOLOGIST: M. SLUSARSKI	Depth N/A Date/Time N/A	DATE COMPLETED: 01/18/89
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	10582	01/21/89	1145	10 14 16	6	MEDIUM DENSE, BROWN (10 YR 4/2) WELL GRADED, COARSE SAND WITH SOME GRAVEL (0.25 - 0.75 IN) WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 20-40 cpm
95.0									
96.5	10583	01/21/89	1415	4 4 8	6	MEDIUM DENSE, BROWN (10 YR 4/2), POORLY GRADED, MEDIUM SAND TRACE GRAVEL (0.25 - 0.50 IN) WET.	SP	N/A	Hnu= 3 ppm α = 0 cpm Bγ = 20-50 cpm
100.0									
101.5	10584	01/21/89	1530	10 13 10	10	MEDIUM DENSE, BROWN (10 YR, 4/2) POORLY GRADED, MEDIUM SAND WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 30-40 cpm

BOTTOM OF BORING 105.0

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

2731

FERNALD RI/FS

REVIEWED BY QA K.G. DATE AUG 21 19

Data				
Initial				
	Field Check	1st Key In	2nd Key In	Hard Copy Verification

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS
PROJECT NO. 602 3.2
BORING NO. 3106
PIEZOMETER NO. 3106

FIELD ENG./GEO. TESORIERO DATE 1-18-89 – 1-25-89
CHECKED BY WA Hantel DATE 2-9-89
DATE OF INSTALLATION 1-18-89 to 1-25-89

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0 TO 105 FT
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0 TO 105 FT
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4 IN ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01
TOTAL PERFORATED AREA 10 FT

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS: WAH 2-9-89
O.D. ~~4 3/8~~ 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 ~~20~~ FT SECTIONS AH 1-25-89
JOINING METHOD THREADED FLUSH JOINT

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 10.5 IN

OTHER PROTECTION LOCKING LID WITH PADLOCK.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0		541.1	
GROUND SURFACE	0.0		539.1	
BOTTOM OF PROTECTIVE PIPE	2.5		536.6	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 71.0	TOP 539.1	BOTTOM 568.1
BENTONITE (NONE)	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND (10-20)	TOP 71.0	BOTTOM 102.0	TOP 568.1	BOTTOM 437.1
GRAVEL (4-30)	TOP 102.0	BOTTOM 105.0	TOP 437.1	BOTTOM 434.1
PERFORATED SECTION	TOP 77.0	BOTTOM 87.0 AH 1-25-89	TOP 462.1	BOTTOM 452.
PIEZOMETER TIP	89.1		450.0	
BOTTOM OF BOREHOLE	105.0		434.1	
GWL AFTER INSTALLATION	20.2 FT 1/31/89			

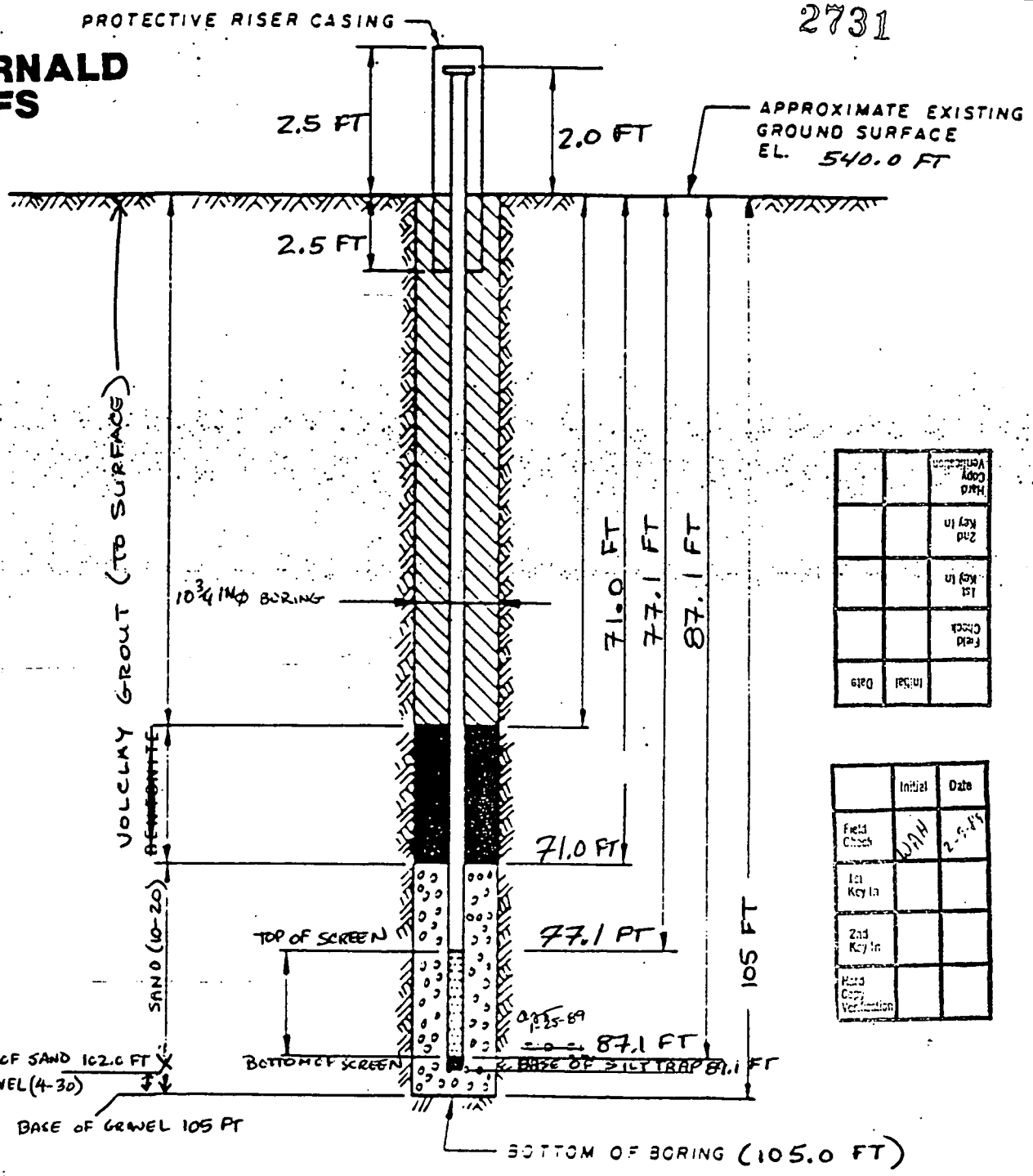
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒ 495
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS

REVISED BY WA 116 DATE

2731

FERNALD RI/FS



	Initial	Date
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2nd Key In		
Hard Copy Verification		

	Initial	Date
Field Check	WAH	2-9-89
1st Key In		
2nd Key In		
Hard Copy Verification		

DRAWING NUMBER	
CHECKED BY	WA Hesler
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 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

MATERIALS USED

4-30 SAND (80 lb BAGS): 2 BAGS AT BASE OF HOLE
10-20 SAND (80 lb BAGS): 19 BAGS TO 71.0 FT
VOLCLAY GROUT (50 lb BAGS): 32 BAGS TO SURFACE
BENTONITE PELLETS: 1/2 BUCKET AS SEALING MATERIAL AROUND PROTECTIVE CASING

WATER ADDED DURING DRILLING AND COMPLETION: 1040 GALLONS

INSTALLATION DETAILS
MONITORING WELL

496

PREPARED FOR
BORING 3106

8 - 10 FT SECTIONS OF SS RISER
1 - 10 FT SS SCREEN WITH 2 FT SILT TRAP.
0.9 FT OF RISER CUT OFF TOP OF WELL.

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 3106
WELL NUMBER: 3106

FIELD ENG./GEO.: TESORIERO DATE: 01/18/89
CHECKED BY : W. A. HERTEL DATE: 02/09/89
N,E COORDINATES: 476094.40, 1379589.6
DATE OF INSTAL.: 01/18/89

2731

LE DRILLING

LLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0 TO: 105
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 105
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: 0.01 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: THREADED FLUSH JOINT

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 10.5 In.
• LOCKING LID WITH PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	540.83
GROUND SURFACE	0.0	539.1
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0.0	71.0	N/A	N/A
Sand	71.0	102.0	N/A	N/A
ravel	102.0	105.0	N/A	N/A
ORATED SECTION	77.1	87.1	N/A	N/A
LL TIP	89.1		N/A	
BOTTOM OF BOREHOLE	105.0		N/A	
GWL AFTER INSTALLATION	20.2		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

COMMENTS:

497

WELL 3120

FERNALD RI/FS

2731

Date	3/26/90			
Initial	[illegible]			
	[illegible]	[illegible]	[illegible]	[illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:	DATE: 1-18-90/1-19-90	
ELEVATION: M. SWANSON	GWL: Depth / Date/Time	DATE STARTED: 1-18-90	
ENGINEER/GEOLOGIST: ~~E. TROWBRIDGE~~	Depth / Date/Time	DATE COMPLETED: 2-2-90	
DRILLING METHODS: CABLE TOOL DRILLING		PAGE 1 OF 11	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED LANDFILL GAS (ppm)	WELL CONSTRUCTION	REMARKS
1	32409 0905 1-18	4 4 7	10	FIRM, DARK BROWN (7.5YR 3/3) CLAYEY SILT, TRACE OF ORGANIC MATERIAL ROOTLETS, MOIST. ↓	ML	1.5	N/A	H_{xu} = 0.2 ppm; α = 0 cpm; $\beta\gamma$ = 40 cpm
2–3	32410 0912 1-18	8 15 18	12	HARD, LIGHT BROWN (10YR 5/3) SILT, TRACE OF COARSE SAND, DRY.	ML / ML	1.5 / 2.5		H_{xu} = 0.2 ppm; α = 0 cpm; $\beta\gamma$ = 50-100 cpm
4–6	32411 0920 1-18; 32412 0930 1-18	15 28 29; 24 28 36	12; 10	HARD, MOTTLED GRAY-YELLOWISH BROWN (10YR 5/2, 4/4) SILTY CLAY, TRACE OF MEDIUM SAND, MOIST. LOW PLASTICITY. ↓	CL / CL	3.0 / 3.0		H_{xu} = 0.0 ppm; α = 0 cpm; $\beta\gamma$ = 50-100 cpm; H_{xu} = 0.0 ppm; α = 0 cpm; $\beta\gamma$ = 60 cpm
7–9	32413 0935 1-18; 32414 1555 1-19	25 32 38; 8 10 12	15; 15	FIRM, YELLOWISH BROWN (10YR 4/4) SANDY CLAY, LOW PLASTICITY, MOIST TO WET ↓	CL / CL	1.0 / 1.0		H_{xu} = 0.0 ppm; α = 0 cpm; $\beta\gamma$ = 50 cpm; H_{xu} = 0.2 ppm; α = 0 cpm; $\beta\gamma$ = 60 cpm
10	32415 1610 1-19	6 10 11	10	MEDIUM DENSE, OLIVE (5Y 5/3) SILT, TRACE OF FINE SAND, MOIST TO WET.	ML	N/A		H_{xu} = 0.0 ppm; α = 0 cpm; $\beta\gamma$ = 60 cpm
11–12	32416 1625 1-19	10 10 17	10	MEDIUM DENSE, GRAY (10YR 5/1) CLAYEY SILT, LOW PLASTICITY, MOIST. ↓	ML	1.5		H_{xu} = 0.2 ppm; α = 0 cpm; $\beta\gamma$ = 60 cpm
13	32417 1637 1-19	6 11 16	10		ML	1.5		H_{xu} = 0.2 ppm; α = 0 cpm; $\beta\gamma$ = 60 cpm
14	32418 1700 1-19	5 8 11	13	FIRM, GRAY (10YR 4/1) CLAY, TRACE OF FINE SAND, IRON OR ~~MANGANESE~~ MANGANESE STAINING ON SAND GRAINS, LOW PLASTICITY, MOIST	CL	1.5		H_{xu} = 0.0 ppm; α = 0 cpm; $\beta\gamma$ = 50-60 cpm

NOTES:

Drilling Contractor: Penn Drill Co.

Drilling Equipment: Cyclone cable tool

Driller: Joe Barile

Asst. Ken Reynolds

Robert Yost

SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

INSTRUMENT BACKGROUND

H_{xu} = 0.0-0.4 ppm

α = 0 cpm

$\beta\gamma$ = 80-100 cpm

499

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES: ← AQUIFER		DATE: 1-19 / 1-20
ELEVATION: M. SWANSON	GWL: Depth 26.5 ft Date/Time 1/21/90 1000		DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: ~~E. TROLLINGER~~ AS	Depth	Date/Time	DATE COMPLETED: 2-2-90
DRILLING METHODS: CABLE TOOL			PAGE 2 OF 11

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED [illegible]	WELL [illegible]	REMARKS
16	32419 1710 1-19	4 8 10	8	FIRM, GRAY (10YR 4/1) CLAY, TRACE OF MEDIUM SAND, LOLO TO MEDIUM SAND, MOIST.	CL	2.0		Hnu = 0.0 ppm α = 0 cpm βγ = 60 cpm
17 18	32420 1530 1-20	8 10 12	6	↓	CL	2.0		Hnu = 0.0 ppm α = 0 cpm βγ = 50 cpm
19	32421 1600 1-20	11 11 28	9	FIRM, GRAY (10YR 4/1) GRAVELLY CLAY, GRAVEL (.5-1.5 in) TRACE TO SOME SAND FINE TO COARSE, LOW PLASTICITY, WET.	CL	2.0		Hnu = 0.0 ppm α = 0 cpm βγ = 40-50 cpm
20 21	32422 1650 1-20	12 12 18	10	↓	CL	2.0		Hnu = 0.0 ppm α = 0 cpm βγ = 50 cpm
22	32423 1249 1-21	6 11 13	9	VERY STIFF, GRAY (5Y 5/1) SILTY CLAY, TRACE OF SUBROUNDED TO ROUNDED SAND, LOW PLASTICITY, MOIST	CL	3.5		Hnu = 0 ppm α = 0 cpm βγ = 100 cpm
23 24	32424 1311 1-21	9 11 17	10	VERY STIFF, GRAY (5Y 5/1) SILTY CLAY, TRACE OF SAND, GRAVEL (≈.25 in.), LOW PLASTICITY, SLIGHTLY MOIST	CL	3.0		Hnu = 0 ppm α = 0 cpm βγ = 60 cpm
25	32425 1329 1-21	13 13 19	9	HARD, GRAY (5Y 5/1) SILTY CLAY, TRACE OF SAND, GRAVEL (.25-.50 in.) LOW PLASTICITY, SLIGHTLY MOIST TO MOIST	CL	>4.0		Hnu = 0 ppm α = 0 cpm βγ = 75 cpm
END OF TILL 26	32426 1459 1-21	10 7 9	6	↓	CL	3.5		Hnu = 0 ppm α = 0 cpm βγ = 150 cpm
START OF AQUIFER 27 28	32427 1517 1-21	28 50	8	VERY DENSE, LIGHT OLIVE BROWN (2.5Y 5/6) SAND, SUB ROUNDED, MOIST TO WET	SW	N/A		Hnu = 0 ppm α = 0 cpm βγ = 120 cpm
29	32428 1522 1-21	10 8 12	7	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5Y 5/6) WELL GRADED SAND, SUBROUNDED TO SUBANGULAR, MOIST	SW	N/A		Hnu = 0 ppm α = 0 cpm βγ = 90 cpm

NOTES

Drilling Contractor: Penn Drill Co.

Drilling Equipment: cyclone cable tool

Driller: Joe Baile

Asst. Brian Strapazzon

RECORDED WATER-LEVELS:
61.8 on 1/31/90
64.13 on 1/24/90
62.25 on 1/25/90

INSTRUMENT BACKGROUND
Hnu = 0.20 ppm
α = 0 cpm
βγ = 80-100 cpm

500

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE: 1-22-90
ELEVATION: M. SWANSON	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: E. Fullmer MS	Depth	Date/Time	DATE COMPLETED: 2-2-90
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 GROUNDWATER (FT)	WELL CONSTRUCTION	REMARKS
30	32489 1533 1-21	17 12 12	10	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5Y 5/6) GRAVELY SAND, SUBANGULAR TO SUB ROUNDED, MOIST (SLIGHTLY)	SW	N/A		HNU: 0 ppm α: 0 cpm βγ: 100 cpm
31								
32								
33								
34								
35	32430 1715 1-21	23 50/8in	9	VERY DENSE, LIGHT OLIVE BROWN, (2.5Y 5/6) GRAVELY SAND, SUBANGULAR TO ROUNDED, WET	SW	N/A		HNU: 0 ppm α: 0 cpm βγ: 90 cpm
36								
37								
38								
39								
40	32431 1039 1-22	12 21 21	12	DENSE, YELLOWISH BROWN (10YR 5/6) POORLY GRADED SAND, TRACE OF SILT, PEBBLES, GRAVEL (.1-.25 in.) SLIGHTLY MOIST	SP	N/A		HNU: 0 ppm α: 0 cpm βγ: 70 cpm
41								
42								
43								
44								

NOTES:

Drilling Contractor: Penn Drill Co

Drilling Equipment: Cyclone cable tool

Driller: Joe Barile

ASST.: BILL STRAPAZZON

BKG
HNU = 0.2 ppm
α = 0 cpm
βγ = 80-100 cpm

501

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE: 1-22-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
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 GWL (FT.)	WELL CONSTRUCTION	REMARKS
45								
46	32432 1153 1-22	25 50/8in	14	VERY DENSE, LIGHT OLIVE BROWN (2.5Y 5/6) POORLY GRADED SAND, TRACE OF SILT, PEBBLES, SUBROUNDED; SLIGHTLY MOIST	SP	N/A		HNU = 0 PPM α = 0 CPM βγ = 80 CPM
47								
48								
49								
50								
51	32433 1351 1-22	37 50 8in	13	VERY DENSE, GRAYISH BROWN (2.5Y 5/2) WELL GRADED SAND; TRACE OF SILT PEBBLES, GRAVEL (.1-.50 in.); SLIGHTLY MOIST TO MOIST	SW	N/A		HNU = 0 PPM α = 0 CPM βγ = 140 CPM
52								
53								
54								
55								
56	32434 1511 1-22	30 50/9in	10	VERY DENSE, GRAYISH BROWN (2.5Y 5/2) POORLY GRADED SAND; TRACE OF SILT, GRAVEL (.25-.50 in.) WET	SP	N/A		HNU = 0 PPM α = 0 CPM βγ = 60-80 CPM
57								
58								
59								
60								

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CYCLONE CABLE TOOL

Driller: JOE BARILE

ASST. BRIAN STRAPAZZON

1375G.
HNU = .2 PPM
α = 0 CPM
βγ = 80 CPM

502

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE: 1-22-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
DRILLING METHODS: CABLE TOOL			PAGE 5 OF 11

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED GAMMA RADIOACTIVITY (CPM)	WELL CONSTRUCTION	REMARKS
60								
61	32435 1537 1-22	50/6in	6	VERY DENSE, GRAYISH BROWN (2.5Y 5/2) WELL GRADED SANDY GRAVEL; TRACE OF SILT; SUBANGULAR TO ROUNDED, WET	GW	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 40-60 CPM
62								
63								
64								
65								
66	32436 1654 1-22	28 45 50	14	VERY DENSE, DARK GRAY (5Y 4/1) SILTY SAND; WELL GRADED SANDS, TRACE OF GRAVEL, SUBANGULAR, WET	SM	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 100-130 CPM
67								
68								
69								
70								
71	32437 1711 1-22	23 21 16	9	DENSE, DARK GRAY (5Y 4/1) SILTY SAND, TRACE OF GRAVEL (.25 IN.) COARSENING SAND, SUBANGULAR TO SUBROUNDED, WET	SM	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 70 CPM
72								
73								
74								
75								

NOTES:

Drilling Contractor: DEAN DRILL CO.

Drilling Equipment: CYCLONE CABLE TOOL

Driller: JOE BARILE

ASST.: BRIAN STRAPAZZON

BKG
H_{AU} = .1 PPM
α = 0 CPM
$\beta\gamma$ = 60 CPM

503

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6023.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE: 1-23-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
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 GWL (FT.)	WELL CONSTRUCTION	REMARKS
75								
76	32438 1020 1-23	13 27 38	14	VERY DENSE, GRAY (10YR 5/1) SAND, SOME SILT, TRACE OF GRAVEL, SUBROUNDED TO SUBANGULAR, WET	SM	N/A		HNU = 0 PPM α = 0 CPM βγ = 60 CPM
77								
78								
79								
80	32439 1045 1-23	21 29 18	8	DENSE, GRAY (10YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE OF SILT, SUBANGULAR GRAVEL, WET	SW	N/A		HNU = 0 PPM α = 0 CPM βγ = 80 CPM
81								
82								
83								
84								
85	32440 1155 1-23	9 30 50	10	VERY DENSE, GRAY (10YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE OF SILT, SUBANGULAR, WET	SW	N/A		HNU = 0 PPM α = 0 CPM βγ = 100 CPM
86								
87								
88								
89								
90								

NOTES:

Drilling Contractor: PENN DRILL CO.

Drilling Equipment: CYCLONE CABLE TOOL

Driller: JOE BARILE

ASST: DUAN STRADAZZOW

BKG
HNU = .20 PPM
α = 0 CPM
βγ = 70 CPM

504

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE 1-23-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
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 GRAVITY (PCF)	WELL CONSTRUCTION	REMARKS
90								
91	32441 1400 1-23	42 25 20	3	DENSE, GRAY (10YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE SILT SUBANGULAR TO SUBROUNDED, WET	SW	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 100 CPM
92								
93								
94								
95	32442 1528 1-23	29 50/7in	7	VERY DENSE, GRAY (10YR 5/1) WELL GRADED SAND, SOME SILT, PEBBLES, SUBROUNDED TO SUBANGULAR, WET.	SW	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 40 CPM
96								
97								
98								
99								
100	32443 1558 1-23	4 10 23	7	DENSE, GRAY (10YR 5/1) WELL GRADED SAND, SOME SILT, PEBBLES, SUBROUNDED TO SUB ANGULAR, WET	SW	N/A		H_{AU} = 0 PPM α = 0 CPM $\beta\gamma$ = 50 CPM
101								
102								
103								
104								
105								

NOTES:

Drilling Contractor: DENNIS DRILL CO.

Drilling Equipment: CYCLONE CABLE TOOL

Driller: JOE BARILE

ASST.: BRIAN SPARRAZZON

BKG

H_{AU} = .20 PPM

α = 0 CPM

$\beta\gamma$ = 80 CPM

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2.1	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 3120	COORDINATES:		DATE: 1-23/24-90
ELEVATION:	GWL: Depth 64.3 cm Date/Time 1/24/90 0941		DATE STARTED: 1-6-90
ENGINEER/GEOLOGIST: M. SWANSON	Depth	Date/Time	DATE COMPLETED: 2-2-90
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 GROUNDWATER (FT)	WELL CONSTRUCTION	REMARKS
105	32444 1744 1-23	36 22 39	8	VERY DENSE, GRAY (10YR 5/1) SILTY SAND; TRACE OF GRAVEL, PEBBLES, SUBANGULAR WET	SM	N/A		H_{AV}: 0 cm; α: 0 cm; β: 50 cm
106								
107								
108								
109								
110	32445 0907 1-24	9 9 12	3	MEDIUM DENSE, DARK GRAY (5Y 4/1) SILTY SAND; TRACE OF GRAVEL PEBBLES; SUBANGULAR TO SUBROUNDED, WET	SM	N/A		H_{AV}: 0 cm; α: 0 cm; β: 130 cm
111								
112								BLOW SANDS ENCOUNTERED
113								
114								
115	32446 1042 1-24	26 32 50	10	VERY DENSE, DARK GRAY (5Y 4/1), WELL ~~SORTED~~ GRADED SAND; SOME SILT, PEBBLES, GRAVEL (X .25 IN.) SUBANGULAR, WET	SW	N/A		H_{AV}: 0 cm; α: 0 cm; β: 110 cm
116								
117								
118								
119								
120								

NOTES:

Drilling Contractor: [illegible] DRILL CO.

Drilling Equipment: CYCLONE CABLE TOOL

Driller: J. JOE BARLE

ASST.: BRIAN STRAPAZZON

BKG
H_{AV} = .20 cm
α = 0 cm
β = .80 cm
FOR 1/23/90 AND 1/24/90

506

FERNALD
RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 602321	PROJECT NAME FMPC RI/FS		
BORING NUMBER 3120	COORDINATES		DATE 1-24-90
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 1-18-90
ENGINEER/GEOLOGIST M. SWANSON	Depth	Date/Time	DATE COMPLETED 2-2-90
DRILLING METHODS CABLE TOOL			PAGE 9 OF 11

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
120								
.21	32447 1107 1-24	19 29 42	7	VERY DENSE, DARK GRAY (5Y 4/1) MEDIUM GRAINED SAND, SOME SILT, PEBBLES, GRAVEL (≈.25 in.) SUBANGULAR, WET	SP	N/A		HNu: 0 ppm ∝: 0 ppm PJ: 90 cpm
.22								BLOW SANDS ENCOUNTERED
.23								
.24								
.25	32448 1517 1-24	9 12 15	5	MEDIUM DENSE, DARK GRAY (5Y 4/1) WELL GRADED SANDY GRAVEL; TRACE OF SILT, SOME PEBBLES, ROUNDED TO SUBANGULAR, WET	GW	N/A		HNu: 0 ppm ∝: 0 ppm PJ: 70 cpm
.26								
.27								
.28								
.29								
.30								DRILLING THROUGH BLOW SANDS CAUSED SAMPLE TO BE TAKEN @ 131.0 FT.
.31	32449 1642 1-24	7 10 12	9	MEDIUM DENSE, DARK GRAY (5Y 4/1) WELL GRADED SANDY GRAVEL; TRACE OF SILT, SOME PEBBLES, ROUNDED TO SUBANGULAR, WET	GW	N/A		HNu: 0 ppm ∝: 0 ppm PJ: 40 cpm
.32								
.33								
.34	32450 SHELBY TUBE 1410 1-30-90			HARD, VERY DARK GRAY (5Y 3/1) CLAY MOIST, LOW PLASTICITY ("BLUE CLAY") SANDIER END OF ~~BORING~~: 135.2 FT	CL	2.5		SHELBY TUBE PUSHED FROM 133.5 FT TO 135.2 FT. 67% PUSHED. 100% RECOVERY
.35								

NOTES

Drilling Contractor: Pelton Drill Co.

Drilling Equipment: Cyclone Cable Tool

Driller: Joe Barile

Asst.: Bob Yost

BKG
HNu = .20 ppm
∝ = 0 ppm
PJ = 20 cpm

507

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE / DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	32409 01/18/90 0905	4 4 7	10	FIRM, DARK BROWN (7.5 YR 3/3) CLAYEY SILT, TRACE OF ORGANIC MATERIAL ROOTLETS, MOIST.	ML	1.5	Hnu= 0.2 ppm α = 0 cpm Bγ = 40 cpm
3.0	32410 01/18/90 0912	8 15 18	12	FIRM, DARK BROWN (7.5 YR 3/3) CLAYEY SILT, TRACE OF ORGANIC MATERIAL ROOTLETS, MOIST. HARD, LIGHT BROWN (10 YR 5/3) SILT, TRACE OF COARSE SAND, DRY.	ML ML	1.5 2.5	Hnu= 0.2 ppm α = 0 cpm Bγ = 50-60 cpm
4.5	32411 52411 01/18/90 0920	15 28 29	12	HARD, MOTTLED GRAY-YELLOWISH BROWN (10 YR 5/2, 4/4) SILTY CLAY, TRACE OF MEDIUM SAND, MOIST, LOW PLASTICITY.	CL	3.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 50-60 cpm
6.0	32412 01/18/90 0930	24 28 36	10	HARD, MOTTLED GRAY-YELLOWISH BROWN (10 YR 5/2, 4/4) SILTY CLAY, TRACE OF MEDIUM SAND, MOIST, LOW PLASTICITY.	CL	3.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 60 cpm
7.5	32413 01/18/90 0935	25 32 38	15	FIRM, YELLOWISH BROWN (10 YR 4/4) SANDY CLAY, LOW PLASTICITY, MOIST TO WET.	CL	1.0	Hnu= 0.0 ppm α = 0 cpm Bγ = 50 cpm
9.0	32414 01/19/90 1555	8 10 12	15	FIRM, YELLOWISH BROWN (10 YR 4/4) SANDY CLAY, LOW PLASTICITY, MOIST TO WET.	CL	1.0	Hnu= 0.2 ppm α = 0 cpm Bγ = 60 cpm
10.5	32415 01/19/90 1610	6 10 11	10	MEDIUM DENSE, OLIVE (5 Y 5/3) SILT, TRACE OF FINE SAND, MOIST TO WET.	ML	N/A	Hnu= 0.0 ppm α = 0 cpm Bγ = 60 cpm
12.0	32416 01/19/90 1625	10 10 17	10	MEDIUM DENSE, GRAY (10 YR 5/1) CLAYEY SILT, LOW PLASTICITY, MOIST.	ML	1.5	Hnu= 0.2 ppm α = 0 cpm Bγ = 60 cpm
13.5	32417 01/19/90 1637	6 11 10	10	MEDIUM DENSE, GRAY (10 YR 5/1) CLAYEY SILT, LOW PLASTICITY, MOIST.	ML	1.5	Hnu= 0.2 ppm α = 0 cpm Bγ = 60 cpm
15.0	32418 01/19/90 1700	5 8 11	13	FIRM, GRAY (10 YR 4/1) CLAY, TRACE OF FINE SAND, IRON OR MANGANESE STAINING ON SAND GRAINS, LOW PLASTICITY, MOIST.	CL	1.5	Hnu= 0.0 ppm α = 0 cpm Bγ = 50-60 cpm

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	32419	01/19/90 1710	4 8 10	8	FIRM, GRAY (10 YR 4/1) CLAY, TRACE OF MEDIUM SAND, LOW TO MEDIUM SAND, MOIST.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 60 cpm
18.0	32420	01/20/90 1530	8 10 12	6	FIRM, GRAY (10 YR 4/1) CLAY, TRACE OF MEDIUM SAND, LOW TO MEDIUM SAND, MOIST.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 50 cpm
19.5	32421	01/20/90 1610	11 11 28	9	FIRM, GRAY (10 YR 4/1) GRAVELLY CLAY, GRAVEL (.5 - 1.5 IN), TRACE TO SOME SAND FINE TO COARSE, LOW PLSTICITY, WET.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 40-50 cpm
21.0	32422	01/20/90 1650	12 12 18	10	FIRM, GRAY (10 YR 4/1) GRAVELLY CLAY, GRAVEL (.5 - 1.5 IN), TRACE TO SOME SAND FINE TO COARSE, LOW PLSTICITY, WET.	CL	2.0	Hnu= 0.0 ppm α = 0 cpm βΓ = 50 cpm
22.5	32423	01/21/90 1249	6 11 13	9	VERY STIFF, GRAY (5 Y 5/1) SILTY CLAY, TRACE OF SUBROUNDED TO ROUNDED SAND, LOW PLASTICITY, MOIST.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
24.0	32424	01/21/90 1311	9 11 17	10	VERY STIFF, GRAY (5 Y 5/1) SILTY CLAY, TRACE OF SAND, GRAVEL (APPROXIMATELY .25 IN.), LOW PLASTICITY, SLIGHTLY MOIST.	CL	3.0	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
25.5	32425	01/21/90 1329	13 13 19	9	HARD, GRAY (5 Y 5/1) SILTY CLAY, TRACE OF SAND, GRAVEL (.25 - .50 IN.) LOW PLASTICITY, SLIGHTLY MOIST TO MOIST.	CL	>4.0	Hnu= 0 ppm α = 0 cpm βΓ = 75 cpm
27.0	32426	01/21/90 1459	10 7 9	6	HARD, GRAY (5 Y 5/1) SILTY CLAY, TRACE OF SAND, GRAVEL (.25 - .50 IN.) LOW PLASTICITY, SLIGHTLY MOIST TO MOIST.	CL	3.5	Hnu= 0 ppm α = 0 cpm βΓ = 150 cpm
28.5	32427	01/21/90 1517	28 50	8	VERY DENSE, LIGHT OLIVE BROWN (2.5 Y 5/6) SAND, SUBROUNDED, MOIST TO WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 120 cpm
30.0	32428	01/21/90 1522	10 8 12	7	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5 Y 5/6) WELL GRADED SAND, SUBROUNDED TO SUBANGULAR, MOIST.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 90 cpm

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	32429	01/21/90	1533	17 12 12	10	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5 Y 5/6) GRAVELLY SAND, SUBANGULAR TO SUBROUNDED, MOIST (SLIGHTLY).	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
35.0									
36.5	32430	01/21/90	1715	23 50	9	VERY DENSE, LIGHT OLIVE BROWN, (2.5 Y 5/6) GRAVELY SAND, SUBANGULAR TO ROUNDED, WET.	SW	N/A	Hnu= 0.2 ppm α = 0 cpm βΓ = 90 cpm
40.0									
41.5	32431	01/22/90	1039	12 21 21	12	DENSE, YELLOWISH BROWN (10 YR 5/6) POORLY GRADED SAND, TRACE OF SILT, PEBBLES, GRAVEL (.1 - .25 IN) SLIGHTLY MOIST.	SP	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
45.0									

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	32432	01/22/90 1153	25 50	14	VERY DENSE, LIGHT OLIVE BROWN (2.5 Y 5/6) POORLY GRADED SAND, TRACE OF SILT, PEBBLES, SUBROUNDED; SLIGHTLY MOIST.	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 80 cpm
50.0								
51.5	32433	01/22/90 1351	37 50	13	VERY DENSE, GRAYISH BROWN (2.5 Y 5/2) WELL GRADED SAND; TRACE OF SILT, PEBBLES, GRAVEL (.1 - .50 IN); SLIGHTLY MOIST TO MOIS	SW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 140 cpm
55.0								
56.5	32434	01/22/90 1511	30 50	10	VERY DENSE, GRAYISH BROWN (2.5 Y 5/2) POORLY GRADED SAND; TRACE OF SILT, GRAVEL (.25 - .50 IN) WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 60-80 cpm
60.0								

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	32435	01/22/90 1537	50	6	VERY DENSE, GRAYISH BROWN (2.5 Y 5/2) WELL GRADED SANDY GRAVEL; TRACE OF SILT; SUBANGULAR TO ROUNDED, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40-60 cpm
65.0								
66.5	32436	01/22/90 1654	28 45 50	14	VERY DENSE, DARK GRAY (5 Y 4/1) SILTY SAND; WELL GRADED SANDS, TRACE OF GRAVEL, SUBANGULAR, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100-130cpm
70.0								
71.5	32437	01/22/90 1711	23 21 16	9	DENSE, DARK GRAY (5 Y 4/1) SILTY SAND, TRACE OF GRAVEL (.25 IN) COARSENING SAND, SUBANGULAR TO SUBROUNDED, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 70 cpm
75.0								

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	32438	01/23/90 1020	13 27 38		14	VERY DENSE, GRAY (10 YR 5/1) SAND, SOME SILT, TRACE OF GRAVEL, SUBROUNDED TO SUBANGULAR, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 60 cpm
80.0									
81.5	32439	01/23/90 1045	21 29 18		8	DENSE, GRAY (10 YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE OF SILT, SUBANGULAR GRAVEL, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 80 cpm
85.0									
86.5	32440	01/23/90 1155	9 30 50		10	VERY DENSE, GRAY (10 YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE OF SILT, SUBANGULAR, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
90.0									

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF

DEPTH	SAMPLE / DATE / TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	32441 01/23/90 1400	42 25 20	3	DENSE, GRAY (10 YR 5/1) WELL GRADED SAND, SOME GRAVEL, TRACE SILT, SUBANGULAR TO SUBROUNDED, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 100 cpm
95.0							
96.5	32442 01/23/90 1528	29 50	7	VERY DENSE, GRAY (10 YR 5/1) WELL GRADED SAND, SOME SILT, PEBBLES, SUBROUNDED TO SUBANGULAR, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 40 cpm
100.0							
101.5	32443 01/23/90 1558	9 10 23	7	DENSE, GRAY (10 YR 5/1) WELL GRADED SAND, SOME SILT, PEBBLES, SUBROUNDED TO SUBANGULAR, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm βΓ = 50 cpm
105.0							

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	32444	01/23/90 1749	36 22 39		8	VERY DENSE, GRAY (10 YR 5/1) SILTY SAND; TRACE OF GRAVEL, PEBBLES, SUBANGULAR, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 50 cpm
110.0									
111.5	32445	01/24/90 0907	9 9 12		3	MEDIUM DENSE, DARK GRAY (5 Y 4/1) SILTY SAND, TRACE OF GRAVEL, PEBBLES, SUBANGULAR TO SUBROUNDED, WET.	SM	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 130 cpm
115.0									
116.5	32446	01/24/90 1042	26 32 50		10	VERY DENSE, DARK GRAY (5 Y 4/1), WELL GRADED SAND; SOME SILT, PEBBLES, GRAVEL (APPROXIMATELY .25 IN) SUBANGULAR, WET.	SW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 110 cpm
120.0									

NOTES:
SAMPLING AND DRILLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 3120	COORDINATES: NORTH 480,167.23 EAST 1,382,095.20	DATE: 01/18/90
GROUND ELEVATION: 581.9	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/18/90
ENGINEER/GEOLOGIST: M. SWANSON	Depth N/A Date/Time N/A	DATE COMPLETED: 02/02/90
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF

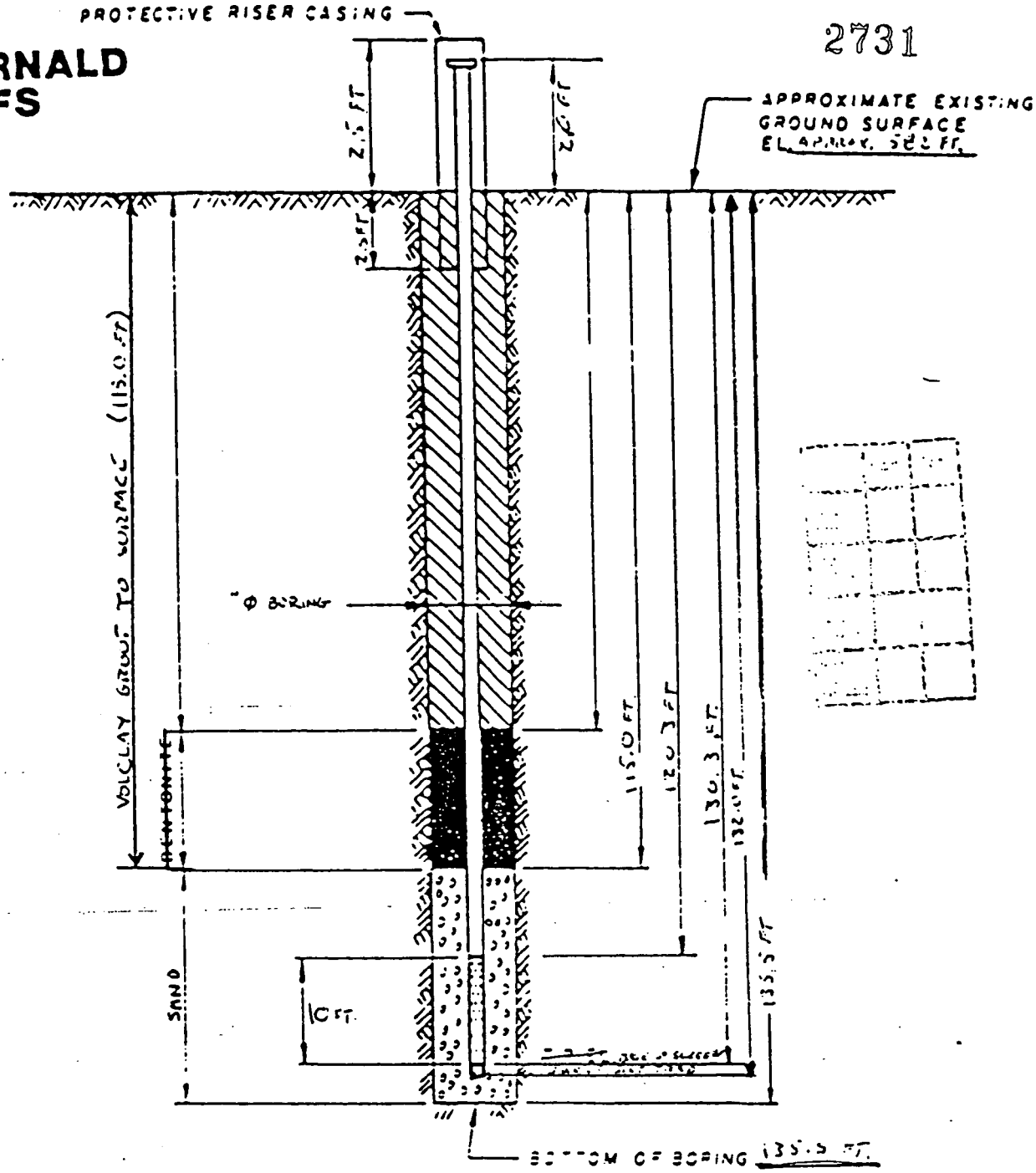
DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	32447 52447	01/24/90 1107	19 29 42	7	VERY DENSE, DARK GRAY (5 Y 4/1) MEDIUM GRADED SAND, SOME SILT, PEBBLES, GRAVEL (APPROX. .25 IN.) SUBANGULAR, WET.	SP	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 90 cpm
125.0								
126.5	32448	01/24/90 1517	9 12 15	5	MEDIUM DENSE, DARK GRAY (5 Y 4/1) WELL GRADED SANDY GRAVEL; TRACE OF SILT, SOME PEBBLES, ROUNDED TO SUBANGULAR, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 70 cpm
131.0								
132.5	32449	01/24/90 1642	7 10 12	9	MEDIUM DENSE, DARK GRAY (5 Y 4/1) WELL GRADED SANDY GRAVEL; TRACE OF SILT, SOME PEBBLES, ROUNDED TO SUBANGULAR, WET.	GW	N/A	Hnu= 0 ppm α = 0 cpm Bγ = 40 cpm
133.5								
135.2	32450	01/30/90 1410			HARD, VERY DARK GRAY (5 Y 3/1) CLAY, MOIST, LOW PLASTICITY, ("BLUE CLAY").	CL	2.5	

BOTTOM OF BORING 135.5

NOTES:
SHELBY TUBE PUSHED FROM 133.5 FT. TO 135.2 FT. 1.7 FT. PUSHED. 1.6 FT. RECOVERY. DRILLING AND SAMPLING IN ACCORDANCE TO ASTM STANDARDS. MUNSELL COLOR CHART USED FOR SOIL DESCRIPTION.

2731

FERNALD RI/FS



DRAWING NUMBER	
CHECKED BY	
APPROVED BY	
MS	
4/1/90	
DRAWN BY	

NOTES:

1. RISER PIPE IS 4 IN 1.0 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. (WITH WELDED SILT TRAP)
4. ELEVATION OF WATER LEVEL 61.8 FT. BELOW GROUND SURFACE
5. WATER LEVEL READING ON 01/31/90 @ 0930

MATERIALS USED DURING WELL INSTALLATION:
12 BAGS OF 10/20 SAND (50 LBS. EACH)
32 BAGS OF VOLCLAY GROUT (50 LBS. EACH)
1 10.0 FT. SCREEN WITH 1.7 FT. WELDED SILT TRAP AND 2.0 FT. BLANK STICKUP
12 10.0 FT. SECTIONS, 0 5.0 FT. SECTIONS, 1 2.0 FT SECTIONS OF 4.0 IN O.D. SS RISER PIPE
TOTAL WATER ADDED TO BORING DURING DRILLING AND GROUTING = 950 GALS.
1 BUCKETS OF BENTONITE PELLETS (5 GALS. EACH)

INSTALLATION DETAILS
MONITORING WELL # 3120

PREPARED FOR
FEZURCO RI/FS

517

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. M. SWANSON DATE 1/30/90
PROJECT NO. 662 3.2.1 CHECKED BY / DATE
BORING NO. E 3120
PIEZOMETER NO. E 3120 DATE OF INSTALLATION 2/2/90

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT HAMMER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0 FT TO 135.0 FT	SIZE 10 in. I.D. FROM 0 FT TO 135.0 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. I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/2 in. I.D. 4.0 in.
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 FT.
AVERAGE SIZE OF PERFORATIONS 0.01 in.	JOINING METHOD FLUSH JOINTED THREADED
TOTAL PERFORATED AREA 10.0 FT	

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	2.0 ABOVE GROUND SURFACE (AGS)			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 BELOW GROUND SURFACE (BGS)			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0 FT (BGS)	BOTTOM 115.0 FT	TOP	BOTTOM
BENTONITE	TOP 1.0 FT (AGS)	BOTTOM 20.0 FT (AGS)	TOP	BOTTOM
SAND	TOP 115.0 FT	BOTTOM 135.5 FT	TOP	BOTTOM
GRAVEL NONE USED	TOP —	BOTTOM —	TOP	BOTTOM
PERFORATED SECTION	TOP 120.3 FT.	BOTTOM 130.3 FT.	TOP	BOTTOM
PIEZOMETER TIP	132.0 FT			
BOTTOM OF BOREHOLE	135.5 FT			
GWL AFTER INSTALLATION	65.0 FT BELOW TOP OF RISER PIPE		518	

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

REMARKS GROUT POURED FROM 115.0 FT TO 20 FT BELOW GROUND SURFACE. BENTONITE ADDED (3 BUCKETS 5 gals EACH) FROM 20 FT BELOW GROUND SURFACE TO 1.0 FT ABOVE GROUND SURFACE AND WILL PROBABLY SETTLE TO GROUND SURFACE INSIDE PROTECTIVE CASING.

409-11-85

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 3120
WELL NUMBER: 3120

FIELD ENG./GEO.: M. SWANSON DATE: 01/30/90
CHECKED BY : Not Noted DATE: N/A
N,E COORDINATES: 480167.23, 1382095.2
DATE OF INSTAL.: 02/02/90

2731

E DRILLING

LLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: H2O FROM: 0 TO: 135.0
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0 TO: 135.0
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: 0.01 (In.)
TOTAL PERFORATED AREA: 10. Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10.0 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: FLUSH JOINTED THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
* HINGED LOCKING COVER W/ PADLOC

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	583.83
GROUND SURFACE	0.0	581.9
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	2.0	115.0	N/A	N/A
Bentonite Pellets	1.0	2.0	N/A	N/A
nd	115.0	135.5	N/A	N/A
DRATED SECTION	120.3	130.3	N/A	N/A

LL TIP	132.0	N/A
BOTTOM OF BOREHOLE	135.5	N/A
GWL AFTER INSTALLATION	65.0	N/A

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : GROUT POURED FROM 115.0 FT. TO 2.0 FT. BELOW GROUND SURFACE. BENTONITE ADDED (3 BUCKETS 5 GALS. EACH) FROM 2.0 FT. BELOW GROUND SRFACE TO 1.0 FT. ABOVE GROUND SURFACE AND WILL PROBABLY SETTLE TO GROUND SURFACE INSIDE PROTECTIVE CASING.

COMMENTS:

APPENDIX D

APPENDIX D

WELL CONSTRUCTION INFORMATION FOR THE 4000-SERIES MONITORING NETWORK

WELL 4001

WELL INFORMATION SHEET

2731

Well Number:
WMCO: 1d

Installer/I.D. Number:
D&M: _____ IT: _____ NLO: 1d Weston: (401)

Location:
Well Location: North of K-65 tanks
State Plane Coordinates: 1379300 E 481230 N
Approx. Site Coordinates: 1428 (S) or N 2222 E
Ground Elevation: 535.710

Monitoring:
Aquifer: Deepest [illegible]
Monitoring Program: _____
Parameters Monitored/Frequency: _____

Approx. Water Table Elevation: 556 Depth to Water: 61.50'

Drilling:
Drilling Method: cable tool Driller: W.A. [illegible]
Date of Installation: _____ Completion Date: 4-12-65
Borehole Diameter: _____ Casing Diameter: 4"
Borehole Depth: 180 Casing Length: 176'6"
Type Of Logs: [illegible] log

Well Construction:
Backfill Type: _____ Type Annular Space Seals: _____
Screen Interval: 4[illegible] - 405 (51) Screenpack Material: _____
Screen Type: rock slots #14 Casing Type: steel
Type of Pump: submersible Pump Model: _____
Pump Capacity: 75 gpm Date Pump Installed: _____
Casing Elevation: 535.510 Height of Stick-up: 1.6'

Hydrologic Tests: _____

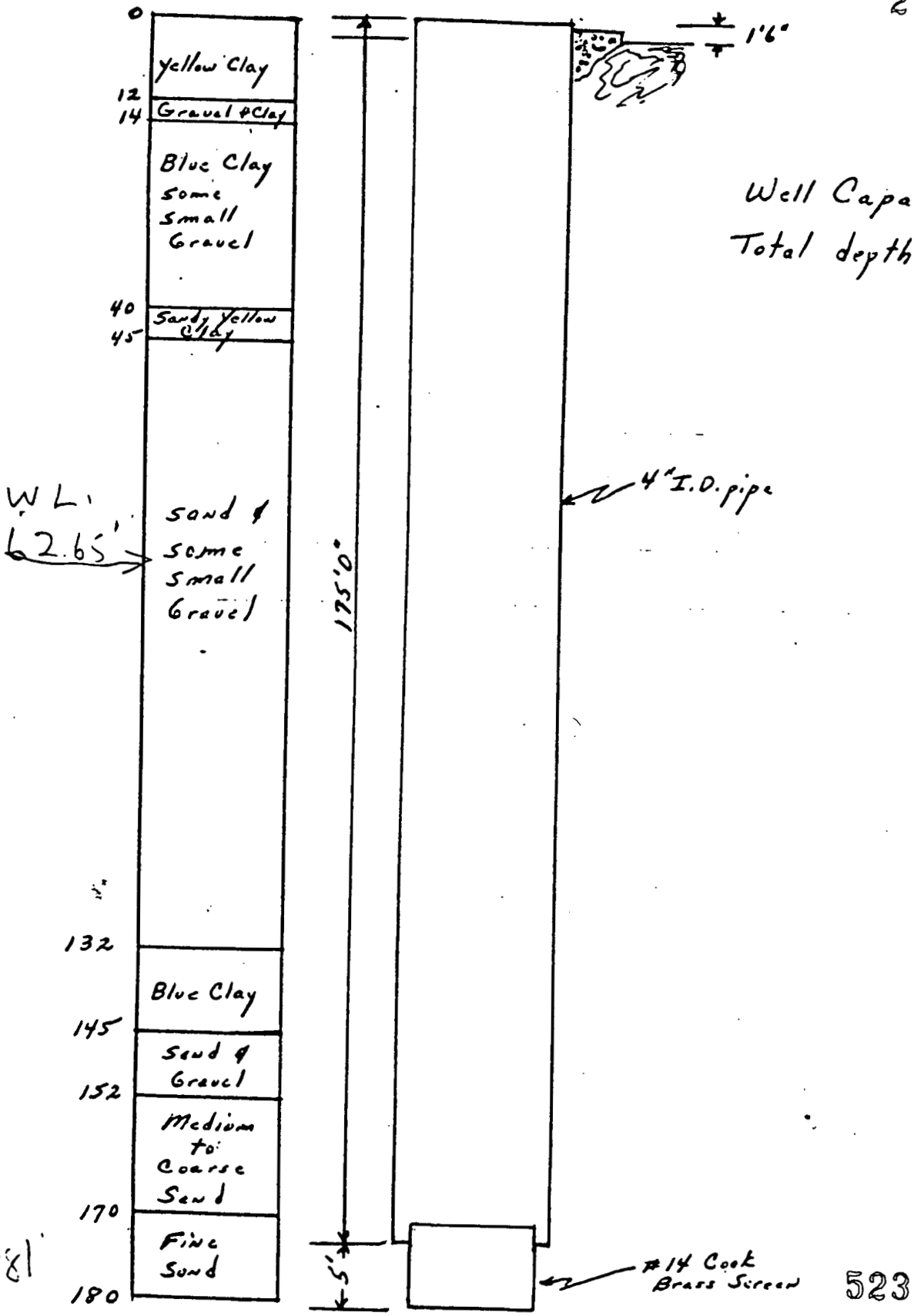
Remarks: well core samples [illegible] analysis [illegible].

Completed By: _____ **Ext.:** _____ **Date:** _____

522

No. 1D Test Well
Driller - Wm Crane Co.
4/12/65

2731



Well Capacity - 60 G.P.M.
Total depth - 180'0"

523

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus 12, Ohio

PLEASE USE PENCIL OR TYPEWRITER DO NOT USE INK.

Nº 291500

County Butler Township Ross Section of Township 32731

Owner National Lead of Ohio Address Box 39158 Cincinnati, O

Location of ~~property~~ Well # 1-D

CONSTRUCTION DETAILS

Casing diameter 4" Length of casing 176'6"

Type of screen Cook Brass 1"x14 Length of screen 5'

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST

Pumping Rate 70 G.P.M. Duration of test 4 hrs.

Drawdown - ft. Date 4/12/65

Static level-depth to water 64' ft.

Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	Ft.
Yellow clay	0	12
gravel & yellow clay	12	14
Blue clay - some gravel	14	40
Sandy yellow clay	40	45
Sand some gravel	45	131'6"
Blue clay	131'6"	145'
~~[illegible]~~		
Sand & gravel	145'	152'
Med & course sand	152'	170'
Fine sand	170'	180'

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

Check with Nall Lead for well location

W. AEC Fernald Plant E.

S.

524

See reverse side for instructions

Drilling Firm Wm Crane Date 4/12/65

Address Shandon, O Signed [illegible]

WELL 4013

RNALD
RI/FS

RECEIVED 6/23/89

Check	WAH	3-30
1st Key In		
2nd Key In		6-14-89
Hard Copy Verification		

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-6-89
ELEVATION:* ≈ 588.5 FT.	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL SPEED STAR		PAGE 1 OF ~~15~~ 17

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (WAH 3-3-89)
1	20499 1000 1-6	3 8 10	4	VERY STIFF, OLIVE YELLOW - BROWN, (2.5 Y 5/4) CLAY, HIGH PLASTICITY, WET TO MOIST.	CL	2.5	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 600 CPM
2 3	20500 1012 1-6	10 13 16	8	HARD, OLIVE YELLOW - GRAY, (5Y 5/4) CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	>4.0	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 450 CPM
4	20501 1020 1-6	14 17 21	8	VERY STIFF, GRAYISH BROWN, (2.5Y 5/2), CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	4.0	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 450 CPM
5 6	20502 1030 1-6	25 29 31	15	HARD, LIGHT OLIVE BROWN, (2.5Y 5/4), GRAVELLY CLAY, HIGH PLASTICITY, MOIST.	CL	>4.0	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 220 CPM
7	20503 1040 1-6	25 35 37	9	HARD, GRAYISH BROWN, (2.5Y 5/2), GRAVELLY CLAY, HIGH PLASTICITY, MOIST.	CL	>4.0	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 220 CPM
8 9	20504 1047 1-6	40 42 40	16	VERY STIFF, GRAY (5Y 4/1) CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	3.5	H_{nu} = BKg α = BKg $\beta\gamma$ = 200 CPM
10	20505 1058 1-6	20 21 20	17	VERY STIFF, DARK GRAY, (5Y 4/1), CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	2.75	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 180 CPM
11 12	20506 1521 1-7	5 9 14	6	MEDIUM STIFF, GRAY, (2.5Y 5/0), CLAY, HIGH PLASTICITY, MOIST	CL	.75	H_{nu} = BKg α = BKg $\beta\gamma$ = 240 CPM
13	20507 1534 1-7	4 5 8	8	STIFF, GRAYISH BROWN TO DARK GRAY, (10YR 4/1) CLAY, SOME COARSE SAND, MEDIUM TO HIGH PLASTICITY, MOIST.	CL	1.5	H_{nu} = BKg α = BKg $\beta\gamma$ = 220 CPM
14	20508 1548 1-7	4 9 14	10	STIFF, GRAY, (10YR 5/1) CLAY, HIGH PLASTICITY, MOIST.	CL	1.5	H_{nu} = BKg. α = BKg. $\beta\gamma$ = 200 CPM

NOTES:
1-6-89 PENN. DRILL Co.
1-7-89 DRILLER: Harry Dykes Jr.
ASSIST.: Jim Lang
MATERIALS
CEMENT: 22 (80lb) BAGS 10/20
CLAY GROUT: 47 BAGS (50 lb)
BENTONITE: NONE USED
WATER: 1500 GALS. DRILLING
1400 Gallons Grouting Total Water added = 2900 gallons
WAH 9-7-89

Color WAH 3-3-89
~~SOIL~~ DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

*ELEVATION TAKEN FROM DAMES AND MOORE DATA SHEET. TOP OF RISER PIPE

526 (ON SURFACE) INSTRUMENT BACKGROUND
H_{nu} = 0.4 ppm
α = 0-5 CPM
$\beta\gamma$ = 300-500 CPM
EXO TOX = 0-1 ppm LOL

NOT DONE
5DM

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		6-14-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 01-08-89
ELEVATION: 588.5 Ft. Estimate	GWL: Depth Date/Time	DATE STARTED: 01-06-89
ENGINEER/GEOLOGIST: E. Trollinger W.A. Hertel	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL		PAGE 2 OF ~~15~~ 17

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (0.50Ft)	RECOVERY (In.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS WAH 3-3-89
16	20509 1555 1-7	5 8 14	10	Stiff, Gray (10YR 5/1) Clay, Trace of Gravel, High to Medium plasticity, Moist	CL	2.0	Hnu = BG α = BG βγ = 180 cpm
17–18	20510 1605 1-7	6 9 11	15	Stiff, Gray (10YR 5/1) Clay, Trace of gravel, Medium to High Plasticity Moist	CL	2.0	Hnu = BG α = BG βγ = 180 cpm
19	20511 1615 1-7	5 11 12	10	Stiff, Brownish Gray (10YR 5/2) Clay Trace of Gravel - 0.5 In. Medium Plasticity, Moist	CL	1.5	Hnu = BG α = BG βγ = 200 cpm
20–21	20512 0900 1-8	18 10 17	4	Medium Dense, Gray (10YR 5/1) Poorly Graded Gravel (0.25 In. Ave)	GP	N/A	Hnu = BG α = BG βγ = 250 cpm Low Recovery Due to gravel Blocking splitspoon opening.
22	20513 0910 1-8	7 9 16	10	Very Stiff, Grayish Brown (10YR 5/2) Inorganic Clay, Trace of Gravel, Medium Plasticity, Moist.	CL	2.25	Hnu = BG α = BG βγ = 220 cpm
23–24	20514 0925 1-8	4 8 11	12	Stiff, Gray, (10YR 5/1) Inorganic Clay, Trace of Gravel, Medium Plasticity, Moist	CL	1.2	Hnu = BG α = BG βγ = 220 cpm
25	20515 0931 1-8	7 7 12	12	Very Stiff, Gray (10YR 5/1) Inorganic Clay, Trace of Gravel, Medium Plasticity, Moist	CL	2.0	Hnu = BG α = BG βγ = 220 cpm
26–27	20516 0941 1-8	4 7 11	10	Medium Stiff, Grayish Brown (10YR 5/2) Inorganic Clay, Trace of Gravel, Medium Plasticity, Moist.	CL	0.80	Hnu = BG α = BG βγ = 250 cpm
28	20517 1000 1-8	6 10 14	18	Medium Stiff, Grayish Brown (10YR 5/2) Inorganic Clay, Trace of Gravel Medium Plasticity, Moist	CL	0.80	Hnu = BG α = BG βγ = 250 cpm
29	20518 1007 1-8	7 14 18	14	Very Stiff, Grayish Brown (10YR 5/2) Inorganic Clay, Trace of Gravel Medium Plasticity, Moist.	CL	2.5	Hnu = BG α = BG βγ = 250 cpm 527

NOTES:

Penn Drill Rig 1
Rig Type: Speedstar
Driller: Harry Dykes
Assistant: Jim Lang
BILL HERTEL SAT. 1-8-89

Instrument Backround @ Surface

	01-07-89	01-08-89
Hnu =	0.4 ppm	0.4 ppm
α =	0-5 cpm	0-5 cpm
βγ =	300-500 cpm	300-500 cpm

GPM

JAN 09 1989

402-11-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-9-89
ELEVATION: ≈ 588.5	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEEDSTAR		PAGE 3 OF 15,17

VAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	20519 0947 1-9	11 10 13	8	VERY STIFF, OLIVE GRAY (5Y 5/2), SILTY CLAY, TRACE OF GRAVEL .25 IN - .5 IN, MED. PLASTICITY, MOIST.	CL	2.25	Hnu = BKg. α = BKg. βγ = 220 CPM
32 33	20520 1000 1-9	7 11 20	8	VERY STIFF, OLIVE GRAY (5Y 5/2) SILTY CLAY, MEDIUM PLASTICITY, MOIST.	CL	3.3	Hnu = BKg. α = BKg. βγ = 200 CPM
34	20521 1024 1-9	13 11 15	10	VERY STIFF, OLIVE GRAY TO GRAY, (5Y 5/2) SILTY CLAY, TRACE OF GRAVEL .25 IN - .5 IN, MED. TO HIGH PLASTICITY. MOIST.	CL	2.5	Hnu = BKg. α = BKg. βγ = 180 - 200
35 36	20522 1051 1-9	35 50 50/2IN	6	VERY DENSE, BROWN (10YR 5/4) POORLY GRADED SAND, VERY LITTLE FINES, DRY.	SP	N/A	Hnu = BKg. α = BKg. βγ = 160 - 180 CPM
37 38 39				SAMPLING AT 5 FT. INTERVALS HEREAFTER.			
40 41	20523 1500 1-9	28 40 43	12	VERY DENSE, YELLOWISH BROWN, (10YR 5/4) POORLY GRADED SAND, DRY TO MOIST.	SP	N/A	Hnu = BKg α = BKg βγ = 170 CPM
42 43 44							

528

NOTES: 1-9-89 / DRILLER: Harry Dykes. ASSIST.: Pete Mihlfin

INSTRU. BKg. ON 1-9-89
Hnu = 0.6 ppm
α = 0-5 CPM
βγ = 180-220 CPM

402-11-86

FERNALD RI/FS

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2.1	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-9-89
ELEVATION: ≈588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEEDSTAR		PAGE 4 OF ~~15~~ 17

WAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	20524 1613 1-9	50/5"	5	VERY DENSE, BROWN (10YR 4/3). POORLY GRADED SAND, DRY.	SP	N/A	Hnu = BKg α = BKg βγ = ~~BKg~~ 160 CPM
47							
48							
49							
50							
51	10665 1633 1-9	21 35 40	12	VERY DENSE, LIGHT BROWN (10YR4/2) POORLY GRADED SAND, DRY.	SP	N/A	Hnu = BKg α = BKg βγ = 160 CPM
52							
53							
54							
55							
56	10666 0935 1-10	50/4½"	4	VERY DENSE, BROWN, (10YR4/3), POORLY GRADED SAND, MOIST.	SP	N/A	Hnu = BKg. α = BKg. βγ = 160 CPM
57							
58							
59							

529

NOTES:

1-10-89 DRILLER: Harry Dykes Jr
ASSIST. Jim Lang

INSTRU. BKg.
Hnu = 0.4 ppm
α = 0-5 cpm
βγ = 200 cpm

FERNALD RI/FS

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: 74.5 FT	DATE: 1-10-89
ELEVATION: ≈588.5 FT	GWL: Depth 4.06 Date/Time 1-10-89 @ 1600	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth 12.0 ft Date/Time 1-11-89 @ 1000	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL / HS SPEED STAR 71.8 FT 2-7-89 @ 1400		PAGE 5 OF 17

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (WAH 3-3-89)
61	10667 1020 1-10	50+/5IN	5	VERY DENSE, BROWN, (10YR 4/2), GRAVELLY SAND, POORLY GRADED, SOME GRAVEL (.25IN-.5IN), MOIST.	SP	N/A	Hnu = BKG α = BKG β/γ = 150 CPM
62							
63							
64							
65							
66	10668 1400 1-10	50+/5IN	4	VERY DENSE, LIGHT BROWN-GRAY, (10YR 4/2), POORLY GRADED SAND, MEDIUM TO FINE, MOIST ~~TO WET~~. E.T. 1-10-89	SP	N/A	Hnu = BKG. α = BKG. β/γ = 160-180 CPM
67							
68							
69							
70							
71	10669 1445 1-10	44 42 36	8	VERY DENSE, DARK GRAYISH BROWN, (10YR 4/2), POORLY GRADED SAND, MOIST.	SP	N/A	Hnu = BKG. α = BKG. β/γ = 120 CPM
72							
73							
74				WATER TABLE ELEV. 1-10-89			

530

NOTES:

1-10-89 PENN DRILL.
DRILLER: Harry Dykes
ASSIST.: Jim Lang

INSTRU. BKG. 1-10-89
Hnu = 0.4 ppm
α = 0-5 CPM
β/γ = 200 CPM

402-1-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In	[illegible]	4/89
2nd Key In	[illegible]	8/89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-10-89 / 1-11/89
ELEVATION: ≈ 588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEED STAR		PAGE 6 OF ~~15~~ 17

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (WAH 3-3-89)
76	10670 1556 1-10	21 32 50/4 IN	10	VERY DENSE, DARK BROWN, (10YR 3/3), POORLY GRADED SAND, WET.	SP	N/A	H_{au} = BKG α = BKG $\beta\gamma$ = 140 CPM
77							
78							
79							
80							
81	10671 1620 1-10	50+/5 IN	4	VERY DENSE, DARK BROWN, (10YR 4/2) WELL GRADED, GRAVELLY SAND SOME GRAVEL .25-.5 IN, WET.	SW	N/A	H_{au} = BKG α = BKG $\beta\gamma$ = BKG - 160 BPM
82							
83							
84							
85							
86	10672 0930 1-11	46 50+/1 IN	6	VERY DENSE, DARK BROWN, (10YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL .25 IN, WET.	SP	N/A	H_{au} = BKG α = BKG $\beta\gamma$ = 120 CPM
87							
88							
89							531

NOTES:

DRILLER: Harry Dykes.
ASSIST.: Jim Lang

INSTRU. BKG.
H_{au} = 0.4 PPM
α = 0-5 CPM
$\beta\gamma$ = 200 CPM

402-11-86

FERNALD RI/FS

2731

1st Key In	
2nd Key In	
Hard Copy Verification	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 4013	COORDINATES:	DATE: 1-11-89 / 1-17-89	
ELEVATION: ≈588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89	
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89	
DRILLING METHODS: Cable Tool		PAGE 7 OF ~~15~~ 17	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (WAH 3-3-89)
91	10673 1030 1-11	28 27 25	12	VERY DENSE, DARK GRAYISH BROWN, (10YR 4/2), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 IN), WET.	SP	N/A	Hnu = BKG α = BKG βγ = 100 CPM
92							
93							
94							
95							
96	10674 1045 1-17	50 50+/4 IN	8	VERY DENSE, DARK BROWN, (10YR 4/3) POORLY GRADED SAND, TRACE OF GRAVEL @ 95.5 FT (.25-1.0 IN) WET.	SP	N/A	Hnu = BKG α = BKG βγ = 90 CPM
97							
98							
99							
100							
101	10675 1340 1-17	2 5 9	7	MEDIUM DENSE, DRK GRAYISH BROWN, (10YR 3/2) WELL GRADED SAND, TRACE OF GRAVEL (.25 IN - .5 IN) WET.	SW	N/A	Hnu = BKG α = BKG βγ = 100 CPM
102							
103							
104							532

NOTES:

1-11-89 DRILLER: Harry Dykes Jr
ASSIST.: Jim Long

1-17-89 DRILLER: Harry Dykes Jr
ASSIST.: Bob Yost

INSTRU. BKG. 1-11-89
Hnu = 0.4 ppm
α = 0-5 cpm
βγ = 180-200 cpm
BKG. SAME 1-17-89

402-1-86

FERNALD RI/FS

2731

1st Key In	
2nd Key In	1-8-89
Hard Copy Verification	

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-18-89
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEED STAR		PAGE 8 OF ~~15~~ 17

WAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	10676 0856 1-18	22 50+/5 IN	7	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF COARSE SAND AT 105.5 FT, WET.	SP	N/A	Hmu = BKg. α = BKg. βγ = 180 CPM
107							
108							
109							
110							
111	10677 1010 1-18	40 37 50	12	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF GRAVEL, WET.	SP	N/A	Hmu = BKg. α = BKg. βγ = 120 CPM
112							
113							
114							
115							
116	10678 1118 1-18	21 27 50	10	VERY DENSE, DARK BROWN, (10 YR 3/3). POORLY GRADED SAND, TRACE OF GRAVEL AT 115.5 FT., WET	SP	N/A	Hmu = BKg α = BKg βγ = 100-120 CPM
117							
118							
119							533

NOTES:
1-18-89 DRILLER: Harry Dykes Jr.
ASSIST.: Bob Yanst

INSTRV. BKg. 1-17-89
Hmu = 0.4 mR
α = 0-5 CPM
βγ = 180-200 CPM
BKg SAME AS ABOVE 1-18-89 E.T.

402-1-86

FERNALD RI/FS

2731

	Initial	Date
1st Key In		4/18/89
2nd Key In		4/18/89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-18-89
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEED STAR		PAGE 9 OF ~~15~~ 17

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (WAH 3-3-89)
121	10679 1400 1-18	28 29 22	10	VERY DENSE, DARK BROWN, (10YR 3/3) WELL GRADED GRAVEL, SOME SAND COARSE TO MEDIUM, WET.	GW	N/A	Hnu = BKG. α = BKG. βγ = 120 CPM
122							
123							
124							
125							
126	10680 1515 1-18	50+ 4IN	3	VERY DENSE, DARK GRAYISH BROWN, (10YR 4/2), GRAVELLY SAND, WELL GRADED, WET.	SW	N/A	Hnu = BKG. α = BKG. βγ = 100-110 CPM. LOW RECOVERY DUE TO GRAVEL
127							
128							
129							
130							
131	10681 1620 1-18	7 11 11	8	MEDIUM DENSE, DARK BROWN, (10YR 3/3), POORLY GRADED SAND, TRACE OF GRAVEL (.25-.50 IN), WET.	SP	N/A	Hnu = BKG α = BKG βγ = 100 CPM
132							
133							
134							534

NOTES:
1-18-89 DRILLER: Harry Dykes
ASSIST.: Bob. Yost

1-18-89 INSTRU. BKG.
Hnu = 0.4 PPM
α = 0.5 CPM
βγ = 180 CPM

FERNALD RI/FS

2731

1st Key In		4/8/89
2nd Key In		6-8-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-19-89 / 1-23-89
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TRALINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL '72 SPEED STAR		PAGE 10 OF ~~15~~ 17

WAH 3-3-89

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136	10682 1415 1-21-89	17 50 50(4 in)	10	Very dense, Dark gray brown (10yr 4/2) Gravelly sand, well graded, wet	SW	N/A	Hnu = Bkg α = Bkg βγ = 280 cpm
137							
138							
139							
140							
141	10683 1515 1-21	5 22 42	6	Very dense, dark gray brown (10yr 4/1) Poorly sorted sand, trace gravel. Wet	SP	N/A	Hnu = Bkg α = Bkg βγ = 180
142							
143							
144							
145							
146	10684 1107 1-23	45 47 50/4in	12	VERY DENSE, GRAYISH BROWN, (10YR 4/2) POORLY GRADED SANDY GRAVEL (.25 IN - .5 IN), WET.	GP	N/A	Hnu = BKg. α = BKg βγ = 120-140 cpm
147							
148							
149							

535

NOTES: Driller: Harry Dykes
Assist. Bob Yost

Lorrie Adams / GEOLOGIST FOR 1-21-89, 2 SAMPLES.

1/21/89 Instru. Bkg
H_{Au} = .2 ppm
α = 0 cpm
βγ = 200 cpm - 280 cpm

402-[illegible]-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

1st Key In	
2nd Key In	
Hard Copy Verification	

PROJECT NUMBER: 6002 TASK 3.2	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 4013	COORDINATES:	DATE: 1-23-89	
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89	
ENGINEER/GEOLOGIST: E. TRALLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89	
DRILLING METHODS: CABLE TOOL		PAGE 11 OF ~~15~~ 17	

WAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151	10685 1345 01-23	50+ / 4 in	4	VERY DENSE, GRAYISH BROWN, (10YR 4/2) WELL GRADED SANDY GRAVEL, WET.	GW	N/A	Hmu = BKg. α = BKg. βγ = 90-100 CPM
152							
153							
154							
155							
156	10686 1525 01-23	17 20 19	12	DENSE, GRAYISH BROWN, (10YR 3/2) WELL GRADED GRAVELLY SAND (.25-.50 IN) GRAVEL, WET.	SW	N/A	Hmu = BKg. α = BKg. βγ = 90-100 CPM
157							
158							
159							
160							
161	10687 1600 01-23	5 6 12	8	MEDIUM DENSE, DARK BROWN, (10YR 3/3) POORLY GRADED SAND, TRACE OF GRAVEL (.25-.50 IN), WET.	SP	N/A	Hmu = BKg. α = BKg. βγ = 100 CPM
162							
163							
164							536

NOTES: DRILLER: HARRY DYKES
ASSIST: Robert Yost

INSTRU. BKg.
Hmu = 0.6 ppm
α = 0 cpm
βγ = 180-200 cpm

402-11-86

FERNALD RI/FS

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1/24/89
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL 172 SPEED STAR		PAGE 12 OF ~~15~~ 17

WAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166	10688 0933 01-24	17 23 23	8	DENSE, DARK BROWN (10YR 3/3) POORLY GRADED SAND, TRACE OF GRAVEL (.25-.50 IN) @ 166.5, WET.	SP	N/A	Hαu = BKg. α = BKg. βγ = 100 CPM
167							
168							
169							
170							
171	10689 1013 01-24	5 7 12	6	MEDIUM DENSE, BROWN (10YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25-.50 IN), WET	SP	N/A	Hαu = BKg α = BKg βγ = 90-100 CPM
172							
173							
174							
175							
176	10690 1441 01-24	19 29 27	10	VERY DENSE, DARK BROWN, (10YR 3/3) POORLY GRADED SAND, MEDIUM TO COARSE, WET.	SP	N/A	Hαu = BKg. α = BKg. βγ = 90-100 CPM
177							
178							
179							

NOTES:
1-24-89

DRILLER: Harry Dykes Jr.
ASSIST.: Robert Yost

INSTRU. BKg. 1-24-89
Hαu = 0.6 ppm
α = 0 CPM
βγ = 160 CPM

537

FERNALD RI/FS

2731

1st Key In		
2nd Key In		6-8-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-24-89 / 1-25-89
ELEVATION: ~588.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
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 WAH 3-3-89
181	10691 1535 01-24	17 19 50	8	VERY DENSE, BROWN (10YR 4/3) POORLY GRADED FINE SAND, WET.	SP	N/A	Hnu = BKG α = BKG. βγ = 100 CPM
182							
183							
184							
185							
186	10692 0943 01-25	12 50+ / 5IN	8	VERY DENSE, GRAYISH BROWN (10YR 4/2) POORLY GRADED SAND, TRACE OF GRAVEL @ 186.5 (.75-1.0 IN), WET.	SP	N/A	Hnu = BKG. α = BKG. βγ = 100 CPM
187							
188							
189							
190							
191	10693 1014 01-25	4 7 12	8	MEDIUM DENSE, BROWN, (10YR 4/2) POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 IN), WET	SP	N/A	Hnu = BKG α = BKG. βγ = 100 CPM
192							
193							
194							

NOTES:

DRILLER: Harry Dykes.
ASSIST.: Robert Yost.

INSTRU. BKG.

1-24-89 Hnu = 0.6 ppm
α = 0 cpm
βγ = 160 cpm

1-25-89 Hnu = .4 ppm
α = 0 cpm βγ = 150 CPM

538

FERNALD RI/FS

2731

	Initial	Date
1st Key In	[illegible]	4/8/89
2nd Key In	[illegible]	4/8/89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-25-89
ELEVATION: ~588.5 FT.	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
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 (WAH 3-3-89)
196	10694 1307 01-25	7 8 8	10	MEDIUM DENSE, BROWN (10YR 4/3) POORLY GRADED SAND, WET.	SP	N/A	Hnu = BKG. α = BKG. βγ = 100 CPM
197							
198							
199							
200							
201	10695 1400 01-25	8 17 46	12	VERY DENSE, BROWN, (10YR 4/3), POORLY GRADED SAND, MEDIUM GRAINED, WET.	SP	N/A	Hnu = BKG. α = BKG. βγ = 90 CPM
202							
203							
204							
205							
206	10696 1623 01-25	17 25 32	6	VERY DENSE, BROWN, (10YR 4/3) POORLY GRADED SANDY GRAVEL, (.25-.50 IN), WET	GP	N/A	Hnu = BKG α = BKG βγ = 90 CPM
207							
208							
209							

NOTES:

DRILLER: HARRY DYKES JR.
ASSIST.: BOB YOST

INSTRU. BKG. 1-25-89
Hnu = 0.4 ppm
α = 0 CPM
βγ = 160 CPM

539

FERNALD R1/FS

2731

	Initial	Date
1st Key In		
2nd Key In		6-8-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC R1/FS	
BORING NUMBER: 4013	COORDINATES:	DATE: 1-26-89 / 1-31-89
ELEVATION: ~558.5 FT	GWL: Depth Date/Time	DATE STARTED: 1-6-89
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED: 2-7-89
DRILLING METHODS: CABLE TOOL		PAGE 15 OF ~~15~~ 17

WAH 3-3-89

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211	10697 1000 01-26	12 23 33	6	VERY DENSE, LIGHT BROWN (10YR 4/4) POORLY GRADED SAND, WET.	SP	N/A	Hαβ = BKG α = BKG. βγ = 100 CPM
212							
213							
214							
215							
216	10698 1000 01-31	12 27 50	15	VERY DENSE, BROWN, (10 YR 4/3) POORLY GRADED SAND, WET.	SP	N/A	Hαβ = BKG α = BKG βγ = 100 CPM
217							
218							
219							
220							
221	10699 1115 01-31	50+ / 2 IN	2	VERY DENSE, BROWN, (10YR 4/3), WELL GRADED GRAVEL, SOME SAND, WET.	GW	N/A	Hαβ = BKG. α = BKG. βγ = 100 CPM
222				BEDROCK @ 222.5 FT			
223							
224							

NOTES:

DRILLER: Harry Dykes Jr.
ASSIST.: Robert Yost

INSTRU. BKG. 1-26-89 / 1-31-89
Hαβ = 0.6 ppm
α = 0 cpm
βγ = 180 cpm

540

402-1-86

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF 15

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
1.5	20499 01/06/89 1000	3 8 10	4	VERY STIFF, OLIVE YELLOW-BROWN, (2.5 Y 5/4) CLAY, HIGH PLASTICITY, WET TO MOIST.	CL	2.5	BΓ = 600 cpm
3.0	20500 01/06/89 1012	10 13 16	8	HARD, OLIVE YELLOW-GRAY, (5 Y 5/4) CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	>4.0	BΓ = 450 cpm
4.5	20501 01/06/89 1020	14 17 21	8	VERY STIFF, GRAYISH BROWN, (2.5 Y 5/2), CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	4.0	BΓ = 450 cpm
6.0	20502 01/06/89 1030	25 29 31	15	HARD, LIGHT OLIVE BROWN, (2.5 Y 5/4), GRAVELLY CLAY, HIGH PLASTICITY, MOIST.	CL	>4.0	BΓ = 220 cpm
7.5	20503 01/06/89 1040	25 35 37	9	HARD, GRAYISH BROWN, (2.5 Y 5/2), GRAVELLY CLAY, HIGH PLASTICITY, MOIST.	CL	>4.0	BΓ = 220 cpm
9.0	20504 01/06/89 1047	40 42 40	16	VERY STIFF, GRAY (5 Y 4/1) CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	3.5	BΓ = 200 cpm
10.5	20505 01/06/89 1058	20 21 20	17	VERY STIFF, DARK GRAY, (5 Y 4/1), CLAY, TRACE OF GRAVEL, HIGH PLASTICITY, MOIST.	CL	2.75	BΓ = 180 cpm
12.0	20506 01/07/89 1521	5 9 14	6	MEDIUM STIFF, GRAY, (2.5 Y 5/0), CLAY, HIGH PLASTICITY, MOIST.	CL	.75	BΓ = 240 cpm
13.5	20507 01/07/89 1534	4 5 8	8	STIFF, GRAYISH BROWN TO DARK GRAY, (10 YR 4/1) CLAY, SOME COARSE SAND, MEDIUM TO HIGH PLASTICITY, MOIST.	CL	1.5	BΓ = 220 cpm
15.0	20508 01/07/89 1548	4 9 14	10	STIFF, GRAY, (10 YR 5/1) CLAY, HIGH PLASTICITY, MOIST.	CL	1.5	BΓ = 200 cpm

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST. * ELEVATION TAKEN FROM DAMES AND MOORE DATA SHEET.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
16.5	20509	01/07/89 1555	5 8 14	10	STIFF, GREY (10 YR 5/1) CLAY, TRACE OF GRAVEL, HIGH TO MEDIUM PLASTICITY, MOIST.	CL	2.0	BΓ = 180 cpm
18.0	20510	01/07/89 1605	6 9 11	15	STIFF, GRAY (10 YR 5/1) CLAY, TRACE OF GRAVEL, MEDIUM TO HIGH PLASTICITY MOIST.	CL	2.0	BΓ = 180 cpm
19.5	20511	01/07/89 1615	5 11 12	10	STIFF, BROWNISH GRAY (10 YR 5/2) CLAY TRACE OF GRAVEL - 0.5 IN. MEDIUM PLASTICITY, MOIST.	CL	1.5	BΓ = 200 cpm
21.0	20512	01/08/89 0900	18 10 17	4	MEDIUM DENSE, GRAY (10 YR 5/1) POORLY GRADED GRAVEL (0.25 IN. AVE).	GP	N/A	BΓ = 250 cpm
22.5	20513	01/08/89 0910	7 9 16	10	VERY STIFF, GRAYISH BROWN (10 YR 5/2) INORGANIC CLAY, TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	2.25	BΓ = 220 cpm
24.0	20514	01/08/89 0925	4 8 11	12	STIFF, GRAY, (10 YR 5/1) INORGANIC CLAY, TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	1.2	BΓ = 220 cpm
25.5	20515	01/08/89 0931	7 7 12	12	VERY STIFF, GRAY (10 YR 5/1) INORGANIC CLAY, TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	2.0	BΓ = 220 cpm
27.0	20516	01/08/89 0941	4 7 11	10	MEDIUM STIFF, GRAYISH BROWN (10 YR 5/2) INORGANIC CLAY, TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	0.80	BΓ = 250 cpm
28.5	20517	01/08/89 1000	6 10 14	18	MEDIUM STIFF, GRAYISH BROWN 910 YR 5/2) INORGANIC CLAY, TRACE OF GRAVEL MEDIUM PLASTICITY, MOIST.	CL	0.80	BΓ = 250 cpm
30.0	20518	01/08/89 1007	7 14 18	14	VERY STIFF, GRAYISH BROWN (10 YR 5/2) INORGANIC CLAY, TRACE OF GRAVEL MEDIUM PLASTICITY, MOIST.	CL	2.5	BΓ = 250 cpm

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST. * ELEVATION TAKEN FROM DAMES AND MOORE DATA SHEET.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
31.5	20519	01/09/89 0947	11 10 13	8	VERY STIFF, OLIVE GRAY (5 Y 5/2) SILTY CLAY, TRACE OF GRAVEL .25 IN - .5 IN, MED. PLASTICITY, MOIST.	CL	2.25	BΓ = 220 cpm
33.0	20520	01/09/89 1000	7 11 20	8	VERY STIFF, OLIVE GRAY (5 Y 5/2) SILTY CLAY, MEDIUM PLASTICITY, MOIST.	CL	3.3	BΓ = 200 cpm
34.5	20521	01/09/89 1024	13 11 15	10	VERY STIFF, OLIVE GRAY TO GRAY, (5 Y 5/2) SILTY CLAY, TRACE OF GRAVEL .25 IN - .5 IN, MED. TO HIGH PLASTICITY. MOIST.	CL	2.5	BΓ = 180-200cpm
36.0	20522	01/09/89 1051	35 50 50	6	VERY DENSE, BROWN (10 YR 5/4) POORLY GRADED SAND, VERY LITTLE FINES, DRY.	SP	N/A	BΓ = 160-180cpm
40.0								
41.5	20523	01/09/89 1500	28 40 43	12	VERY DENSE, YELLOWISH BROWN, (10 YR 5/4) POORLY GRADED SAND, DRY TO MOIST.	SP	N/A	BΓ = 170 cpm
45.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST. * ELEVATION TAKEN FROM DAMES AND MOORE DATA SHEET.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
46.5	20524	01/09/89 1613	50	5	VERY DENSE, BROWN (10 YR 4/3), POORLY GRADED SAND, DRY.	SP	N/A	BΓ = 160 cpm
50.0								
51.5	10665	01/09/89 1633	21 35 40	12	VERY DENSE,LIGHT BROWN (10 YR 4/2) POORLY GRADED SAND, DRY.	SP	N/A	Hnu= 0 ppm α = 0 cpm BΓ = 160 cpm
55.0								
56.5	10666	01/10/89 0935	50	4	VERY DENSE, BROWN, (10 YR 4/3), POORLY GRADED SAND, MOIST.	SP	N/A	α = 0-5 cpm BΓ = 160 cpm
60.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
61.5	10667	01/10/89 1020	50	5	VERY DENSE, BROWN, (10 YR 4/2), GRAVELLY SAND, POORLY GRADED, SOME GRAVEL (.25 IN - .5 IN), MOIST.	SP	N/A	Hnu= 0 ppm α = 0-5 cpm BΓ = 150 cpm
65.0								
66.5	10668	01/10/89 1400	50	4	VERY DENSE, LIGHT BROWN-GRAY, (10 YR 4/2), POORLY GRADED SAND, MEDIUM TO FINE, MOIST.	SP	N/A	Hnu= 0 ppm α = 0-5 cpm BΓ = 160-180cpm
70.0								
71.5	10669	01/10/89 1445	44 42 36	8	VERY DENSE, DARK GRAYISH BROWN, (10 YR 4/2), POORLY GRADED SAND, MOIST.	SP	N/A	α = 0-5 cpm BΓ = 120 cpm
75.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF 15

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
76.5	10670	01/10/89	1556	21 32 50	10	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, WET.	SP	N/A	α = 0-5 cpm βΓ = 140 cpm
80.0									
81.5	10671	01/10/89	1620	50	4	VERY DENSE, DARK BROWN, (10 YR 4/2) WELL GRADED, GRAVELLY SAND, SOME GRAVEL .25 - .5 IN, WET.	SW	N/A	α = 0-5 cpm βΓ = 160 cpm
85.0									
86.5	10672	01/11/89	0930	46 50	6	VERY DENSE, DARK BROWN (10 YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL .25 IN, WET.	SP	N/A	α = 0-5 cpm βΓ = 120 cpm
90.0									

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS 2731	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 7 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
91.5	10673	01/11/89 1030	28 27 25	12	VERY DENSE, DARK GRAYISH BROWN, (10 YR 4/2), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 IN), WET.	SP	N/A	α = 0-5 cpm BΓ = 100 cpm
95.0								
96.5	10674	01/17/89 1045	50 50	8	VERY DENSE, DARK BROWN, (10 YR 4/3) POORLY GRADED SAND, TRACE OF GRAVEL 95.5 FT. (.25 - 1.0 IN) WET.	SP	N/A	α = 0-5 cpm BΓ = 90 cpm
100.0								
101.5	10675	01/17/89 1340	2 5 9	7	MEDIUM DENSE, DRK GRAYISH BROWN, (10 YR 3/2) WELL GRADED SAND, TRACE OF GRAVEL (.25 IN - .5 IN) WET.	SW	N/A	α = 0-5 cpm BΓ = 100 cpm
105.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 8 OF 15

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
106.5	10676	01/18/89	0856	22 50	7	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF COARSE SAND AT 105.5 FT. WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
110.0									
111.5	10677	01/18/89	1010	40 37 50	12	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF GRAVEL, WET.	SP	N/A	α = 0-5 cpm βΓ = 120 cpm
115.0									
116.5	10678	01/18/89	1118	21 27 50	10	VERY DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF GRAVEL AT 115.5 FT., WET.	SP	N/A	α = 0-5 cpm βΓ = 100-120cpm
120.0									

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 9 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
121.5	10679	01/18/89 1400	28 29 22	10	VERY DENSE, DARK BROWN, (10 YR 3/3), WELL GRADED GRAVEL, SOME SAND COARSE TO MEDIUM, WET.	GW	N/A	α = 0-5 cpm βΓ = 120 cpm
125.0								
126.5	10680	01/18/89 1515	50	3	VERY DENSE, DARK GRAYISH BROWN, (10 YR 4/2), GRAVELLY SAND, WELL GRADED, WET.	SW	N/A	α = 0-5 cpm βΓ = 100-110cpm
130.0								
131.5	10681	01/18/89 1620	7 11 11	8	MEDIUM DENSE, DARK BROWN, (10 YR 3/3), POORLY GRADED SAND, TRACE OF GRAVEL (.25 - .50 IN), WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
135.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 10 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
136.5	10682	01/21/89 1415	17 50 50	10	VERY DENSE, DARK GRAY BROWN (10 YR 4/2) GRAVELLY SAND, WELL GRADED, WET.	SW	N/A	α = 0-5 cpm βΓ = 280 cpm
140.0								
141.5	10683	01/21/89 1515	5 22 42	6	VERY DENSE, DARK GRAY BROWN (10 YR 4/1) POORLY SORTED SAND, TRACE GRAVEL, WET.	SP	N/A	α = 0-5 cpm βΓ = 180 cpm
145.0								
146.5	10684	01/23/89 1107	45 47 50	12	VERY DENSE, GRAYISH BROWN, (10 YR 4/2) POORLY GRADED SANDY GRAVEL (.25 IN - .5 IN), WET.	GP	N/A	α = 0-5 cpm βΓ = 120-140cpm
150.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	2731
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 11 OF 15

DEPTH	SAMPLE	DATE	TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
151.5	10685	01/23/89	1345	50	4	VERY DENSE, GRAYISH BROWN, (10 YR 4/2) WELL GRADED SANDY GRAVEL, WET.	GW	N/A	α = 0-5 cpm βΓ = 90-100 cpm
155.0									
156.5	10686	01/23/89	1525	17 20 19	12	DENSE, GRAYISH BROWN, (10 YR 3/2) WELL GRADED GRAVELLY SAND (.25 - .50 IN) GRAVEL, WET.	SW	N/A	α = 0-5 cpm βΓ = 90-100 cpm
160.0									
161.5	10687	01/23/89	1600	5 6 12	8	MEDIUM DENSE, DARK BROWN, (10 YR 3/3) POORLY GRADED SAND, TRACE OF GRAVEL (,25 - .50 IN), WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
165.0									

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 12 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
166.5	10688	01/24/89 0933	17 23 23	8	DENSE, DARK BROWN (10 YR 3/3) POORLY GRADED SAND, TRACE OF GRAVEL (.25 - .50 IN) AT 166.5, WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
170.0								
171.5	10689	01/24/89 1013	5 7 12	6	MEDIUM DENSE, BROWN (10 YR 4/3), POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 - .50 IN), WET.	SP	N/A	α = 0-5 cpm βΓ = 90-100 cpm
175.0								
176.5	10690	01/24/89 1441	19 29 27	10	VERY DENSE, DARK BROWN, (10 YR 3/3) POORLY GRADED SAND, MEDIUM TO COARSE, WET.	SP	N/A	α = 0-5 cpm βΓ = 90-100 cpm
180.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 13 OF 15

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
181.5	10691	01/24/89 1535	17 19 50	8	VERY DENSE, BROWN (10 YR 4/3) POORLY GRADED FINE SAND, WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
185.0								
186.5	10692	01/25/89 0943	12 50	8	VERY DENSE, GRAYISH BROWN (10 YR 4/2) POORLY GRADED SAND, TRACE OF GRAVEL AT 186.5 (.75 - 1.0 IN), WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
190.0								
191.5	10693	01/25/89 1014	4 7 12	8	MEDIUM DENSE, BROWN, (10 YR 4/3) POORLY GRADED SAND, TRACE OF FINE GRAVEL (.25 IN), WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
195.0								

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 14 OF 15

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
196.5	10694	01/25/89	1307	7 8 8		10	MEDIUM DENSE, BROWN, (10 YR 4/3) POORLY GRADED SAND, WET.	SP	N/A	α = 0-5 cpm βγ = 100 cpm
200.0										
201.5	10695	01/25/89	1400	8 17 46		12	VERY DENSE, BROWN, (10 YR 4/3), POORLY GRADED SAND, MEDIUM GRAINED, WET.	SP	N/A	α = 0-5 cpm βγ = 90 cpm
205.0										
206.5	10696	01/25/89	1623	17 25 32		6	VERY DENSE, BROWN, (10 YR 4/3) POORLY GRADED SANDY GRAVEL, (.25 - .50 IN), WET.	GP	N/A	α = 0-5 cpm βγ = 90 cpm
210.0										

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4013	COORDINATES: NORTH 481,659.30 EAST 1,382,016.82	DATE: 01/06/89
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 01/06/89
ENGINEER/GEOLOGIST: ET	Depth N/A Date/Time N/A	DATE COMPLETED: 01/06/89
DRILLING METHODS: CABLE-TOOL		PAGE 15 OF 15

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
211.5	10697	01/26/89	1000	12 23 33		6	VERY DENSE, LIGHT BROWN (10 YR 4/4) POORLY GRADED SAND, WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
215.0										
216.5	10698	01/31/89	1000	12 27 50		15	VERY DENSE, BROWN, (10 YR 4/3) POORLY GRADED SAND, WET.	SP	N/A	α = 0-5 cpm βΓ = 100 cpm
220.0										
221.5	10699	01/31/89	1115	50		2	VERY DENSE, BROWN, (10 YR 4/3), WELL GRADED GRAVEL, SOME SAND, WET.	GW	N/A	α = 0-5 cpm βΓ = 100 cpm

BOTTOM OF BORING 222.5

NOTES:
COLOR DESCRIBED BY MUNSELL COLOR CHART AND SAMPLING FOLLOWED ASTM STD. PENE. TEST.

FERNALD RI/FS

Field Check	WAH	3-3-89
1st Key In		
2nd Key In		6-16-89
Hard Copy Verification		

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. E. TROLLINGER DATE 2-7-89
PROJECT NO. 602 TASK 3.2.1 CHECKED BY W.A. Hertel DATE 3-3-89
BORING NO. 4013
PIEZOMETER NO. 4013 DATE OF INSTALLATION 1-6-89 TO 2-7-89

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT. TO 222.5 FT.
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10 IN ID FROM 0.0 TO 222.5
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 IN ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN ~~[X]~~ WAH 3-3-89
AVERAGE SIZE OF PERFORATIONS 0.01 IN.
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 2 FT, 10 FT, 11.5 SCREEN + SILT TRAP WAH 3-3-89
JOINING METHOD SCREW TYPE THREADED FLUSH JOINTED.

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT.
PROTECTIVE PIPE O.D. 10.75 IN.

OTHER PROTECTION RISER PROTECTIVE PIPE LOCKING LID WITH INSTALLED PADLOCK

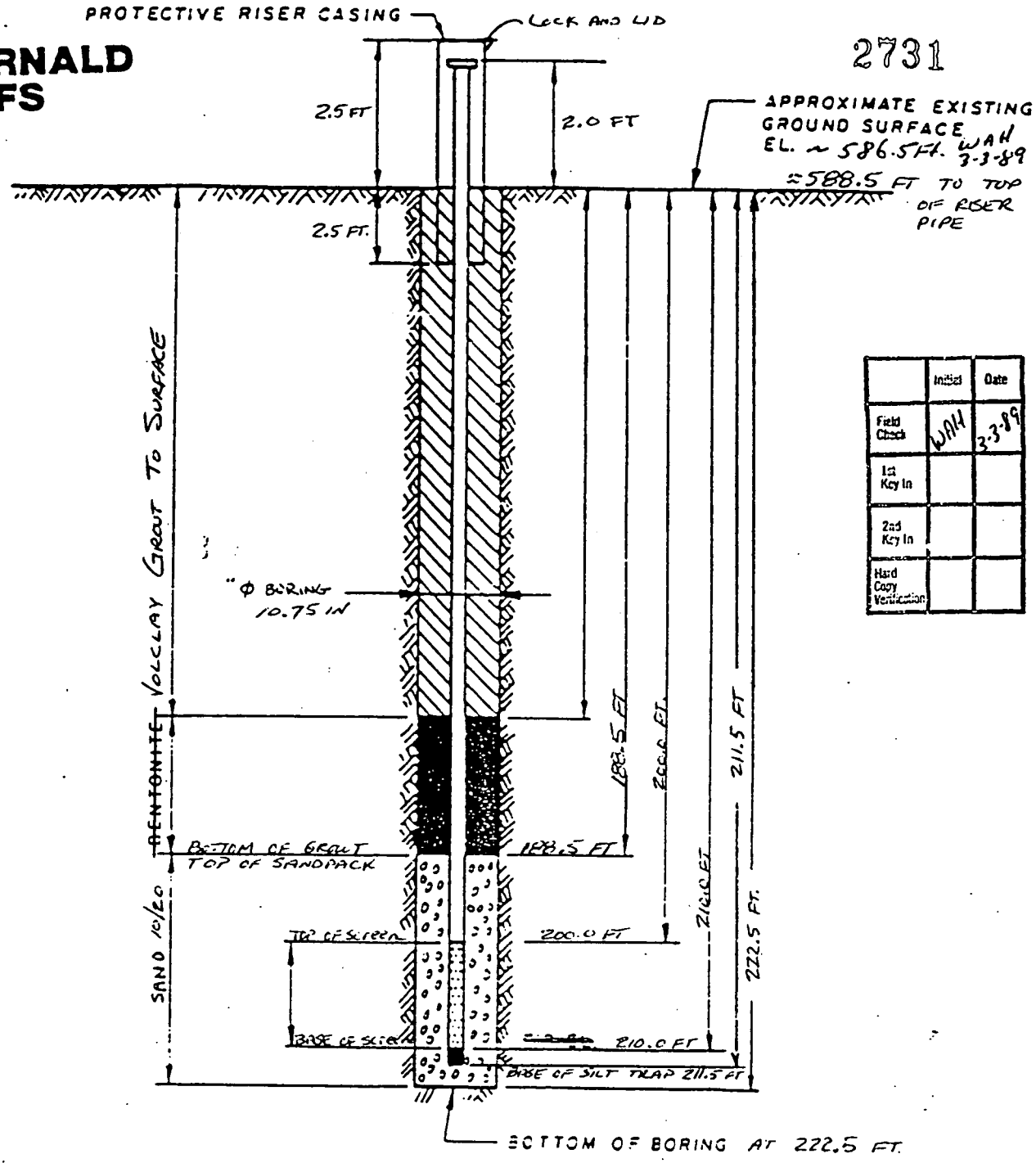
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT / ~~SLURRY~~	TOP 0.0	BOTTOM 188.5	TOP	BOTTOM
~~BENTONITE~~ N/A ON 4000 SERIES	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND 10/20	TOP 188.5	BOTTOM 222.5	TOP	BOTTOM
~~GRAVEL~~ ONLY SAND USED	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 200.0	BOTTOM 210.0	TOP	BOTTOM
PIEZOMETER TIP	211.5			
BOTTOM OF BOREHOLE	222.5			
GWL AFTER INSTALLATION	71.8		556	

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

REMARKS WELL DEVELOPMENT WILL DEVELOP THIS WELL BEFORE INSTALLATION OF PIEZOMETER IS ENTIRELY COMPLETE.

FERNALD RI/FS

2731



	Initial	Date
Field Check	WAH	3-3-89
1st Key In		
2nd Key In		
Hard Copy Verification		

DRAWN BY	2-7-89	CHECKED BY	WAH	3-3-89	DRAWING NUMBER
	E.T.	APPROVED 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 (0.0 0 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED - SILT TRAP 1.5 FT (WELDED)
4. ELEVATION OF WATER LEVEL 74.5 FT 1-10-89
5. WATER LEVEL READING ON 72.0 FT 2-1-89
   71.8 FT 2-7-89

MATERIALS USED:

SAND: 22 BAGS (80 lb) 10/20

VOLCLAY GROUT: 47 BAGS (50 lb.)

BENTONITE PELLETS: NONE USED

WATER: 1500 GALLONS DRILLING
1400 GROUTING

INSTALLATION DETAILS
MONITORING WELL
MW-4013
PREPARED FOR 557

Monitoring well installation 1-6-89 to 2-7-89
Started Drilling and Sampling 1-6-89. Hole Cover employed 2-7-89. (WAH 3-3-89)

WELL 4064

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: EVERETT TROLLINGER	Depth Date/Time	DATE COMPLETED: 11-22-88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				INTERVAL 0.0 FT. TO 141.5 FT PREVIOUSLY SAMPLED IN BORING #3064. BASE OF TILL AT 32.5 FT. RIG UP ON LOCATION (MW 4064) ON 11-14-88, ONLY 3.0 FT. DRILLED. DRILLING TO COMMENCE ON 11-15-88 AT 3.0 FT. SAMPLING TO COMMENCE AT 145.0 FT. TO BEDROCK.			
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							

559

NOTES:

A.S.I.
PENN. DRILLING RIG #3
DRILLER: JOE BARILE
HELPER: SID SMITH

Used 1400 gallons of Water to drill and mix Volclay grout.
BD. 12/13/88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3 FT	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16				SEE BORING LOG 3064 ↓			
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							

NOTES:

A.S.I

PENN DRILLING RIG #3

DRILLER: JOE BARLE

HELPER: SID SMITH

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3 FT	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31				SEE BORING LOG 3064 FOR SAMPLE DESCRIPTIONS			
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							

NOTES:

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 580.3 FT.	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46				SEE BORING LOG #3064			
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							

NOTES:

A.S.I.
PENN DRILLING RIG #3
DRILLER: JOE BARILE

562

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 4064	COORDINATES:		DATE: 11-16-88
ELEVATION: 588.3	GWL: Depth	Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS:			PAGE 5 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61				SEE BORING LOG # 3064			
62							
63							
64							
65							
66							
67							
68							
69							
70							
71							
72							
73							
74							

NOTES:

A.S.I.

PENN DRILLING RIG #3

DRILLER: JOE BARILE

563

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3 FT.	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76				SEE BORE LOG #3064			
77							
78							
79							
80							
81							
82							
83							
84							
85							
86							
87							
88							
89							

NOTES:

A.S.I.

PENN. DRILLING RIG #3

DRILLER: JOE BARILE

564

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3 FT.	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 7 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91				BORELOG # 3064			
92				CONTAINS SOIL			
93				DESCRIPTION			
94							
95							
96							
97							
98							
99							
100							
101							
102							
103							
104							

NOTES:

A.S.I.

PENN DRILLING RIG #3

DRILLER: JOE BARILE

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 1602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-16-88
ELEVATION: 588.3 FT.	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 8 OF 15

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106				SEE BORE LOG 3064			
107							
108							
109							
110							
111							
112							
113							
114							
115							
116							
117							
118							
119							

NOTES:

A.S.I.

PENN DRILLING RIG #3

DRILLER: JOE BARILE

566

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3 2	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 4064	COORDINATES:		DATE: 11-16-88
ELEVATION: 588.3 FT.	GWL: Depth	Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E TROWINGER	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL			PAGE 9 OF 15

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ( )	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121				SEE BORELOG # 3064			
122							
123							
124							
125							
126							
127							
128							
129							
130							
131							
132							
133							
134							

NOTES:

A.S.I.

PENN. DRILLING RIG #3

DRILLER: JOE BARILE

567

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002 TASK 3.2	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 4064	COORDINATES:		DATE: 11-17-88
ELEVATION: 588.3 FT.	GWL: Depth	Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROWINGER	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL			PAGE 10 OF 15

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136							
137							
138							
139							
140							
141							
142							
143							
144							
145							
146	11098 1655	7/10/16	14	STIFF, OLIVE GRAY, (5Y 3.1) SILTY CLAY W/ TRACE V.F. SAND. MOIST, ROOTLETS,	cl	1.45	H_{Nu} = 0 PPM α = 0 cpm $\beta\gamma$ = 100 cpm
147							
148							
149							

NOTES:

A.S.I.

PENN. DRILLING RIG #3

DRILLER: JOE BARILE

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 607 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-18-88
ELEVATION: 588.3	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TRILLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 11 OF

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS * ∠ PROBE BROKEN
151	11049 0940	12/17/21	18	STIFF, OLIVE GREY (5Y 3.1) SILTY CLAY W/TRACE TO SOME V.F. SAND, MOIST, ROOTLETS.	CI	2.2	HNU = 0 PPM α = 0 cm * βγ = 100 cm
152							
153							
154							
155							
156	11050 1130	14/21/29	10	STIFF, OLIVE GREY (5Y 3.2) SILTY CLAY W/TRACE TO SOME V.F. SAND, MOIST SOME WHITE SHELL FRAGMENTS	CI	1.45	HNU = 0 PPM α = * βγ = 40-80 cm
157							
158							
159							
160							
161	11051 1345	22/15/11	6	LOOSE, GRAY (10YR 4/1) GRAVEL W/ TRACE COARSE SAND, WET, ANGULAR TO SUB-ANGULAR, 1/4 TO 1" DIAM.	GP	NA —	HNU = 0 PPM α = * βγ = 40-80 cm
162							
163							
164							

NOTES:

A.S.I.

PENN DRILLING #3

DRILLER: JOE BARILE

569

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC		
BORING NUMBER: 4064	COORDINATES:		DATE: 11-18-88
ELEVATION: 588.3 FT.	GWL: Depth	Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL			PAGE 12 OF

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS * α PROBE NOT WORKING
166	11052 1530	19/20/19	14	DENSE, GREY (10YR 5/1) SILTY SAND SOME SILT, WET, MED TO COARSE, SUB-ROUNDED TO SUB-ANGULAR	SP	NA	H_{NU} = 0 PPM α = * PY = 40-100 CPM
167							
168							
169							
170							
171	11053 1500	8/14/20	6	DENSE, GREY (10YR 5/1) SILTY SAND WET, MED TO COARSE, SUB-ROUNDED TO SUB-ANGULAR.	SP	NA	H_{NU} = 0 PPM α = PY = 20-60 CPM
172							
173							
174							
175							
176	11054 1715	50 FOR 5"	12	VERY DENSE, GREY (10YR 5/1) SILTY SAND, WET, VERY FINE	SP	NA	H_{NU} = 0 PPM α = * PY = 20-80 CPM
177							
178							
179							

NOTES:

A.S.I

PENN DRILLING RIG #3

DRILLER: JOE BARILE

570

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-19-88
ELEVATION: 588.3 FT	GWL: Depth Date/Time	DATE STARTED: 11-19-88
ENGINEER/GEOLOGIST: K. HEMLEIN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 13 OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS * α PROBE NOT WORKING
181	11055 1045	8/10/13	18	DENSE, GREY (10YR 5/1) SILTY SAND WET, V.F. TO COARSE GRAINED, SUB-ANGULAR TO SUB-ROUNDED.	SP	NA	HNu = 0 ppm α = * βγ = 40-60 cpm
182							
183							
184							
185							
186	11056 1130	30/42/45	12	VERY DENSE, GREY (10YR5/1) SILTY SAND, WET, V.F.-MED GRAINED, SUB-ROUNDED	SP	NA	HNu = 0 ppm α = * βγ = 40-60 cpm
187							
188							
189							
190							
191	11057 1430	7/15/22	12	VERY DENSE GREY (10YR 5/1) SILTY SAND W/ FEW GRAVELS, WET, MED TO COARSE GRAINED, SUB-ROUNDED TO SUB-ANGULAR	SP	NA	HNu = 0 ppm α = * βγ = 40-80 cpm
192							
193							
194							

NOTES:

A.S.I.

PENN DRILLING RIG #3

DRILLER J. BARILE

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 TASK 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-20-88
ELEVATION: 588.3 FT.	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 14 OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196	11058 1530	6/8/12	10	VERY DENSE, GREY (10YR 5/1) SILTY SAND, WET, V.F. GRADING TO MED GRAINED AT 96.5'.	SW	NA	HNU - 0 PPM α - ✱ βγ - 40-60 cpm
197							
198							
199							
200	11059 1700	10/13/18	15	VERY DENSE, GREY (10YR 5/1) SILTY SAND, WET, VERY FINE W/ OCCASIONAL PEBBLES AT 201 FT.	SP	NA	HNU - 0 PPM α - ✱ βγ - 40-60 cpm
201							
202							
203							
204							
205							
206							
207	11060 1115	5/7/15	2	LOOSE, GREY, (10YR 5/1) GRAVELS W/SOME SILTY SAND, WET, 1/4 TO 1" DIAM, SUB-ANGULAR TO SUB-ROUNDED, SAND V.F. TO COARSE	GM	NA	HNU = 0 PPM α = βγ = 80-160 cpm
208							
209							

NOTES:

A.S.I.

PENN DRILLING RIG #3

572

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES:	DATE: 11-21-88
ELEVATION: 588.3	GWL: Depth Date/Time	DATE STARTED: 11-14-88
ENGINEER/GEOLOGIST: K. HEMLEIN	Depth Date/Time	DATE COMPLETED: 11/21/88
DRILLING METHODS: CABLE TOOL		PAGE 15 OF 15

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211	11061 1445	11/9/10	6	LOOSE, GREY (10YR 5/1) GRAVEL WITH SILTY SAND, WET, SAND V.F. TO COARSE, SUB-ROUNDED	GM	NA	H_{NU} = 0 ppm α = * BG = 40-80 cpm
212							
213							
214							
215	11062 1630	150 FOR 5"	8	DENSE, GREY (10YR 5/2) SILTY SAND, WET, MED GRAINED. 2" PIECE OF GRAVEL STUCK IN TOE OF SAMPLER.	SP	NA	H_{NU} = 0 ppm α = * BG = 40-60 cpm
216							
217							
218	11063	150 FOR 2"	1.5"	HARD, GRAY, (2.5Y N/5) CLAYSTONE, DRY TO MOIST, HIGHLY WEATHERED, FRIABLE.		NA	H_{NU} = 0 ppm α = * BG = 40-60 cpm
219				TD BORING 218.2 FT.			
220							
221							
222							
223							
224							

NOTES:

A.S.I

PENN DRILLING RIG #3

573

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 1 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
145.0								
146.5	08912 11/17/88 1655		7 10 16	14	STIFF, OLIVE GRAY, (5 Y 3.1) SILTY CLAY W/TRACE V.F. SAND MOIST, ROOTLETS.	CL	1.45	Hnu= 0 ppm α = 0 cpm BΓ = 100 cpm
150.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 2 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
151.5	08913	11/18/88 0940	12 17 21	18	VERY STIFF, OLIVE GREY (5 Y 3.1) SILTY CLAY W/ TRACE TO SOME V.F. SAND, MOIST, ROOTLETS.	CL	2.2	Hnu= 0 ppm α = 0 cpm BΓ = 100 cpm
155.0								
156.5	08914	11/18/88 1115	14 21 29	10	STIFF, OLIVE GREY (5 Y 3.2) SILTY CLAY W/ TRACE TO SOME V.F. SAND, MOIST SOME WHITE SHELL FRAGMENTS.	CL	1.45	Hnu= 0 ppm BΓ = 40-80 cpm
160.0								
161.5	08915	11/18/88 1345	22 15 11	6	MED. DENSE LOOSE, GRAY (10 YR 4/1) GRAVEL W/ TRACE COARSE SAND, WET, ANGULAR TO SUB-ANGULAR, 1/4 TO 1" DIAM-.	GP	N/A	Hnu= 0 ppm BΓ = 40-80 cpm
165.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 3 OF

DEPTH	SAMPLE	DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
166.5	08916 11/18/88 1530		19 20 19	14	DENSE, GREY (10 YR 5/1) SILTY SAND SOME SILT, WET, MED. TO COARSE, SUB-ROUNDED TO SUB-ANGULAR.	SP	N/A	Hnu= 0 ppm BΓ = 40-100 cpm
170.0								
171.5	08917 11/18/88 1600		8 14 20	6	DENSE, GREY (10 YR 5/1) SILTY SAND WET, MED TO COARSE, SUB-ROUNDED TO SUB-ANGULAR.	SP	N/A	Hnu= 0 ppm BΓ = 20-60 cpm
175.0								
176.5	08918 11/18/88 1715		50	12	VERY DENSE, GREY (10 YR 5/1) SILTY SAND, WET, VERY FINE.	SP	N/A	Hnu= 0 ppm BΓ = 20-80 cpm
180.0								

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

2731

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 4 OF

DEPTH	SAMPLE	DATE	TIME	BLOWS ON	SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
181.5	08919	11/20/88	1045	8 10 13		18	MED DENSE, GREY (10 YR 5/1) SILTY SAND WET, V.F. TO COARSE GRAINED, SUB-ANGULAR TO SUB-ROUNDED.	SP	N/A	Hnu= 0 ppm BΓ = 40-60 cpm
185.0										
186.5	08920	11/20/88	1130	30 42 45		12	VERY DENSE, GREY (10 YR 5/1) SILTY SAND, WET, V.F. - MED GRAINED, SUB-ROUNDED.	SP	N/A	Hnu= 0 ppm BΓ = 40-60 cpm
190.0										
191.5	08921	11/20/88	1430	7 15 22		12	DENSE GREY (10 YR 5/1) SILTY SAND W/ FEW GRAVELS, WET, MED TO COARSE GRAINED, SUB-ROUNDED TO SUB-ANGULAR.	SP	N/A	Hnu= 0 ppm BΓ = 40-80 cpm
195.0										

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 5 OF

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
196.5	08922 11/20/88 1530	6 8 12	10	MED DENSE, GREY (10 YR 5/1) SILTY SAND, WET, V.F. GRADING TO MED GRAINED AT 96.5'.	SW	N/A	Hnu= 0 ppm BΓ = 40-60 cpm
200.0							
201.5	08923 11/20/88 1700	10 13 18	15	DENSE, GREY (10 YR 5/1) SILTY SAND, WET, VERY FINE W/ OCCASIONAL PEBBLES AT 201 FT.	SP	N/A	Hnu= 0 ppm BΓ = 40-60 cpm
205.0							
206.5	08924 11/21/88 1115	5 7 15	2	MED DENSE, GREY, (10 YR 5/1) GRAVELS W/ SOME SILTY SAND, WET, 1/4 TO 1" DIAM, SUB-ANGULAR TO SUB-ROUNDED, SAND V.F. TO COARS	GM	N/A	Hnu= 0 ppm BΓ = 80-160 cpm
210.0							

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

PROJECT NUMBER: 602 3.2	PROJECT NAME: FMPC RI/FS	
BORING NUMBER: 4064	COORDINATES: NORTH 480,730.23 EAST 1,382,193.62	DATE: 11/17/88
GROUND ELEVATION: 588.3	GWL: Depth N/A Date/Time N/A	DATE STARTED: 11/17/88
ENGINEER/GEOLOGIST: E. TROLLINGER	Depth N/A Date/Time N/A	DATE COMPLETED: 11/22/88
DRILLING METHODS: CABLE-TOOL		PAGE 6 OF

DEPTH	SAMPLE DATE TIME	BLOWS ON SAMPLE	RECOVERY INCHES		USCS SYMBOL	TSF	REMARKS
211.5	08925 11/21/88 1445	11 9 10	6	MED DENSE, GREY (10 YR 5/1) GRAVEL WITH SILTY SAND, WET, SAND V.F. TO COARSE, SUB-ROUNDED.	GM	N/A	Hnu= 0 ppm BΓ = 40-80 cpm
215.0							
216.5	08926 11/21/88 1630	15	8	VERY DENSE, GREY (10 YR 5/2) SILTY SAND, WET, MED GRAINED 2" PIECE OF GRAVEL STUCK IN TOE OF SAMPLER.	SP	N/A	Hnu= 0 ppm BΓ = 40-60 cpm
218.0							
218.3	08927 11/21/88 1730	15	1.5	HARD, GRAY, (2.5 Y N/S) CLAYSTONE, DRY TO MOIST, HIGHLY WEATHERED, FRIABLE.			Hnu= 0 ppm BΓ = 40-60 cpm

BOTTOM OF BORING 218.3

NOTES:
SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST. COLORS IDENTIFIED USING MUNSELL COLOR CHART.

FERNALD RI/FS

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD FMPC RI/FS FIELD ENG./GEO. K. HEMLEIN DATE 11-22-88
PROJECT NO. 602 3.2 CHECKED BY _____ DATE _____
BORING NO. 4064
PIEZOMETER NO. _____ DATE OF INSTALLATION 11-22-88

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT _____
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE 10 IN FROM 0 TO 218 FT
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL	RISER PIPE MATERIAL 316 L STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4 INCH	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 INCHES I.D. _____
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10 FEET
AVERAGE SIZE OF PERFORATIONS _____	JOINING METHOD FLUSH THREADED
TOTAL PERFORATED AREA 10 FEET	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT	OTHER PROTECTION _____
PROTECTIVE PIPE O.D. 0.5 FT	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2 FT		590.30 FT	
GROUND SURFACE	0.0		588.30 FT	
BOTTOM OF PROTECTIVE PIPE	2.5 FT		585.80 FT	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 193	TOP 588.30	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP 193	BOTTOM 218	TOP 395.30	BOTTOM 370.3
PERFORATED SECTION	TOP 198	BOTTOM 208	TOP 390.30	BOTTOM 380.3
PIEZOMETER TIP				
BOTTOM OF BOREHOLE	218.30		370.0	
GWL AFTER INSTALLATION				

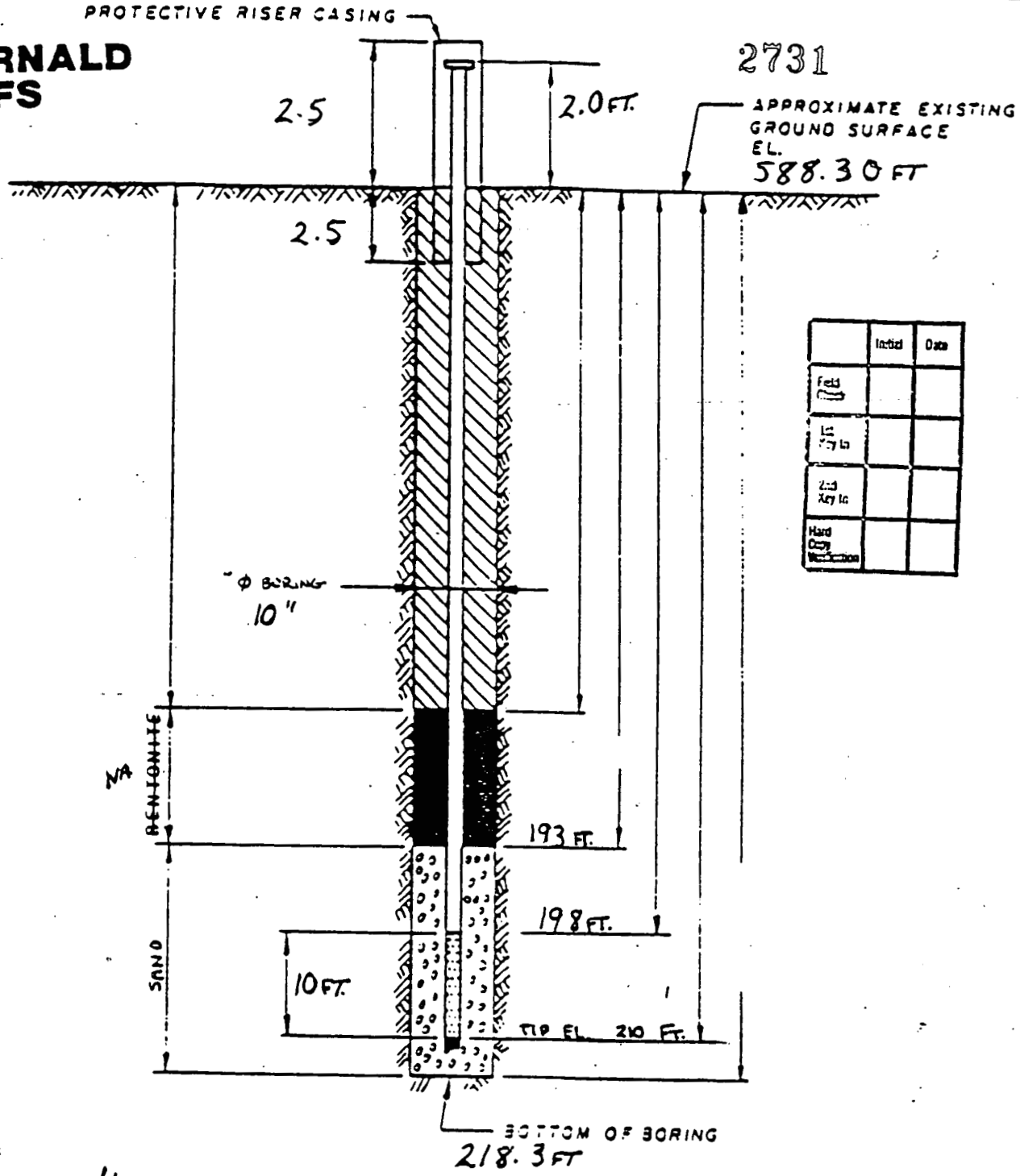
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS _____

580

FERNALD RI/FS

2731



	Initial	Date
Field Check		
1st Key In		
2nd Key In		
Hard Copy Verification		

DRAWING NUMBER	
	4/2/88
CHECKED BY / APPROVED BY	R.E.
DRAWN BY	K.H.

NOTES:

1. RISER PIPE IS 4 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4 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
5. WATER LEVEL READING ON

INSTALLATION DETAILS
MONITORING WELL 3064

PREPARED FOR

FMPC RI/FS

581

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 4064
WELL NUMBER: 4064

FIELD ENG./GEO.: K. HEMLEIN DATE: 11/22/88
CHECKED BY : WAH DATE: 01/06/89
N,E COORDINATES: 480730.23, 1382193.6
DATE OF INSTAL.: 11/22/88

2731

BOREHOLE DRILLING

DRILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0.0TO: 218.3
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0.0 TO: 218
SIZE: N/A FROM: N/A TO: N/A

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Screen
AVG. SIZE OF PERFORATIONS: 0.01 (In.)
TOTAL PERFORATED AREA: 10 Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 10 Ft.
2ND PIPE SECTION: Not Noted
3RD PIPE SECTION: Not Noted
COMMENTS

RISER JOINING METHOD: FLUSH THREADED, SCREW TYPE JOINT

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5 Ft.
PROTECTIVE PIPE O.D.: 0.5 Ft.
* LOCKING COVER WITH PADLOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2 Ft.	589.93
GROUND SURFACE	0.0	588.3
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0	193	588.3	N/A
Sand	193	218	395.3	370.3
PERFORATED SECTION	198	208	390.3	380.3
TIP	210.0		N/A	
BOTTOM OF BOREHOLE	218.3		370	
GWL AFTER INSTALLATION	71.8		N/A	

WAS THE WELL FLUSHED AFTER INSTALLATION? : No
WAS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : ELEVATIONS ARE ESTIMATED
COMMENTS:

WELL 4067

REVIEWED BY QA DATE

MEMORANDUM

2731

To: File
From: John Amarica
Date: September 10, 1990
Subject: Data Validation of MW 4967

COPY

It has come to the attention of the Data Validation Team that MW 4967 was once numbered MW 4067. The Data Validation Team was informed by Walter Weick that originally MW 4067 collapsed on itself and was plugged, subsequent to which the well was renumbered MW 4967. All documentation should reflect this change. As a result, the Data Validation team corrected the carbon copies of the Request For Analysis #20410 & #20411, corrected the carbon copies of Chain of Custody #20308 and #20309, and made a note for all applicable Field Activity Daily Logs to reflect this change in well number. For clarity, subsurface soil samples numbers 10420-10435 taken from this well originally assigned to MW 4067, are now reassigned to MW 4967.

The well has now been redrilled and assigned number MW 4067 again. No subsurface soil samples were taken during this redrilling, and all inquiries about subsurface soil samples from this well location should be directed to MW 4067.

Concurrence by: Daryl Stagg Date: 9/10/90

JA/to

JA1127.TO2

MONITORING WELL INSTALLATION RECORD
11/21/91

PROJECT NAME: Fernald RI/FS
PROJECT NO. : 602.3.2
BORING NO. : 4067
WELL NUMBER: 4067

FIELD ENG./GEO.: M. SLUSARSKI DATE: 02/01/89
CHECKED BY : W. A. HERTEL DATE: 02/09/89
N,E COORDINATES: 479772.61, 1382994.4
DATE OF INSTAL.: 01/20/89

2731

BOREHOLE DRILLING

DRILLING METHOD: Cable Tool
DRILLING FLUID(S) USED: (in Feet)
FLUID: WATER FROM: 0.0TO: 220.7
FLUID: N/A FROM: N/ATO: N/A
NOTES/COMMENTS:

TYPE OF BIT: Flat Head Hammer
IS CASING TEMPORARY?: No
CASING TYPE : MONITORING WELL
CASING DIAM.: 4.0 In. ID
CASING SIZE(S) USED: (in Feet)
SIZE: 10 FROM: 0.0 TO: 100.0
SIZE: 8.0 FROM: 0.0 TO: 220.0

WELL DESCRIPTION

TYPE: MONITORING WELL
DIAMETER OF PERFORATED SECTION:
PERFORATION TYPE: Slots
AVG. SIZE OF PERFORATIONS: .010 (In.)
TOTAL PERFORATED AREA: 10. Ft.
NOTES/COMMENTS:

RISER PIPE MATERIAL: Stainless Steel
RISER PIPE DIAMETERS:
O.D.: 4 3/8 In. I.D.: 4.0 In.
LENGTH OF 1ST PIPE SECTION: 1.7 Ft.
2ND PIPE SECTION: 2.0 Ft.
3RD PIPE SECTION: 10.0 Ft.
COMMENTS

RISER JOINING METHOD: SCREW TYPE FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH: 5.0 Ft.
PROTECTIVE PIPE O.D.: 10 3 In.
* LOCKING CAP AND LOCK

OTHER PROTECTION (* NOTED BELOW)

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE	ELEVATION MSL
TOP OF RISER PIPE	2.0 Ft.	595.09
GROUND SURFACE	0.0	593.3
BOTTOM OF PROTECTIVE PIPE	2.5 Ft.	

BOREHOLE FILL MATERIALS	TOP	BOTTOM	TOP	BOTTOM
Grout/Slurry	0.0	191.0	N/A	N/A
Sand	191.0	212.0	N/A	N/A
PERFORATED SECTION	200.0	210.0	N/A	N/A
WELL TIP	211.7		N/A	
BOTTOM OF BOREHOLE	220.7		N/A	
AFTER INSTALLATION	N/A		N/A	

IS THE WELL FLUSHED AFTER INSTALLATION? : No
IS A SENSITIVITY TEST PERFORMED ON THE WELL : No

REMARKS -- COMMENT AREA

REMARKS : OPEN HOLE INTERVAL FROM 220.7 FT. TO 212.0 FT.WAS ALLOWED TO COLLAPSE ON ITSELF. SIX (6) BUCKETS OF BENTONITE PELLETS WERE POURED AROUND THE PROTECTIVE CASING TO SERVE AS PACKING AND SEALING MATERIAL AT THE SURFACE.

COMMENTS:

FERNALD RI/FS

2731

32

WPK 4/23/88
RIG # 3

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B35~~ B3067 BB	COORDINATES: N 479760.13 E 1382988.18	DATE: Nov 21, 1987
ELEVATION: 595.15 tow 1-5-88	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Willo	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 1 OF 10

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ FT)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	11-20 1330 7427	8 14 18	13	Soft black 7½YR 2/0 sandy clay some silt, organic plant matter - moist ½	Oh	NA	HNU = 0 ppm
				rock - slag 1	NA	NA	γβ = 60 cpm
				Fill: (hard yellowish brown silty clay, trace sand and gravel slag - dry 1½	NA	>5	α = 2 cpm
2	11-20 1335 7428	16 10 10	12	Fill: (hard yellowish brown 10YR 5/4 silty clay some sand and gravel slag - dry	NA	>5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
3							
4	11-20 1340 7429	9 10 11	10	Fill: (hard yellowish brown 10YR 5/4 mottled gray 10YR 5/1 and brownish yellow 10YR 6/8 silty clay some sand and gravel slag - dry 4.6	NA NA	>5	HNU = 0 ppm γβ = 80 cpm α = 30 cpm
5	11-20 1345 7430	10 10 12	11	hard yellowish brown 10YR 5/6 mottled gray 10YR 5/1 and red(?) silty clay some sand and gravel - dry	Cl	>5	HNU = 0 ppm γβ = 70 cpm α = 20 cpm
6							
7	11-20 1350 7431	8 10 12	10	hard yellowish brown 10YR 5/6 mottled dark gray 10YR 4/1 silty clay some sand trace gravel and pebbles - dry	cl	>5	HNU = 0 ppm γβ = 60 cpm α = 20 cpm
8	11-20 1645 7432	4 9 20	11	hard yellowish brown 10YR 5/6 mottled gray 10YR 5/1 silty clay some sand trace gravel - dry 8½	cl	>5	HNU = 0 ppm γβ = 70 cpm α = 20 cpm
9				hard yellowish brown 10YR 5/6 gravelly clay some silt and sand - dry 9	cl		
10	11-20 1700 7433	6 15 21	11	hard yellowish brown 10YR 5/4 gravelly clay, some silt and sand, trace pebbles - dry	cl	>5	HNU = 0 ppm γβ = 60 cpm α = 20 cpm
11	NS	NA	NA	11.5		NA	0935 pushed Shelby tube - No return 1.2 ft
12							
13	11-21 1015 7434	8 10 16	12	hard grey 10YR 5/1 gravelly clay some silt and sand, trace pebbles - dry	cl	>5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
14	11-21 1040 7435	8 13 22	12	hard gray 10YR 5/1 gravelly clay some silt and sand - dry	cl	>5	HNU = 0 ppm γβ = 70 cpm α = 2 cpm

586

NOTES:
Pennsylvania Drilling Co.
Bucyrus Erie 24-W drilling rig
Driller Dave Neuman
Helper Bob Johnson
Blows on sampler follow ASTM standard for 2 in by 18 in split spoon sampler
Soil color description follow Munsell color charts

Background Nov 20, 1987
HNU = 0 ppm
γβ = 60 cpm
α = 2 cpm

402-11-88

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: ~~B 367~~ B3067 BB 1-5-89	COORDINATES: see p1	DATE: Nov 21, 1987	
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987	
ENGINEER/GEOLOGIST: Lowell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87	
DRILLING METHODS: Cable Tool		PAGE 2 OF 10	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (density and consistency based on relative soil texture)
16	11-21 1100 7436	2 10 13	3	hard gray 10YR 6/1 gravelly clay, some silt, sand, trace pebbles - dry	cl	UNKNOWN	No return first try, second try got 3 inches HNU = 0 ppm γβ = 60 cpm α = 2 cpm
17	11-21 1120 7437	4 9 13	10	hard gray 10YR 6/1 silty clay, trace sand and gravel, dry	cl	4.5	HNU = 0 ppm γβ = 70 cpm α = 2 cpm
18							
19	11-21 1140 7438	6 9 13	18	very stiff gray 10YR 6/1 silty clay, some ~~sand~~, trace gravel, dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
20	NS	NA	NA			NA	HNU = 0 ppm γβ = 70 cpm α = 1 cpm Pushed Shelby tube 1.3 feet get 0.2 return did not keep sample
21							
22	11-21 1430 7439	3 6 10	11	very stiff gray 10YR 5/1 silty clay, some sand, trace gravel - dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 2 cpm
23	11-21 1450 7440	8 6 10	14	very stiff gray 10YR 5/1 gravelly clay some silt and sand - dry	cl	3.5	HNU = 0 ppm γβ = 80 cpm α = 3 cpm
24							
25	11-21 1500 7441	3 5 7	14	very stiff gray 10YR 5/1 gravelly clay some silt, trace sand - dry	cl	3.2	HNU = 0 ppm γβ = 70 cpm α = 2 cpm
26	11-21 1515 7442	3 8 39	2	~~very~~ rock, very stiff gray 10YR 6/1 gravelly clay some silt and sand - dry	NA	NA	HNU = 0 ppm γβ = 80 cpm α = 2 cpm
27							
28	11-21 1530 7443	13 13 17	12	hard gray 10YR 6/1 gravelly clay some sand, silt and pebbles ~~many~~, trace pebbles - dry	cl	<5	HNU = 0 ppm γβ = 60 cpm α = 1 cpm
29	11-21 1600 7444	7 10 28	12	~~hard~~ very stiff gray 10YR 5/1 gravelly clay, some sand, silt and pebbles dry	cl	3.5	HNU = 0 ppm γβ = 60 cpm α = 0 cpm

NOTES:

587

402-11-86

GC/DH/2.4.89

2731

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 60232	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 DB 1-5-88	COORDINATES: see p1	DATE: Nov 22, 1987
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 3 OF 10

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ ft)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31	11-22 730 7445	8 10 15	10	very stiff gray 10YR 5/1 gravelly clay sew silt and sand, trace pebbles dry 31½	cl	3.5	HNU=0ppm SB=70cpm α=2cpm
32	11-22 810 7446	3 16 27	8	dense yellowish brown 10YR5/8 sand, sew silt and clay, trace gravel-dry	sp	NA	HNU=0ppm SB=60cpm α=0cpm
33 34	11-22 900 7447	8 12 13	12	dense brownish yellow 10YR 5/6 sand sew silt and clay, trace gravel dry	sp	NA	HNU=0ppm SB-60cpm α=0cpm
35 36	11-22 920 7448	8 18 19	12	dense brownish yellow 10YR 5/6 sand and fine gravel - sew silt, trace clay and pebbles-dry	sp	NA	HNU=0ppm SB=60cpm α=0cpm
37 38 39							
40 41	12-1 945 7449	32 38 50	18	dense yellowish brown 10YR6/8 sand and gravel, some silt and clay, dry	sm	NA	HNU=0ppm SB=800cpm α=2cpm
42 43 44							

NOTES:

588

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 7602.32	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3167	COORDINATES: see p1	DATE: 12/1/87
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Wille	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 4 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	12-1 1340 7450	26 36 37	12	dense yellowish brown 10YR 6/8 sand and fine gravel, some silt, clay and med to coarse gravel, dry.	SM	NA	HNU = 0ppm γB = 80cpm α = 2cpm
47							
48							
49							
50	12-1 1550 7451	20 23 30	8	med. dense, yellow brown 10YR 6/8 sand and gravel, some silt, clay and med. to coarse gravel, brown silty fine sand lens @ 50.5 ft., dry.	SM	NA	HNU = 0ppm γB = 60cpm α = 2cpm
51							
52							
53							
54							
55	12-1 1630 7452	16 30 42	11	dense brown 10YR 6/4 sand and gravel, some silt, dry. 56.0	SM	NA	HNU = 0ppm γB = 80 cpm α = 2cpm
56				brown-gray 10YR 6/3 med. sand, some silt, clay, gravel, dry.	SM		
57							
58							
59							

NOTES:

589

402-11-86

QC/DH/2.4.89

FERNALD RI/FS

2731

	Initial	Date
1st Key In		
2nd Key In		
Hard Copy Verified		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B3067	COORDINATES: See p1	DATE: 12/2/87
ELEVATION: See p1	GWL: Depth – Date/Time –	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille/T. Sullivan	Depth – Date/Time –	DATE COMPLETED: 12/6/87
DRILLING METHODS:		PAGE 5 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1½ ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60							
61	07453 12-2 0820	11 33 42	12	dense brown gray 10YR 5/4 sand with some gravel and pebbles, some silt and clay, dry.	SM	NA	HNU = 0ppm βB = 80cpm α = 2cpm
62							
63							
64							
65							
66	01454 12-2 1130	75 for 6in.	6	very dense brown 10YR5/3 sand and gravel, some silt and clay, trace pebbles, dry.	SM	NA	HNU = 0ppm βB = 60cpm α = 2cpm
67							
68							
69							
70							
71	07700 12-2 1420	16 33 29	9	med. dense, brown-gray 10YR 5/3 sand and gravel, some pebbles, silt and clay, dry.	SM	NA	HNU = 0ppm βB = 60cpm α = 2cpm
72							
73							
74							
75							

NOTES:

590

402-11-86

FERNALD RI/FS

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 ~~SB 1~~	COORDINATES: see p1	DATE: 12/2/87
ELEVATION: see p1	GWL: Depth – Date/Time –	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Willey/T. Sullivan	Depth – Date/Time –	DATE COMPLETED: 12/6/87
DRILLING METHODS:		PAGE 6 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
75							
76	07701 12-2 1520	16 13 18	6	med. dense, dark brown gray 10YR 4/1 sand with trace gravel, some silt, clay, moist.	SM	NA	HNU = 0ppm ΔB = 60cpm α = 2cpm
77							
78							
79							
80	07702 12-2 1710	11 15 11	10	med dense, gray 10YR 4/1, sand and gravel, with some silt, pebbles, and clay, wet.	SM	NA	HNU = 0ppm ΔB < 60cpm α = 2cpm
81							
82							
83							
84				84.0 very dense gray 10YR 4/1 fine sand, some silt and clay - wet	SW		
85	7703 12-3 1140	48 72	10	85.5 very dense gray 10YR 4/1 sand and gravel some silt and clay - wet	SM	NA	HNU = 0ppm ΔB = 80cpm α = 2cpm
86							
87							
88							
89							
90							

NOTES:

591

402-11-88

QC/DH/2-4-89

2731

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: ~~B367~~ B3067 BB 12-89	COORDINATES: see p1	DATE: 12-3-87	
ELEVATION: see p1	GWL: Depth — Date/Time —	DATE STARTED: 11-20-87	
ENGINEER/GEOLOGIST: L. Wille / T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87	
DRILLING METHODS: Cable Tool		PAGE 7 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (½ ft)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91	7704 12-3 1400	7 7 14	15	medium dense gray 10YR 4/1 sand with some gravel, silt and clay, some gravel lens with some silt, pebbles sand and clay @ 91 ft - wet	SM	NA	HNU = 0 ppm γB = 80 cpm α = 2 cpm
92							
93							
94							
95	7705 12-3 1620	32 63	18	very dense gray 10YR 4/1 sand with some ~~sand~~ silt gravel and clay - wet	SM	NA	HNU = 0 ppm γB - 100 cpm α = 2 cpm
96							
97							
98							
99							
100	7706 12-4 0900	5 5 11	10	medium dense, gray 10YR 4/1 sand with some gravel, silt and clay - wet	SM	NA	HNU = 0 ppm γB = 80 cpm α = 2 cpm
101				medium dense gray 10YR 4/1 sandy gravel, some silt and clay, trace pebbles	gm		
102							
103							
104							

NOTES:

592

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B367 B3067, RB 1-3-89	COORDINATES: see p1	DATE: 12-4-87	
ELEVATION: see p1	GWL: Depth 77.3 Date/Time 12/4 0800	DATE STARTED: 11-20-87	
ENGINEER/GEOLOGIST: L. Wille / T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87	
DRILLING METHODS: Cable Tool		PAGE 8 OF 10	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106	7707 12-4 1315	20 50 35	13	very dense gray 10YR 4/1 sandy gravel with some silt and clay - wet	gm	NA	HNU = 0 ppm γβ = 80 cpm α = 2 cpm
107							
108							
109				109½			
110	7708 12-4 1415	4 5 16	11	loose gray 10YR 4/1 sand with some gravel and pebbles, some silt and clay, wet	SM	NA	HNU = 0 ppm γβ = 80 cpm α = 2 cpm — NO RETURN 1st Try, 11 in second try blowouts first try
111							
112							
113							
114							
115	7709 12-4 1600	33 50 57	12	very dense gray 10YR 4/1 gravelly sand with some silt and clay - wet (115)	gm	NA	HNU = 0 ppm γβ = 80 cpm α = 2 cpm
116				very dense gray 10YR 4/1 sand with some gravel, silt and clay - wet (115½)	gm		
117							
118							
119							

NOTES:

593

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: ~~B367~~ B3067 BA 1-5-88	COORDINATES: see p1	DATE: 12-5-87
ELEVATION: see p1	GWL: Depth 77.0 Date/Time 12/5 0740	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille/T. Sullivan	Depth — Date/Time —	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 9 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (1/2 ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
120	7710 12-5 0845	7 13 21	18	med. dense gray 10YR 4/1 sand with some silt, clay, ~~and~~ gravel and pebbles, wet.	gm	NA	HNU=0ppm γB = 100 cpm α = 2 cpm
121							
122							
123							
124							
125	7711 12-5 1500	17 56 66	7	very dense gray 10YR 4/1 sand and gravel, some silt, clay, and pebbles, wet.	gm	NA	HNU=0ppm γB = 80 cpm α = 2 cpm
126							
127							
128							
129							
130	7712 12-5 1555	4 7 12	6	med. dense gray 10YR 4/1 sand and gravel, some pebbles, silt, and clay, wet.	gm	NA	HNU=0ppm γB = 80 cpm α = 2 cpm
131							
132							
133							
134							
135							

NOTES:

594

402-11-86

FERNALD RI/FS

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367 B306 7BB 1-5-99	COORDINATES: see p1	DATE: 12/5/87-12/6/87
ELEVATION: see p1	GWL: Depth 76.0 Date/Time 12/6 0735	DATE STARTED: 11/20/87
ENGINEER/GEOLOGIST: L. Wille/T. Sullivan	Depth 76.0 Date/Time 12/6 1010	DATE COMPLETED: 12/6/87
DRILLING METHODS: Cable tool		PAGE 10 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1/2 ft	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
135							
136	7713 12-5 1710	7 6 9	2	loose, gray 10YR 4/1 sand and gravel, some pebbles, silt, and clay, wet.	gm	NA	HNU=0 ppm βB=100 cpm α=2 cpm
137							
138							
139							
140	7714 12-6 0930	11 9 10	3	loose gray 10YR 4/1 sand with some gravel, silt, and clay, some pebbles present, wet.	gm	NA	HNU=0 ppm βB=100 cpm α=2 cpm
141							
142				E.O.B. 141.5 ft.			

NOTES:

595

402-11-86

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE 6/23/89

RECEIVED AUG 2 7 1989

Field Check	WAH	2-9-89
1st Key In	[illegible]	6/88
2nd Key In	[illegible]	6-15-89
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: ~~4067~~ 4967 MLI	COORDINATES: N479772.61 E1362994.40	DATE: 11-30-88 (11-30-88) WAH 2-9-89
ELEVATION: 593.0	GWL: Depth Date/Time	DATE STARTED: 11-15-88
ENGINEER/GEOLOGIST: ~~[illegible]~~ LAURI ADAMS	Depth Date/Time	DATE COMPLETED: 12-5-88
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 6

2731

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				INTERVAL 0.0 FT TO 141.5 FT PREVIOUS SAMPLED IN BORING # 3067. SEE VISUAL CLASSIFICATION OF SOILS FROM BORING # 3067 FOR DETAILED DESCRIPTION OF SEDIMENTS. SAMPLING IN BORING #4067 TO COMMENCE @ 145.0 FT.			
145	10420	27		VERY DENSE, GREY (10YR 4/1) POORLY GRADED FINE SAND TRACE FINE GRAVEL, WET	SP	N/A	HNU = 0
146	0955 11-22	50+	6				α = 0 BG = <10 100ppm
147							
148							
149							
150	10421	66		very dense, gray (10yr 4/1) poorly graded fine sand, trace gravel, wet	SP	N/A	HNU = 0
151	0900 11-30	36 28	8	yellowish brown poorly graded fine sand, lg gravel (>in.) (10yr 6/4)			α = 0 BG = 60-80 ppm
152				very dense gray (10yr 4/1) poorly graded fine sand, trace gravel, wet			
153							
154							

NOTES: CONTRACTOR: PENN DRILL
RIG: BUCYRUS ERIE 24-W
DRILLER: DAVE NEWMAN
ASSISTANTS: JIM LAX, KEVIN KRAMER

SAMPLES COLLECTED AS PER ASTM STANDARD PENETRATION TEST
COLORS IDENTIFIED USING MUNSELL COLOR CHART
BACKGROUND LEVELS: HNU = 0 LEL = 0 PPM LEL
α = 0-2 ppm 20.6% O_2
BG = 40-60 ppm

WATER ADDED TO HOLE DURING DRILLING ACTIVITIES: NA WAH 2-9-89

596

402-11-86

FERNALD
RI/FS

REVIEWED BY QA DATE

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald RIFS		
BORING NUMBER: ~~4067~~ 4967	COORDINATES:		DATE: 11-30-88
ELEVATION: 593.0	GWL: Depth	Date/Time	DATE STARTED: 11-15-88
ENGINEER/GEOLOGIST: L. Adams	Depth	Date/Time	DATE COMPLETED: 12-5-88
DRILLING METHODS: Cable Tool			PAGE 2 OF 6

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
156	10422 1330 11-30	13 33 28	3	Very dense, medium gray (10yr 5/1) poorly graded fine sands. Have gravel. Some clays. wet	SC	N/A	Hnu = 0 ppm α = 0 β = 60-80 cpm
157							
158							
159							
160	10423 1420 11-30	22 28 36	18	Very dense, dark gray (10yr 4/1) poorly graded fine sand moist	SP	N/A	Hnu = 0 ppm α = 0 β = 100 cpm
161				very dense dark gray (10yr 4/1) poorly graded gravelly fine sand moist	SP		
162							
163							
164							
165	10424 1630 11-30	29 31 46	12	Very dense med gray very fine sand poorly graded moist	SP	N/A	Hnu = 0 α = 0 β = 60 cpm
166							
167							
168							
169							

NOTES:

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE [illegible]

2731

1st Key In	[illegible]	[illegible]
2nd Key In	[illegible]	[illegible]
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald RI FS		
BORING NUMBER: ~~HG 01-88-01~~ 4067 4967	COORDINATES: Seep1		DATE: 12-1-88
ELEVATION: 593.0	GWL: Depth	Date/Time	DATE STARTED: 11-15-88
ENGINEER/GEOLOGIST: L. Adams	Depth	Date/Time	DATE COMPLETED: 12-5-88 WAH 2-2-89
DRILLING METHODS: Cable Tool			PAGE 5 OF ~~5~~ 6

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
171	10425 0845 12-1-88	125 29 30	3 4	Very dense, gray poorly graded sand (10yr 4/1) wet, no gravel 70.25' Very dense, well graded gravel sand mixture gray (10yr 4/1) moist (gravel to .75 in.)	SP GW	N/A	Hnu = 0ppm α = 0cpm β = 30-100 cpm
172							
173							
174							
175	10426 1130 12-1-88	35 80+	20	Very dense, well graded sandy gravel, gray (10yr 4/1) very wet (gravel to 3 in.) Very dense: poorly graded fine sand, gray (10yr 4/1) wet	GW SP	N/A	Hnu = 0ppm α = β = 20 cpm
177							
178							
179							
180	10427 1400 12-1-88	22 22 17	10	Dense, gray (10yr-4/1) med to poorly graded sand with some gravel. wet (gravel to .5 in.)	SP	N/A	Hnu = 0ppm α = β = 80cpm
181							
182							
183							
184							

NOTES: No α readings from 175 ft to 220.75 ft due to meter malfunction. WAH 2-2-89

598

REVIEWED BY QA [illegible] DATE: AUG 27 1991

2731

	Initial	Date
1st Key In	[illegible]	12-1-89
2nd Key In	[illegible]	12-1-89
Hard Copy Verification		

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald - RI/FS		
BORING NUMBER: ~~4064~~ 4967	COORDINATES: Surf	DATE: 12-1-88	
ELEVATION: 593.0 Ft.	GWL: Depth / Date/Time	DATE STARTED: 11-15-88	
ENGINEER/GEOLOGIST: L. Adams	Depth / Date/Time	DATE COMPLETED: 12-5-88	
DRILLING METHODS: Cable Tool		PAGE 4 OF 6	

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
186	10428 1630 12-1-88	73 50+	7	Very dense, gray (10 yr 4/1) well sorted sand. (Grain size to .25 in.) wet -only able to push spoon 7 inches-	SW	N/A	Hnu = 0 ppm α = β = 80 cpm
187							
188							
189							
190	10429 0900 12-2-88	13 21 37	10	~~Brownish gray~~ Very dense, (10 yr 4/2) poorly sorted sand some gravel, wet. (grain size to .4 in)	SP	N/A	Hnu = 3 ppm α = β = 80 cpm.
191							
192							
193							
194							
195	10430 0840 12-3-88	7 18 40	10	Very dense, brownish gray (10 yr 4/2) poorly sorted sand with some gravel wet, (grain size to .5 in.)	SP	N/A	Hnu = 0 cpm α = β = 10
196							
197							
198							
199							

NOTES:

FERNALD RI/FS

REVIEWED BY QA [signature] ~~DATE~~ AUG 27 1991

2731

1st Key In		
2nd Key In		
Hard Copy Verification		

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald RIFS		
BORING NUMBER: ~~4067~~ 4961	COORDINATES: See pl	DATE: 12-3-88	
ELEVATION: 593.0 ft.	GWL: Depth Date/Time	DATE STARTED: 11-15-88	
ENGINEER/GEOLOGIST: L. Adams	Depth Date/Time	DATE COMPLETED: 12-5-88	
DRILLING METHODS: Cable Tool		PAGE 5 OF 6	

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
201	10431 1530 12-3-88	23 21 18	8	Dense, med. to well sorted gravelly sand. Gray (10yr 4-2) wet. (Gravel to .7 in.)	SW	N/A	Hnu = 0 α = β = 80 cpm
202							
203							
204							
205							
206	10432 0930 12-4-88	18 22 25	12	Dense, gray (10yr 4/2) med to well sorted gravelly sand. (Gravel to .5 in.) wet	SW	N/A	Hnu = 0ppm α = β = 80 cpm
207							
208							
209							
210							
211	10433 1315 12-4	21 17 26	18	Dense, brownish gray (10 yr - 4/2) med. to well sorted gravelly sand. Gravel to .5 in. wet.	SW	N/A	Hnu = 0ppm α = β = 80 cpm
212							
213							
214							

NOTES:

600

FERNALD RI/FS

REVIEWED BY QA [illegible] DATE AUG 2 7 1991

2731

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald RIFS		
BORING NUMBER: ~~4067~~ 4967	COORDINATES: Seep 1	DATE: 12-8-88	
ELEVATION: 593.0 Ft.	GWL: Depth	Date/Time	DATE STARTED: 11-15-88
ENGINEER/GEOLOGIST: L. Adams	Depth	Date/Time	DATE COMPLETED: 12-5-88
DRILLING METHODS: Cable Tool			PAGE 6 OF 6

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
216	10434 1515 12-4	19 32 50	12	very dense, gray (10yr 4-1) poorly graded gravelly sand. moist (Gravel to .25 in.)	SP	N/A	H_{Am} = 0ppm α = β = 80 cpm
217							
218							
219							
220							
221	10435 1000 12-5	48 50+	18	Very dense, brown gray (10yr 4/2) poorly graded gravelly sand. wet, some blue clay., 1in. bedrock (limestone/shale) pieces gravel to .5 in.	SP	N/A	H_{Am} = 0ppm α = β = 80 cpm
222							
223				Reached bedrock at 220.75'			
224							
225							
226							
227							
228							
229							

NOTES:

FERNALD RI/FS

RECEIVED 6/23/89

REVIEWED BY QA _____ DATE AUG 2 7 1991

VISUAL CLASSIFICATION OF SOILS

Field Check	WAH	2-89
1st Key In	[illegible]	3/28/89
2nd Key In	[illegible]	6-15-89
Hard Copy Verification		

PROJECT NUMBER: 602 3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: 4067	COORDINATES: See 21	DATE: 1-5 Through 1-19-89
ELEVATION: 593.0 GL estimate	GWL: Depth Date/Time	DATE STARTED: 1-5-89
ENGINEER/GEOLOGIST: See Notes	Depth Date/Time	DATE COMPLETED: 1-19-89
DRILLING METHODS: Cable Tools		PAGE 1 OF 3

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (N/A)	RECOVERY (N/A)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	2731 WAH 3-3-89 REMARKS
50				See Visual Classification of Soils Log For Boring 4967 for sample description to 221.5 Ft.			
100							
150							
200							
250				Bottom of Boring 4067 is 220.7 Ft.			

NOTES: Personnel involved in supervision of this boring: K. Hemlein, L. Adams, M. Slusarski, S. Moore. This page was completed by W.A. Hartel on 2-10-89

602

602-11-86

FERNALD RI/FS

REVIEWED BY QA [signature] DATE AUG 2 7 1991

2731

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
PROJECT NO. 602 3.2
BORING NO. 4067
PIEZOMETER NO. 4067

FIELD ENG./GEO. M. SLUSARSKI DATE 02-01-89
CHECKED BY W. Herkel DATE 2-9-89
DATE OF INSTALLATION 01-20-89 TO 01-26-89, 01-31-89
INSTALLATION COMPLETED 01-31-89

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 FT. TO 220.7 FT.
FLUID — FROM — TO —

TYPE OF BIT HAMMER
CASING SIZE (S) USED:
SIZE 10.0 IN ID FROM 0.0 FT TO 100.0 FT.
SIZE 8.0 IN ID FROM 0.0 FT. TO 220.0 FT

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 IN ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN ~~[X]~~ WAH 2-9-89
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 1.7 FT/2.0 FT/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 LOCKING CAP & LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT.)		ELEVATION ( )	
TOP OF RISER PIPE	2.0		591.0	
GROUND SURFACE	0.0		593.0	
BOTTOM OF PROTECTIVE PIPE	2.5		595.5	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY (VOLCLAY)	TOP 0.0	BOTTOM 191.0	TOP 593.0	BOTTOM 402.0
BENTONITE	TOP —	BOTTOM —	TOP —	BOTTOM —
SAND (10-20)	TOP 191.0	BOTTOM 212.0	TOP 402.0	BOTTOM 381.0
GRAVEL None Used WAH 2-9-89	TOP —	BOTTOM —	TOP —	BOTTOM —
PERFORATED SECTION	TOP 200.0	BOTTOM 210.0	TOP 393.0	BOTTOM 383.0
PIEZOMETER TIP	211.7		381.3	
BOTTOM OF BOREHOLE	220.7		372.3	
GWL AFTER INSTALLATION	Not Checked WAH 2-9-89		—	

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

603

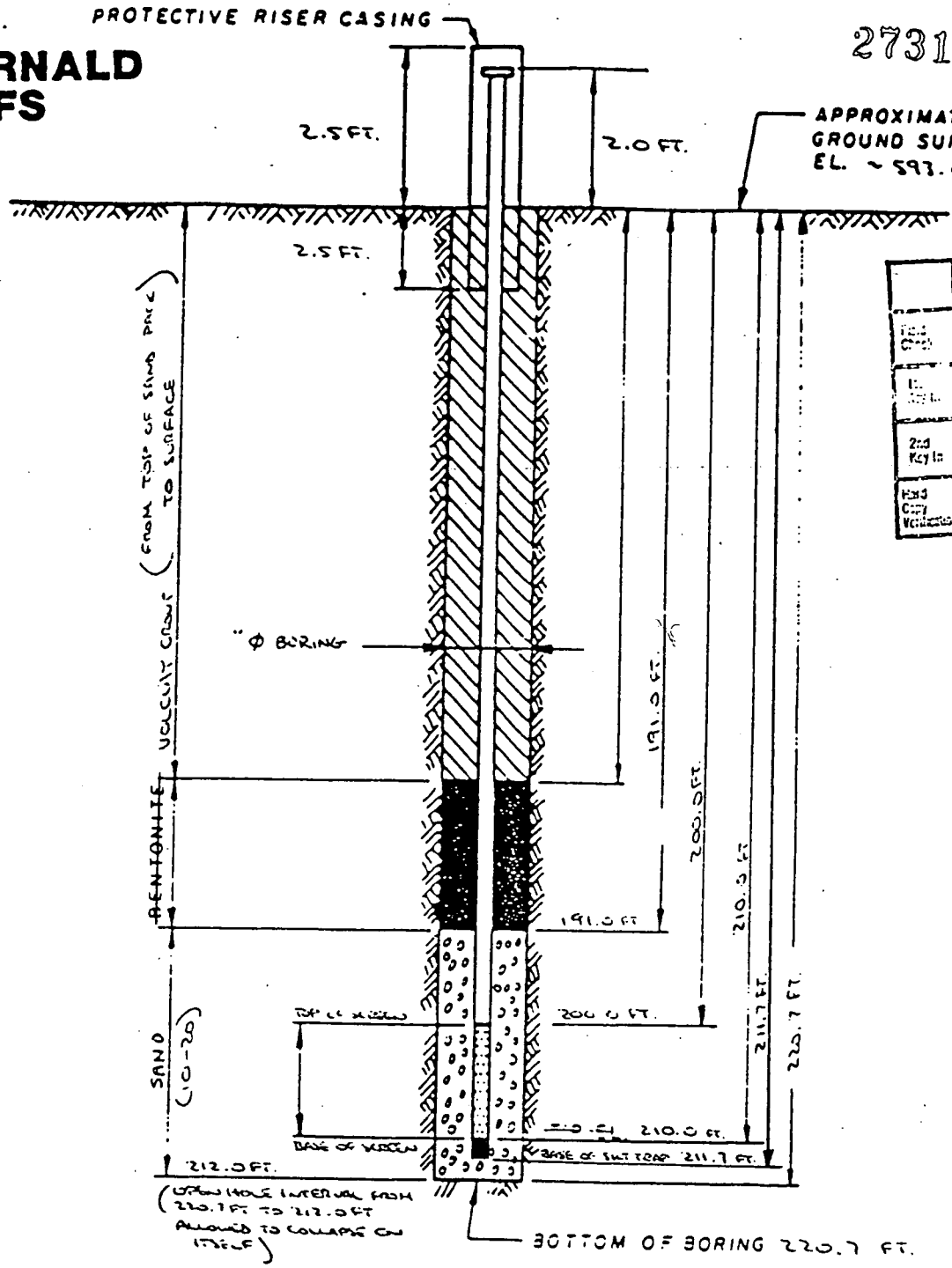
REMARKS OPEN HOLE INTERVAL FROM 212.0 FT TO 212.0 FT WAS ALLOWED TO COLLAPSE ON ITSELF. SIX (6) BUCKETS OF BENTONITE PELLETS WERE POURED AROUND THE PROTECTIVE CASING TO SERVE AS PACKING AND SEALING MATERIAL AT THE SURFACE.

DATE

BORING 4067

2731

FERNALD RI/FS



	Initial	Date
Field Check	JJH	2-7-89
Initial Key In		
2nd Key In		
Hand Copy Verification		

DRAWING NUMBER	2-7-89	JJH	CHECKED BY	APPROVED BY	HAS.	2-1-89	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.
4. ELEVATION OF WATER LEVEL
5. WATER LEVEL READING ON

MATERIALS USED DURING WELL INSTALLATION:

10-20 SAND : 7 - 80 LB SACKS

VOLCLAY GROUT : 66 - 50 LB SACKS

BENTONITE PELLETS : 6 BUCKETS

TOTAL WATER USED DURING DRILLING AND WELL INSTALLATION ACTIVITIES: 1920 GAL.

INSTALLATION DETAILS
MONITORING WELL 02-01-89

PREPARED FOR
BORING 4067 804

STAINLESS STEEL RISER PIPE: 1 - 2.0' SECTION
20 - 10.0' SECTIONS

STAINLESS STEEL WELL SCREEN : 1 - 10.0' SECTION

STAINLESS STEEL SILT TRAP : 1 - 1.7' SILT TRAP

APPENDIX E

APPENDIX E

LABORATORY ANALYTICAL PROCEDURES

APPENDIX E

Laboratory Analytical Procedures

Groundwater samples, collected for the RCRA GMP, are currently analyzed by the National Environmental Testing (NET) Laboratory in Dayton, Ohio. NET currently operates many independent environmental divisions in the United States. NET offers analytical services for metals, extractable and organic compounds, and other conventional pollutants in support of various federal, state, and local regulations and policies. The FEMP is in the process of obtaining the use of a CLP Mixed Waste Laboratory.

The National Environmental Testing Laboratory Quality Assurance Program Plan is included as Attachment 1 of this document. All analytical protocols used at NET are documented in established analytical procedures that are taken from the following sources where applicable: Standard Methods for the Examination of Water and Wastewater, 16th ed., 1985; EPA 600; SW 846, 3d edition, Code of Federal Regulations; ASTM; Surface Mining Procedures, USGS. NET reports that their quality control program meets all the requirements of the current EPA procedures for potable water, wastewater, hazardous waste, and priority pollutant analysis.

The laboratory has its own courier service. The courier will sign off on the chain-of-custody forms for each sample. Sample coolers are stored in a large, walk-in refrigerator maintained at 4°C. Building security is maintained at all hours by a commercial system.

The laboratory utilizes a computerized sample log-in procedure to guarantee sample integrity. Chain-of-Custody and Request for Analysis are compared to confirm agreement. Individual seals are checked for security. Readings from the maximum/minimum thermometers are recorded on the corresponding Request for Analysis documents. The lab maintains historical documentation of all testing activity including hard copy reports, magnetic disc, and tape archives. All GC/MS data is archived on nine-track magnetic tape per USEPA protocol.

Overview of NET QA Protocols for Wet Chemistry Analyses

Instruments at NET are calibrated with three levels of QC standards that cover the linear working range of the parameter analysis. After calibration, an accuracy check standard is analyzed. If all of these standards meet the acceptance criteria, then samples are analyzed. After every five samples, a continuing calibration standard is run. If the samples have undergone a digestion prior to instrumental analysis, a digested standard is also analyzed after every five samples. If the standards fail to meet acceptance criteria, the samples must be repeated. Standards are analyzed after every five samples. Method blanks, spikes, and duplicates are run a minimum of one per twenty samples for routine parameters.

Overview of NET QA Protocols for Metals Analyses

Instruments at NET are calibrated over the linear working range of the parameter analysis with a minimum of three levels of standards. Three calibration check standards made from a separate stock solution are run as QA standards to verify calibration. A continuing calibration standard is run after every fifth analysis. If acceptance criteria are not met, the instrument is recalibrated and the affected samples are repeated. Reagent blanks, duplicate samples, and spiked samples are prepared and analyzed at a minimum of one per twenty samples.

Overview of NET QA Protocols for Organic Analyses

At NET, Organochlorine Pesticides, PCBs, and Herbicides are analyzed by gas chromatography (GC). The instruments are calibrated with five to six levels of standards prior to the start of sample analysis. The calibration is followed by the analysis of a GC standard. If the protocol acceptance criteria are met, sample analysis begins. After every ten samples a QC standard is analyzed, with recovery of true value to be +-20 %. One reagent blank is analyzed and one spiked sample is prepared for every ten samples. USEPA standards are analyzed as QA checks of the external standards. Aqueous samples are extracted within seven days of sampling. All analyses are performed within 28 days of extraction.

Volatile organic compounds are analyzed by GC/mass spectroscopy (MS). The instruments are calibrated with five levels of calibration standards. The relative standard deviation (RSD) of the Response Factors (RF) over the range of the calibration cannot exceed 25%. Three internal standards are added to every sample, as well as three surrogate compounds whose percent recoveries are monitored for QC purposes. A method blank is run with each sample group. A spiked sample or a USEPA standard is analyzed after every ten samples. A Bromofluorobenzene (BFB) tune check is performed with each sample analysis. The instruments are auto-tuned if the tune check acceptance criteria are not met, and a calibration check standard is run to verify calibration. All samples are analyzed within 14 days of sampling.

A reagent blank is extracted with each set of samples. One spiked sample or one USEPA standard is analyzed per ten samples. A calibration check standard is run per ten samples analyzed. A minimum of one DFTPP/BFB tune check is performed on each instrument per day. If the tune check criteria are not met, the instrument is auto-tuned and a calibration check standard is run to verify calibration. Aqueous samples are extracted within seven days of sampling. All analyses are performed within 28 days of extraction.

The analytical method is chosen based on the level of contamination of the samples. All QA/QC criteria established for other GC and GC/MS procedures are followed during the analysis of these samples. Aqueous samples are extracted within seven days of sampling. All analyses are performed within 28 days of extraction. Volatile TOX analyses are performed within 14 days of sampling.

ATTACHMENT 1

ATTACHMENT 1

2731

NATIONAL QUALITY ASSURANCE PLAN

NET ®

National Environmental Testing, Inc. (NET)
Corporate Headquarters
220 Lake Drive East, Suite 301
Cherry Hill, New Jersey 08002
(609)-779-3373

609

2731

TABLE OF CONTENTS

Section Page

1. TITLE, SIGNATURES and TABLE OF CONTENTS.....1 - 3

2. INTRODUCTION & SCOPE.....4

3. QUALITY ASSURANCE POLICY STATEMENT.....5

4. QUALITY ASSURANCE MANAGEMENT.....6 - 12
4.1 Introduction.....6
4.2 Assignment of Responsibilities .....6 - 10
4.3 Communications 11
4.4 Program Assessment 11
Figure 4.1 NET QA Organizational Structure 12

5. FACILITIES, EQUIPMENT & SERVICES.....13

6. QUALITY ASSURANCE PLANS.....14
6.1 Quality Assurance Plans.....14
6.2 Quality Assurance Project Plans.....14

7. STANDARD OPERATING PROCEDURES (SOPs).....15

8. INTERLABORATORY TESTING PROGRAM (ITP) Overview.....16

9. DATA PROCESSING.....17

10. DATA QUALITY ASSESSMENT.....18 - 20
10.1 Definitions 18
10.2 General Requirements 19
10.3 Other Specific Requirements 19

11. CORRECTIVE ACTION.....21

APPENDIX A - SOP Scope and Format.....22 - 23

APPENDIX B - ITP.....24 - 36
B.1 Communications .....25 - 26
B.2 Data Quality Assessment.....27 - 30
Table B-1 Grubbs Test for Outlying Observations.....30
B.3 Corrective Action.....31 - 36
Figure B.2 Corrective Action Report (CAR).....33 - 35
Figure B.3 ITP Corrective Action Flow Chart.....36

2. INTRODUCTION & SCOPE

National Environmental Testing, Inc. (NET) currently operates many independent environmental laboratory Divisions in the United States. Services consist primarily of multimedia analysis for metals, extractable and volatile organic compounds, and other conventional pollutants. These services are performed in support of various federal, state and local regulations and policies.

NET's Quality Assurance Plan is based on the belief that quality is the key to maintaining leadership in the environmental analytical industry. We are committed to providing our customers with consistently high quality services. The purpose of this document is to describe the essential elements of the Quality Assurance (QA) programs NET employs to ensure a national standard of quality at all of our laboratories.

Specifically, these QA programs include:

- a Quality Assurance Plan (QAP) for each NET Division describing its capabilities, quality assurance objectives and the systems for meeting those objectives. In addition, Quality Assurance Project Plans (QAPP) may be developed for specific client or project needs;

- Standard Operating Procedures (SOPs) for instrumentation, field services, analytical services and applicable administrative systems; and,

- a consistent national quality control program which includes analysis of blanks, spikes, duplicates, the use of calibration verification standards and participation in NET's Interlaboratory Testing Program (ITP).

In addition to these programs, NET provides the following resources to support our employees in their efforts to deliver quality services:

- a Divisional, Regional and Corporate QA management structure;

- a laboratory information management system (LABSYS);

- laboratory facilities and instrumentation; and,

- development and implementation of ongoing training programs.

3. QUALITY ASSURANCE POLICY STATEMENT

NET subscribes to the following policies as its standard of quality in its analytical program:

- It is our policy to maintain a national QA Program throughout all NET laboratories, thereby providing our clients with consistent data of known high quality;

- It is our policy to communicate the scope and content of our QA Program internally to our employees and to train each employee in the application of our Program;

- It is our policy that no data will be reported to our clients that has not met our full QA requirements;

- It is our policy to remove from commercial offering any analysis offered by a NET laboratory when that laboratory fails to demonstrate that it can consistently perform that analysis to NET's high quality standard based upon our Interlaboratory Testing Program; and,

- It is our policy to resolve to the client's full satisfaction any questions concerning the validity or accuracy of analytical data reported by NET to the client.

4. QUALITY ASSURANCE MANAGEMENT

4.1 Introduction

The success of this QA Plan requires the cooperative efforts and support of all personnel--Divisional, Regional and Corporate. The primary responsibility for data quality rests with the analyst in performing frequent and regular quality control checks on the work he/she does. This program is designed to support and coordinate these efforts at the bench level. The organizational structure related to quality assurance nationally is shown on Figure 4.1 and specific responsibilities related to quality assurance are as follows.

4.2 Assignment of Responsibilities

4.2.1 The Analysts shall:

- Adhere to analytical and QC protocols prescribed by Regionally approved SOPs and QAP/QAPPs;
- Review analytical QC data on a daily basis;
- Correct out of control analyses if possible; otherwise, seek the Supervisor's help immediately; and,
- Suggest improvements in methodologies to Supervisors and Quality Assurance personnel. These improvements, if approved, will be incorporated into SOPs.

4.2.2 The Supervisors shall:

- Train new analysts in methodologies using Regionally approved SOPs;
- Ensure compliance with Regionally approved SOPs, and QAP/QAPPs, including quality control measures they prescribe;
- Investigate and assist the analyst in correcting an out of control analysis and document the investigation to the Division Manager and the Division QA Coordinator;
- Review and evaluate data produced by analysts prior to reporting; and,
- Communicate with other NET Supervisors with similar areas of responsibilities.

4.2.3 The Division Quality Assurance Coordinator will:

- Carry out the National and Regional QA Programs, including the development of SOPs and QAP/QAPPs;
- Educate analysts in quality control measures for all analyses in coordination with the analyst's Supervisor;
- Make recommendations to Division Managers for corrective action and methodology improvement;
- Evaluate quality control data and documentation throughout the laboratory;
- Conduct and assist in audits, internally and externally;
- Work closely with the Division Manager and the Regional QA Manager to resolve quality related issues;
- Coordinate the Division's participation in the ITP and review and submit corrective action reports to the Division Manager; and,
- Serve as a repository for all Division SOPs, QAP/QAPPs, proficiency evaluation results and certification and licensing documentation.

4.2.4 The Division Managers shall:

- In the absence of a Division QA Coordinator, assume all responsibilities of the Division QA Coordinator position;
- Ensure that the operational requirements of this Plan and supporting programs are met;
- Manage the on-going requirements of Quality Assurance and Quality Control activities through Supervisors and Division QA Coordinators;
- Edit, approve and assure the implementation of SOPs, QAPs and QAPPs;
- Ensure that ITP samples are handled as directed and provide written notice to the Regional QA Manager and the Corporate QA Director if an analysis the Division normally performs cannot be conducted on a particular ITP sample; and,
- Review and submit corrective action reports to the Regional QA Manager.

2731

4.2.5 The Regional Quality Assurance Manager shall:

- Manage Regional Quality Assurance Activities;

- Coordinate communications regarding any quality related issue, including customer/regulatory audits, PEs and certification activities within the Region between Divisions and the Corporate QA Director;

- Review and coordinate corrective action reporting from Divisions identified as having out of control analyses to the Regional General Manager and the Corporate QA Director;

- Ensure that a supply of performance evaluation samples (PEs) for all parameters tested in the ITP is available. These PEs are to be submitted to the appropriate Division Manager as a part of Level One corrective action (see Appendix B);

- Be the repository for all SOPs, QAPs, accreditations and certification correspondence within the Region;

- Conduct systems and performance audits as required by the Regional General Manager or national QA programs;

- Manage, direct the writing and editing of and approve Regional and Division SOPs, QAPs and QAPPs; and,

- Maintain a record of revision numbers and revision dates for the documents addressed in this Plan and control the distribution of these documents.

4.2.6 The Regional President/General Manager shall:

- Direct Regional Quality Assurance Programs;

- Ensure that sufficient personnel resources are available at the Regional and/or Division level to implement this plan. This includes making sure that the Regional Quality Assurance Manager has sufficient resources in time and direction to effect continuing improvements in data quality and that appropriate staffing is available to complete the writing and verification of SOPs and QAPs;

- Require Divisions to comply with and provide input on SOPs and QAP/QAPPs used within the Region;

- Prepare and ensure timely delivery of Regional Corporate Action Plans (RCAPs) as a part of Level Two corrective action when required; and,

- Remove analyses from Division product lines as outlined in Appendix B.

615

2731

4.2.7 The Director of Data Information Systems shall:

- Assist the Divisions, Regions, and Corporate office in implementing specifics of this Plan when computer resources are employed as directed by the Vice President of Technical Services; and,

- Coordinate the computer transfer of generic SOPs and QAP/QAPPs among the Divisions and Regions. He/She shall design and provide uniform directories, subdirectories and file nomenclature for these documents at every NET location.

4.2.8 The Corporate Quality Assurance Director shall:

- Manage the ITP;

- Make biannual written reports to the Corporate Officers, Regional General Managers and the Regional QA Managers regarding the implementation of this QA Program;

- Be the repository for all Division QAPs that conform to the requirements of this document;

- Assist in writing and initiating NET Standard Operating Procedures (SOPs) and QA Plans (QAPs);

- Be the respository of all external performance evaluation (PE) results in which NET Divisions participate;

- Perform pre-acquisition laboratory audits as directed by the Vice President of Business Development or routine audits as directed by the Vice President of Technical Services; and,

- Monitor certification status and assist Regions and Divisions with certification activities.

4.2.9 The Vice President of Technical Services shall:

- Ensure that the specific requirements of this Plan are met as detailed in the Programs this Plan addresses;

- Designate tasks to the Quality Assurance Director to carry out specific Programs identified in this Plan;

- Conduct systems and performance audits at his or her discretion, or authorize the Corporate Quality Assurance Director to do so;

616

- Determine the analytical scope of the Interlaboratory Testing Program (ITP);

- Reauthorize analyses to a Division's product line that have been removed by the Regional General Manager as outlined in Appendix B. He or she shall have the authority to remove analyses that the Regional General Manager fails to remove as outlined in Appendix B;

- Oversee and direct QA and QC issues related to data systems management, development and reporting; and,

- Provide, upon request, technical support for identification and resolution of data quality related issues arising from this Plan.

4.2.10 The President shall:

- Communicate management support of this Plan to all levels of the organization.

4.3 Communications

The NET Corporate office supports an "open door" communications policy: every NET employee has free access to the Corporate office. Additionally, this Plan supports using resources (people in particular) at all levels; appropriate, frequent, effective communication is encouraged throughout NET. In addition, specific documents relating to this Plan are available to all employees, including:

- Quality Assurance Programs to address specific areas identified in this Plan. Programs exist for SOPs, QAPs, and the ITP and these have been incorporated into this Plan. Other Programs may be developed at the discretion of the Vice President of Technical Services.

- Quality Assurance Policies to address specific quality related items outside the scope of existing Programs.

4.4 Program Assessment

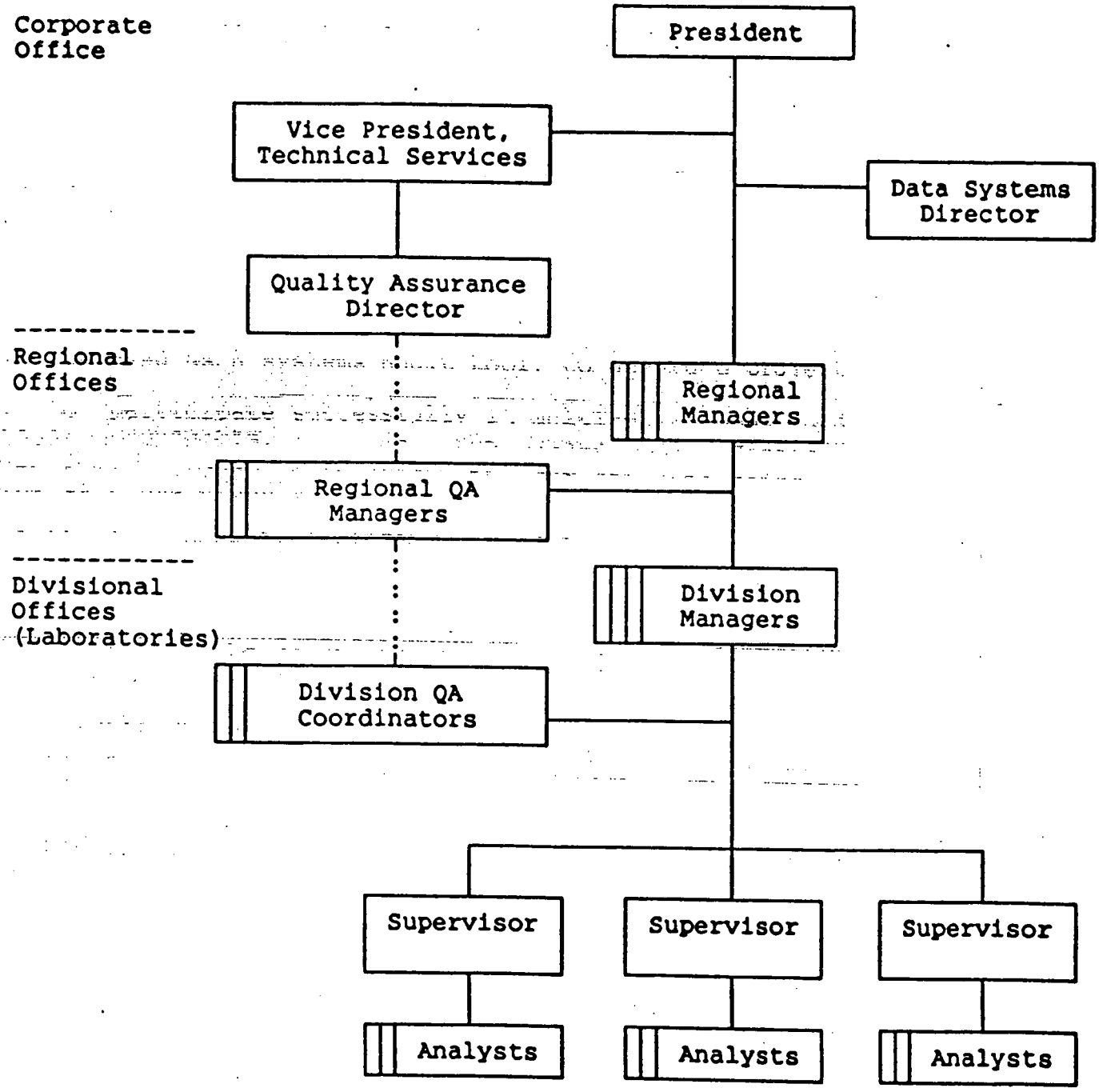
The Biannual Corporate QA Report will address all elements of this Plan. The Biannual Corporate QA Report specifically will address:

- Status of or Changes to this QA Plan or its Programs
- Status of QAPs and SOPs
- Measures of Data Quality other than the ITP
- Significant QA Problems, Accomplishments and Recommendations
- Results of Systems Audits
- Status of QA Requirements for Contracts and Grants
- Summary of QA Training Programs and Their Effectiveness
- Status of Divisions' Certifications
- Data Quality as Measured through the ITP and other Measurement Systems

2731

FIGURE 4.1 NATIONAL ENVIRONMENTAL TESTING, INC.

Quality Assurance Organizational Structure



6. QUALITY ASSURANCE PLANS

6.1 Quality Assurance Plans (QAPs)

Each Region or Division will, with the direction and assistance of the Regional Quality Assurance Manager and the Division's Quality Assurance Coordinator, develop at least one Quality Assurance Plan describing the standard level of service each Division provides; this document will be called the Quality Assurance Plan (QAP). These QA Plans will be maintained at the Regional and Corporate Offices on the Altos computers. The Division QAP will be the QA Manual for that Division. The NET guidance document for preparing QAPs is:

> Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, (QAMS-005/80, 12/80), USEPA

The QAP will be used as a systems audit tool, to generate project specific Quality Assurance Project Plans (QAPPs) for larger customers, to participate successfully in multi-divisional and multi-regional contracts, as the basis for verifying contractual specifications with customers, and for certification applications to state agencies.

6.2 Quality Assurance Project Plans (QAPPs)

Several NET laboratories have specialized operations, including mobile laboratories, food testing, stack testing, and industrial hygiene monitoring. For each of these areas and for specific environmental projects, a single Quality Assurance Project Plan (QAPP) will be completed by each NET Division. Guidance documents for QAPPs include:

> Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, (QAMS-005/80, 12/80), USEPA

> DER Guidelines for Preparing Quality Assurance Plans, State of Florida (DER QA-001/85)

7. STANDARD OPERATING PROCEDURES

Each Region or Division, with the assistance and direction of the Regional Quality Assurance Manager, will develop SOPs for all analytical activities in which the laboratory participates. Whenever possible, SOPs must be based on federal, state, or local approved methods. SOPs will be used in training, in identifying and correcting problem analyses, in methodology improvement, and in procedural audits.

The NET guidance document for preparing SOPs is the SOP Program contained in Appendix A.

In addition to analytical SOPs, SOPs will be developed through the Regional and/or Corporate Offices for the following operations which have an impact on data quality:

- Sample Management
- Reagent/Standard Preparation
- General Lab Techniques
- Equipment Calibration and Maintenance
- QC Data
- Corrective Action
- Data Reduction and Validation
- Reporting
- Records Management
- Waste Disposal
- Health & Safety

Regions may incorporate SOPs into their QAPs or incorporate them by reference.

8. INTERLABORATORY TESTING PROGRAM

The objective of the Interlaboratory Testing Program (ITP), in conjunction with other NET QA programs, is to continuously monitor and improve NET data quality. The ITP consists of periodic double blind performance evaluation samples which are analyzed by each NET Division. Results of these analyses are evaluated by an independent vendor. In addition, statistical evaluation of each NET Division is performed by the Corporate Quality Assurance Director to identify potential problems at each Division. Resources throughout NET are devoted to correction of problems so identified. More details on the ITP are presented in Appendix B.

9. DATA PROCESSING

9.1 Collection

NET's LIMS (LABSYS) will be capable of accepting direct transfer of data from computerized instrumentation systems. This interface will be programmed to check for approval of data.

9.2 Validation

Data validation is defined as the process whereby data are accepted or rejected based on a set of criteria. This aspect of Quality Assurance involves establishing specified criteria for data validation. The QAP will indicate the specified criteria that will be used for data validation and these will be contained in the applicable analytical SOPs as well.

9.3 Storage

At every stage of data processing in which a permanent collection of data is stored, procedures must be established to ensure data integrity and security. QAP/QAPPs must indicate how specific types of data will be stored with respect to media, conditions, location, retention time, and access.

9.4 Transfer

QAP/QAPPs will describe procedures which will be used to ensure that data transfer is error-free (or has an admissible error rate), that no information is lost in the transfer, and that the input is completely recoverable from the output. QAP/QAPPs will indicate a minimum number of data transfer steps in the processing of data.

9.5 Reduction

Data reduction includes all processes which change either the form of expression or quantity of data values or numbers of data items. This category includes validation, verification, statistical and mathematical analysis. It is distinct from data transfer in that it involves reducing the size or dimensionality of the data set.

Validation of the data reduction process itself must be addressed (i.e. software validation) appropriate to the level of effort involved. Common to each type of processing is the capability of a reviewer to reliably check the validity of this conversion process against some prescribed methodology which will be contained in the analytical SOP.

10. DATA QUALITY ASSESSMENT

It is NET's objective to consistently produce data of adequate accuracy, precision, completeness, representativeness, and comparability.

10.1 Definitions

Accuracy - The measure of the degree of agreement between and analyzed value and the true or accepted reference value. Accuracy is measured as a comparison between the analyzed value and the true value and is usually expressed in terms of error, bias, or percent recovery.

Precision - The estimate of variability of measurements. Common analytical terms used to describe precision include repeatability which is associated with a single analyst (within laboratory), and reproducibility, which is associated with different analysts in different laboratories. Precision measures include standard deviation, coefficient of variation, or relative percent difference.

Completeness - The measure of amount of valid data obtained from the analytical measurement system. Completeness is expressed as a percentage of the number of valid measurement that should have been or were planned to be collected.

Representativeness - The measure of how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the sample.

Comparability - The measure of how closely sample data generated by NET compares with sample data generated by another laboratory or laboratory group.

Performance audits provide a systematic check of a laboratory's operations and measurement systems. For maximum usefulness, two types of performance evaluation (PE) samples are employed: a "single blind" and a "double blind".

Single blind - A sample which is known by all concerned to be a PE, but the true values of the analytes are unknown. The results of these samples are useful in determining technical systematic problems within the operating group.

Double blind - A sample which appears to be a routine client sample; the identity and values are both unknown to the laboratory. Double blind samples are useful in identifying technical systematic problems, random analytical problems, and nontechnical systematic problems.

10.2 General Requirements

The following quality control checks should precede sample analyses in the order presented where applicable. Methodologies and specific matrices may require additional QC checks. All QC checks performed, with specific quantitative acceptance criteria, will appear in analytical SOPs and QAP/QAPPs.

- Method blanks (contamination check): 1 per analytical batch or preparation process.

- Initial Calibration Verification Standard (independent reference required every calibration): 1 per calibration

- Continuing Calibration Verification Standard (one of the standards used for the calibration): daily

- Duplicate analyses (precision check - may be MS/MSD): 1 in 20 or analytical batch if the batch is less than 20 per day.

- Spiked samples (accuracy check): 1 in 20 or analytical batch if the batch is less than 20 per day.

10.3 Other Specific Requirements

10.3.1 Detection Limits

Detection limit studies in reagent water will be performed for all analyses offered at each Division. No analytical data will be reported less than the detection limit without a qualifying statement in the analytical report. Detection limit studies will also be performed upon addition of a new instrument or analytical method. Such studies will be performed in accordance with procedures incorporated into the method in question, or in accordance with an approved MDL SOP, or as in 40 CFR 136 Appendix B, Revision 1.11 where not otherwise available.

10.3.2 Calibration

Instrumental calibration curves will be generated at a frequency consistent with the instrument used and its stability. Calibrations will be prepared according to the SOP for each instrument or method employed.

10.3.3 Additional QC for ICP

In addition to the QC measures described above, the following performance check samples will be included in all ICP analyses, as required by the methods being used:

- Interference Check Sample
- ICP Interelement Correction Factors
- ICP Linear Ranges

10.3.4 Additional QC for GC/MS Analyses.

GCMS analyses must meet respective analytical (BFB for VOAs and DFTPP for SVOs) tuning criteria at a minimum of every twelve hours of operation.

11. CORRECTIVE ACTION

The Corporate office may be considered a technical resource for corrective action. The Corporate office may require corrective action based upon results of ITP sample analyses. Results from the following QA activities may also initiate corrective action:

- Performance audits
- Systems audits
- Failure to adhere to this QA Plan, its Programs, QAPs or SOPs

Corrective actions will be minimized through the use of internal controls at the analyst level on a daily basis.

It is the responsibility of quality assurance personnel to identify and report corrective action; it is the responsibility of managers at all levels to insure that the prescribed corrective action is operational.

SOPs, QAPs and the ITP all specify who is responsible for taking corrective actions, when corrective actions are to be taken, and who follows up to see that corrective actions have been taken and have produced the desired results.

Appendix A: SOP Scope and Format

SCOPE

NET's standard format will be applicable to all core chemical analyses which laboratories perform.

STANDARD FORMAT REQUIREMENTS

Cover. The cover of each analytical SOP will indicate that what follows is an NET Standard Operating Procedure. A "copyright #### NET" must appear on this page, along with:

- Identification of the analyte or suite of analytes to be measured (e.g. Volatile Organics in Waters and Soils)

- General information about the methodology employed in the procedure (e.g. GCMS)

- A reference citation of an EPA approved method that most closely approximates the SOP (e.g. Method 8240, SW-846, 1986)

- NET Region and Division(s) in which the SOP is used

- Revision # and date revised

- Location of and path on the Altos computer where the SOP is stored.

- Signature of the Division Manager and Regional QA Manager.

Pagination. Each page of the SOP will be consecutively numbered as "Page # of ##" where ## is the total number of pages. This will be in the upper right corner of each page along with the method number, revision number, and date of the revision.

Format. Every analytical SOP will address the following items as a minimum. The order that these items appear below is the preferred order.

1. Scope and Application
2. Summary of the Method
3. Safety
4. Reagents and Materials
5. Interferences
6. Analytical Procedures
7. Quality Control
8. References

Appendix B: ITP

2731

B.1 COMMUNICATIONS

Requests for ITP Sample Analyses from the QA Director shall be addressed to the Division Managers and Regional Quality Assurance Managers with copies to the Corporate Officers and Regional Managers. This request shall be received before the arrival of the sample(s) and will identify the origin of the samples, the parameters to be run, and reporting requirements.

Results of ITP Sample Analyses shall be reported by the QA Director to all Corporate Officers, Regional General Managers, Regional QA Managers within at most one month of the scheduled reporting date. This report shall include identification of the the out of control values reported as well as the control limits for all analyses. In addition, all values reported by all laboratories participating shall be included in this report. The QA Director may disregard all data for a single analysis based on statistical considerations. In this case, the analysis will be identified in the Results report with the reason for disregarding the analysis.

Corrective Action Reports (CARs) will be furnished to the QA Director by the Regional QA Managers with a concurrent signature from the Division Manager on corrective action taken for out of control Division analyses identified by the results report. CARs will identify a reference for analysis methodology, QC parameters and control limits appropriate to the analysis, a narrative discussion of likely causes of error, and a description of specific steps taken to correct the out of control analysis. In addition the CARs will include the results of the Division's performance on a Regionally managed PE administered to the laboratory by the Regional QA Manager. CARs will be due to the QA Director within two to four weeks of publication of the results of ITP sample analyses report. The due date for CARs shall be indicated in the results report.

Regional Corporate Action Plans (RCAPs) will be free-form reports by the Regional General Manager to the Quality Assurance Director and the Vice President of Technical Services for all analyses at Level Two corrective action that have not been resolved at the Division level. RCAPs will be due within one month of the latest out of control PE.

ITP Program Assessment

631

The Biannual Report will provide a narrative and quantitative assessment of the progress of the ITP. Annually, the QA Director and the Regional QA Managers shall make joint recommendations, as elicited from biannual meetings of quality assurance personnel,

to the Vice President of Technical Services and to NET's President on the effectiveness of the ITP and suggestions for this Program to be incorporated in future revisions.

B.2 DATA QUALITY ASSESSMENT

B.2.1 Introduction

The purpose of the NET ITP is to supplement, monitor, and improve Regional and Division quality assurance activities through the use of double blind samples submitted to all laboratories with applicable analytical capability. Every routine analysis cited in the scope of this plan will be evaluated through the ITP on a quarterly basis. Data generated from these samples subsequently is reported and statistically analyzed for conformance to the criteria stated in this document. Reports on performance shall be reported throughout NET. Problem analyses at the respective Divisions shall be noted in these reports and corrective action, depending on the history of the problem, will be implemented as explained in B.3.

B.2.2 General Control Limit Development

Data from all laboratories (including non-NET laboratories) participating in an ITP shall be used to determine control limits for any particular analyte. The methodology for determining control limits for an analyte is as follows:

1) The data is tested for outliers using the Grubbs T-test Table B.1. Outliers at the 5% significance level are then discarded from the data set for an analyte.

2) Using the remaining data, control limits are defined as plus or minus two standard deviations from the mean. These are the control limits for any ITP analyte. However, to account for differences in significant figures between reported values and control limits, reported values exceeding plus or minus 2.1 standard deviations from the mean will be the used to initiate corrective action.

The two standard deviation control limit may be changed upon agreement by the Vice President of Technical Services and the Corporate QA Director.

B.2.3 Organic Analyses

Since most organic analyses are a multicomponent analysis and the ITP tests an analytical operation rather than an analyte, the following analytical groups will be scored separately by the ITP: 1) Volatiles; 2) Semivolatiles; and, 3) Pesticides. The following algorithm adapted from the EPA's CLP program shall be used to generate a score for each of these analyses:

$$\text{Score} = 100 - \left[\frac{100}{x} \cdot (2A + B + C) + 2.2 \cdot (D + E) \right]$$

where x = the number of TCL compounds spiked into the sample

A = the number of spiked TCL compounds not identified

B = the number of TCL spiked compounds identified but misquantitated

C = the number of unspiked TCL compounds

D = the number of spiked non-TCL (TIC) compounds not identified

E = the number of unspiked TIC compounds identified

TCL = CLP Target Compound List

TIC = non-TCL Tentatively Identified Compound

An organic analysis shall be judged to be out of control if the overall score is less than 85% for the analytical group tested.

B.2.4 Scoring for the Biannual Report

Each department (metals, conventionals/wet chem, and organics) shall be weighted equally.

The percentage of correct analyses for each department will be calculated based on the total number of all analyses performed. Based upon the average of these departmental averages for the biannum, the laboratories will be ranked.

B.2.5 Special Rules

1) Data reported as less than the detection limit, when the laboratory's detection limit falls within or above the control limit range, shall be judged a correct analyses. If the laboratory's detection limit is less than the lower control limit and the analyte is reported as a non-detect, the analyte shall be judged out of control.

2) If more than 40% of the laboratories report an unspiked compound, that compound will not be considered for scoring purposes.

3) A laboratory not reporting an ITP analysis that it normally conducts and NOT providing notification i.e. not reported, shall be deemed to have an incorrect analysis (out of control).

2731

TABLE B.1 Grubbs Test for Outlying Observations

This test is useful for making statistical decisions on the rejection of outliers. The procedure for using it is as follows:

1. Rank the data in order of increasing numerical value.

$$X_1 < X_2 < X_3 < \ldots < X_{n-1} < X_n$$

2. Decide whether the smallest, X_1, or the largest, X_n, is suspected to be an outlier.
3. Estimate the standard deviation, s, of the data set (using all data).
4. Calculate the appropriate value of T as follows:

$$T = \frac{\bar{X} - X_1}{s} \quad \text{or} \quad T = \frac{X_n - \bar{X}}{s}$$

5. Select the risk you are willing to take for false rejection.
6. Compare T with values tabulated in this table, depending on n and the acceptable risk. If T is larger than the tabulated value, rejection may be made with the associated risk.

Values for Use in the Grubbs Test for Outliers

Number of Data Points	Risk of False Rejection 0.1%	0.5%	1.0%	5.0%	10.0%
3	1.155	1.155	1.155	1.153	1.148
4	1.496	1.496	1.492	1.463	1.425
5	1.780	1.764	1.749	1.672	1.602
6	2.011	1.973	1.944	1.822	1.729
7	2.201	2.139	2.097	1.938	1.828
8	2.358	2.274	2.221	2.032	1.909
9	2.492	2.387	2.323	2.110	1.977
10	2.606	2.482	2.410	2.176	2.036
15	2.997	2.806	2.705	2.409	2.247
20	3.230	3.001	2.884	2.557	2.385
25	3.389	3.135	3.009	2.663	2.486
50	3.789	3.483	3.336	2.956	2.768
100	4.084	3.754	3.600	3.207	3.017

Tabulated values obtained in part from ASTM E-178 which should be consulted for more extensive tables. Reference: F.E. Grubbs and G. Beck, "Extension of Sample Sizes and Percentage Points for Significance Tests of Outlying Observations," Technometrics, TCMTA, 14 (No. 4): 847-54 (November 1972).

2731

B.3 CORRECTIVE ACTION

At any corrective action level, the Corporate office may be considered a technical resource after exhausting other avenues. These requirements apply to a single analysis at a Division.

Level Zero - In Control Analysis

This is the ideal place to be. It represents no prior history of problem analyses (the past is forgotten). Note that Level Zero may be entered from any subsequent corrective action Level.

Level One - Any ITP Analysis Out of Control

Any ITP analysis judged out of control by B.2 will require submission of a CAR to the QA Director. This CAR will contain the results of an internal, blind PE sample managed by the Regional QA Manager, after corrective action has been taken. This PE must be a standard external to the calibration of the analysis; it must have had its true concentration assigned outside the Division and it must have documented acceptable control limits assigned to it.

Level Two - Two ITP Analyses Out of Control

Entry into Level Two can occur when:

1) The internal, blind sample required in Level One, administered by the Regional Quality Assurance Manager, can not be run within control limits and reported by the CAR due date, or,

2) Two consecutive corporate ITP analyses are out of control.

Level Two requires the following corrective action:

- A detailed SOP of the analysis in a required format.

- A Regional Corporate Action Plan (RCAP) from the Regional Manager to the QA Director and the Vice President of Technical Services identifying how he or she intends to bring the analysis in control. This report may be verbal, and is not constrained by any format other than that it must address and specifically attempt to resolve the problem analysis.

Level Three - Three ITP Analyses Out of Control

Level Three is reached when the next ITP analysis after Level Two is out of control. If Level Two action yields an in control ITP analysis, the Division reverts to Level Zero for the analysis. At Level Three, the Regional General Manager removes that analysis from the Division's product line, making every effort to subcontract the analysis within NET.

637

To exit Level Three, the Regional Manager petitions the Vice President of Technical Services for another ITP sample. The Division's analysis remains in Level Three until this ITP analysis is run successfully. An in control ITP sample analysis results in Level Zero status; the Division may run the analysis again for hire.

How to Complete the Corrective Action Report (CAR)

Section 1 of Part 1, "The Problem" should be filled-in using data from the QA Director's ITP #xxx Results Report, for those analyses that have been identified as out of control in that report.

For Section 2 of Part 1, "The Analysis", the Method Reference must cite an EPA approved analytical method, e.g. Method 8240, SW-846, 3rd Ed.; "Volatiles by GCMS" is NOT acceptable. Instrument ID and type must identify the manufacturer of the primary analytical instrument used, e.g. Perkin-Elmer, and the Model #, e.g. 6500, and the type, e.g. ICAEPS.

The "QC Indicator" is the most difficult to fill out because of a wide variability among methods. "CL" and "CL ref" refer to control limit and the reference from which the control limit was obtained respectively (the latter may be internally derived). A "continuing calibration standard" is a laboratory standard such as a mid-point calibration standard used daily or batchwise to verify the calibration has not drifted. "External standard verification" is an independent (of the calibration standards) reference standard such as those available from the Environmental Monitoring and Support Laboratory in Cinncinati.

2731

Figure B.2 Corrective Action Report (CAR)

NATIONAL ENVIRONMENTAL TESTING, INC.

Corrective Action Report

DATE:

TO: QA Director
cc:
RE: Out-of-Control ITP Value Reported

FR: _____

Division: _____ Dept: _____

Analysis: _____ ITP#: _____

True value: _____ Reported value: _____ Units: _____

Control limits (CLs): _____ CL ref: APG; 2*stdev

Method reference & #: _____

Instrument ID and type: _____

Problem Identification - Check ALL Boxes That Apply

- [ ] Training
- [ ] Supervision
- [ ] Method not followed
- [ ] Login
- [ ] QC not performed
- [ ] Reporting
- [ ] QC CLs ignored
- [ ] Laboratory contamination
- [ ] Detection limits problems
- [ ] Instrument or service problem
- [ ] Dilution or calculation
- [ ] Standards supplier problem
- [ ] Other _____
- [ ] Unknown

Corrective Action Taken: 1. _____

639

Regional QA Manager

Section Supervisor

QA Manager

Division Manager

2731

NATIONAL ENVIRONMENTAL TESTING, INC.

Corrective Action Report Part Two

DATE:

TO: QA Director

cc:

RE: Regionally Administered PE Results

FR: Regional Quality Assurance Manager

ITP#:_____ Analysis:_____ Division:_____

PE Sample Source: _____

PE True Value: _____ PE Control Limits: _____

Control Limit reference: _____

Laboratory Result: _____

Date of PE Analysis: _____

Was the PE Single Blind? _____ Double Blind? _____

Is the Analysis now in Control: _____

Comments: _____

_____

_____

_____

_____

_____

640

_____
Regional Quality Assurance Manager

2731

Corrective Action Report - Quality Control Indicators

ITP#:_____ Anaylsis:_____ Division:_____

DETECTION LIMIT (DL)		METHOD BLANK		
Date run	Measured DL	Date	Concentration	Control Limit(CL)
Detection Limit Reference		Method Blank CL Reference		

EXTERNAL STANDARD VERIFICATION - INDEPENDENT REFERENCE

Date run	True Concentration	Measured Concentration	CLs
External Standard Control Limit Reference			

CONTINUING CALIBRATION VERIFICATION-ON-GOING CALIBRATION CHECK

Date run	True Concentration	Measured Concentration	CLs
LCS Control Limit Reference			

ACCURACY CHECK - SAMPLE SPIKE

Date run	Sample Conc.	Spike Conc. Added	Total Conc. Observed	Percent Recovery
Accuracy CLs	Accuracy Control Limit Reference			

PRECISION CHECK - SPIKE & SPIKE DUPLICATE OR SAMPLE & DUPLICATE

Date run	True Conc.	Relative % Difference (RPD)	RPD CL	RPD CL Reference

CALIBRATION

Date run	# of standards	Lowest standard Concentration	Highest standard Concentration
Calibration CL	Observed	Calibration CL Reference	

641

SIGNATURE _____ DATE _____

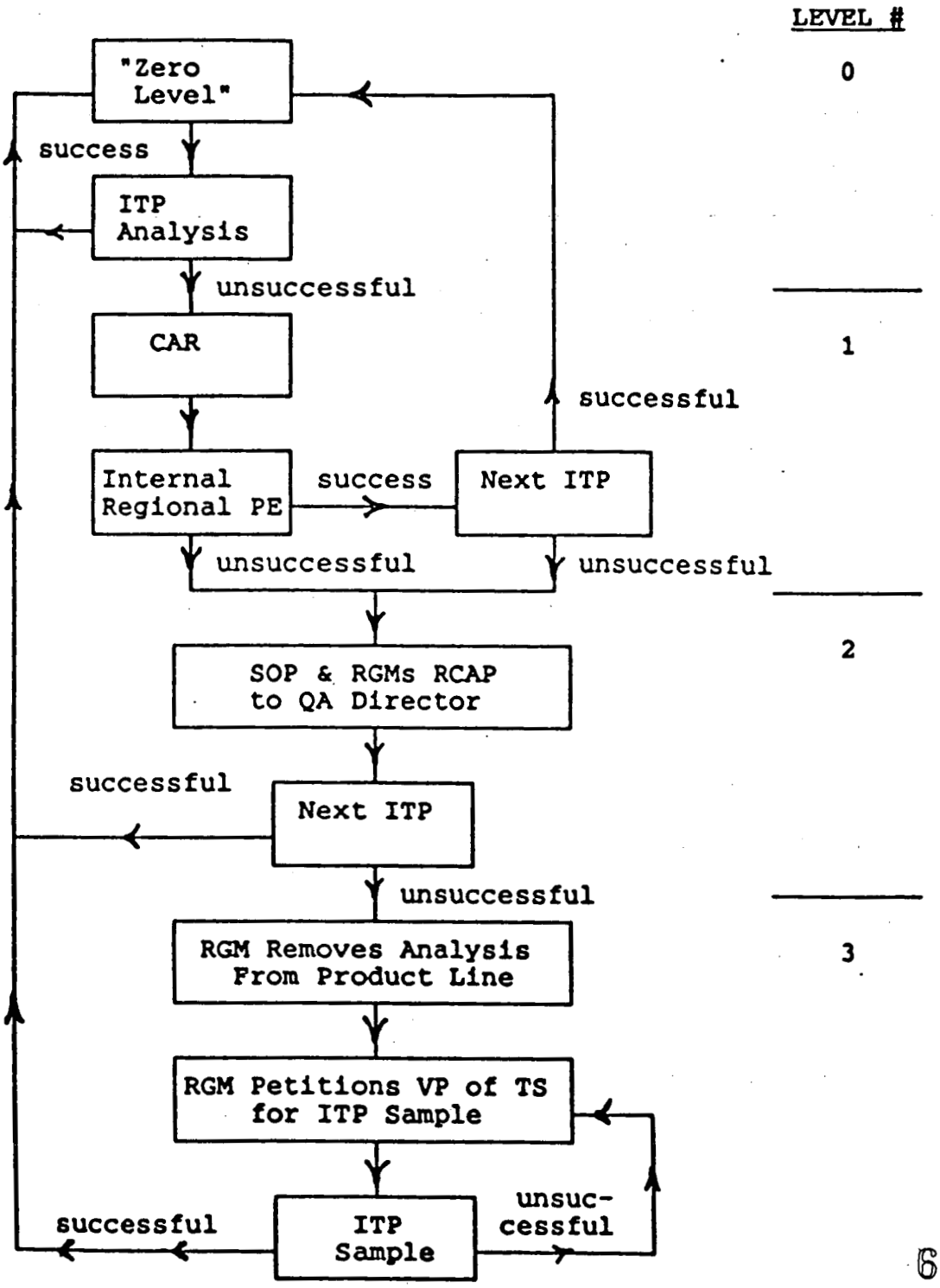



Figure B.3 ITP Corrective Action Flowchart