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U. S. ENVIRONMENTAL PROTECTION AGENCY MONTHLY TECHNICAL PROGRESS REPORTS

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ENCLOSURE

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REMEDIAL INVESTIGATION
AND
FEASIBILITY STUDY
FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

U.S. ENVIRONMENTAL PROTECTION AGENCY
MONTHLY TECHNICAL PROGRESS REPORTS

JANUARY 1988

FMPC SITEWIDE RI/FS
DECEMBER 1987
MONTHLY TECHNICAL PROGRESS REPORTS

STATUS

General

Progressive actions have continued on the FMPC sitewide RI/FS. Nine monitoring wells were completed, for a total of 35, bringing the total drilling footage to 2192.1. A meeting was conducted at USEPA-Region 5 on December 10 and 11, 1987 to review draft EPA comments on the Work Plan Rev. 1. Of a total of eighty-eight comments, sixteen required additional discussions to resolve the differences. At the conclusions of the meeting, FMPC and regulatory personnel had reached tentative agreement on all but three issues. Two of the remaining outstanding issues were the subject of a second meeting between FMPC and USEPA on December 21, 1987. Tentative agreements were reached regarding the methods by which two of these concerns may be resolved. Final EPA comments on the Work Plan Rev. 1 were received at the FMPC on December 28, 1987.

A site walkover was conducted by FMPC, USEPA, and OEPA personnel on December 15, 1987 to position the remaining on-site wells and the 15 additional off-site wells. RI/FS field activities were temporarily suspended from December 19 thru December 31, 1987 for the holidays.

Task 1 - Description of Current Situation

Task Completed.

Task 2 - RI Work Plan Requirements

On December 10 and 11, 1987, FMPC personnel met with USEPA and OEPA personnel in Chicago, Illinois. The purpose of the meeting was to address the second round of EPA comments on the FMPC RI/FS Work Plan and to focus on issues where the regulatory agencies and FMPC still disagree. Of a total of eighty-eight comments, sixteen required additional discussions to resolve differences. At the conclusion of the meeting, FMPC and regulatory personnel had reached tentative agreement on all but three issues. A second meeting was held between FMPC and USEPA personnel on December 21, 1987. Tentative agreements were reached regarding the methods by which two of these concerns may be resolved. The third issue remained open at the conclusion of the second meeting.

Final EPA comments on the RI/FS Work Plan were received at the FMPC on December 28, 1987. Submittal of comment responses and change pages is scheduled for completion and transmittal to USEPA by February 11, 1988.

Percent Complete: Original Deliverable - Complete
Revised Deliverable (1st Rev.) - Complete
Comment Response Round 2 - 10%
Revised Deliverable (2nd revision) - 10%

Task 3 - Site Investigation

Groundwater and Subsurface Soils - Drilling was completed at well locations 111, 181, 182, 178, 367, 343, 243, 127, and 227 during December. Additionally, 17 feet of drilling was completed at well location 125 and 142.6 feet of drilling was completed at well location 364. A summary of the wells and their completed depths appears in the following table:

RI/FS WELL LOCATION	COMPLETION DEPTH (ft)	
111	36.5	
181	33.0	
182	24.0	
178	34.6	
367	141.5	
343	126.5	
243	69.2	
364	142.6	(In Progress)
127	31.5	
227	76.5	
125	17.0	(In Progress)
Total:	715.5	

When added to the previously reported total drilling depth of 1476.6 feet, the total drilling footage through December 31, 1987 is 2192.1 feet. The casing and screen section of the above listed wells were installed as specified in the Work Plan.

A walkover survey was conducted by FMPC, USEPA, and OEPA personnel on December 15, 1987 to locate the additional on-site and off-site monitoring wells.

Transit Survey - Survey layout of 100 foot grids within the FMPC production area was completed during December. The staking of 1000 foot grid points was completed sitewide. Vertical and horizontal survey control was established sitewide during December to assist in locating recently installed monitoring wells.

Radiation Measurement Survey - Walkover surveys were continued north of the production area within the security buffer zone and in the perimeter area around the sewage treatment plant. Several isolated areas north of the production area were found to exhibit above background direct radiation levels as detected with both the FIDLER probes and the large-volume scintillation detectors (SPA-3).

Exposure rate measurements at the 1000 foot grid nodes were completed during December using the pressurized ionization chamber. As of December 31, 1987, walkover surveys were completed on 156-100 foot grids. In addiion, approximately 31 grid blocks were partially surveyed during December.

Surface Soil Sampling - Surface soil sampling continued during December with random (1000 foot center) samples collected at 32 locations.

Biological Resources - The collection of medium sized mammals is on hold until late winter.

Percent Complete: 35%

Task 4 - Site Investigation Analysis

Data Base - Data entry into the Flow Gemini Database from sample collection forms for biological resources data and subsurface soils data was completed during December.

Design of the database segment to store RIFS laboratory results was initiated during December. Preparations are 95% complete for the transfer of CIS data to the RIFS Flow Gemini Database.

Groundwater Modeling - Configuration of the McDonald & Harbaugh Model (2nd Edition) for verification of the SWIFT III model was completed during December.

Percent Complete: 15%

Tasks 5 and 6

No significant progress.

Task 7 - Program Management and Reports

Health and Safety - A Health and Safety Audit was performed in December 1987 on RIFS field activities. The overall program was found to be satisfactory.

Percent Complete: Not applicable (apportioned effort).

Task 8 - Community Relations Support

No significant actions during this reporting period.

Percent Complete: Not applicable (apportioned effort).

CHARACTERIZATION INVESTIGATION STUDY

Volume 1 of the Characterization Investigation Study (CIS) final report was issued October 26, 1987. Volume 1 provides an indepth report of the findings of the geophysical surveys performed in the waste storage area during the CIS. Volume 2 of the CIS final report was issued on November 30, 1987. Volume 2 covers the radiological and chemical analysis of samples collected from the waste storage facilities. Volume 3 of the CIS final report is in final review and is anticipated to be issued in January, 1988. Volume 3 of the CIS final report provides the results of the comprehensive surface radiological survey conducted in the FMPC waste storage area.

DIFFICULTIES ENCOUNTERED

None.

ACTIONS TAKEN TO RECTIFY PROBLEMS

None Required.

CHANGES IN PERSONNEL

There were no personnel changes during this reporting period.

RESULTS OF SAMPLING

Initial radiological laboratory results from the RI field sampling are now available. As data becomes available, it will be reported in Technical Information Exchange (TIE) meetings as was done in the November TIE meeting.

Attachment 1 to this report provides the lithologic and well completion logs for monitoring wells 181, 182, 111, 367, 343, 127, 227, 178, and 243. The lithologic log for well location 364 is also provided in attachment 1.

PLANNED ACTIVITIES NEXT MONTH

- Conduct a demonstration of the US RADS system at the FMPC.
- Complete capability to electronically transfer data from the CIS to the Flow Gemini database.
- Complete 10 additional groundwater monitoring wells

FERNALD RI/FS

PAC

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 181	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

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6/IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				0.3 STIFF BROWN (10YR, 5/3) SILT, TRACE CLAY AND SAND DRY	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 - 0PPM Bα - 60CPM γ - 0CPM
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 - 0PPM Bα - 50CPM γ - 0CPM
				3.4			
4	07635 10:00	12 16 17	15	HARD YELLOWISH BROWN (10YR, 5/4) CLAY, SOME SAND AND SILT, TRACE FINE GRAVEL - DRY	CL	4.0	HNU - 0PPM Bα - 70CPM γ - 0CPM
				4.5 HARD PALE 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~~ SAND, TRACE GRAVEL AND SILT - DRY	CL	2.25	HNU - 0PPM Bα - 70CPM γ - 0CPM
				6.6			
7	07637 10:50	4 5 4	14	STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, 7.2 SOME SILT - MOIST	CL	1.0	HNU - 0PPM Bα - 50CPM γ - 0CPM
				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 - 0PPM Bα - 60CPM γ - 0CPM
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 - 0PPM Bα - 40CPM γ - 0CPM
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 - 0PPM Bα - 40CPM γ - 0CPM
				12.2 VERY STIFF DARK GRAYISH BROWN (2.5Y 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 - 0PPM Bα - 90CPM γ - 0CPM
14 15	07642 15:50	3 7 9	9	VERY STIFF YELLOWISH BROWN (10YR, 5/4) SILTY CLAY, TRACE GRAVEL AND SAND - MOIST	CL	2.25	HNU - 0PPM Bα - 50CPM γ - 0CPM

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

SAMPLES TAKEN USING ASTM STANDARD PENETRATION TEST.
COLORS CLASSIFIED USING MUNSELL COLOR CHARTS, 7

BACKGROUND
HNU - 0PPM γ - 0CPM
LEL - 0% Bα 60-140 CPM
(AIR) (GROUND)

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 181	COORDINATES:	DATE: 12-2-87
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 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 FT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				LIGHT YELLOWISH 2.5Y (6/4)			
16	9:00 ST-07643 07644 9:55	4 7 10	8	VERY STIFF ~~BROWNISH YELLOW (10YR)~~ CLAY, SOME GRAVEL AND SILT, TRACE SAND - MOIST	CL	1.25	HNU - 0PPM Bq - 30CPM γ - 0CPM
17	07645 10:00	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 - 0PPM Bq - 40CPM γ - 0CPM
18 19	07646 10:30	5 12 18	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - ~~DRY~~ MOIST	CL	3.0	HNU - 0PPM Bq - 50CPM γ - 0CPM
20 21	07647 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	HNU - 0PPM Bq - 50CPM γ - 0CPM
22	07648 11:15	5 14 27	16	HARD LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME GRAVEL, SILT, AND SAND. - MOIST	CL	4.0	HNU - 0PPM Bq - 60CPM γ - 0CPM
23 24	07649 13:20	~~3~~ 5 ~~18~~ 8	6	STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME GRAVEL, SILT, AND SAND - MOIST	CL	2.0	HNU - 0PPM Bq - ~~40~~ CPM γ - 0CPM
25	07650 13:45	4 10 13	11	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) ~~SILT~~ CLAY AND SILT, SOME SAND, TRACE FINE GRAVEL - ~~DRY~~ MOIST	CL	1.0	HNU - 0PPM Bq - 40CPM γ - 0CPM
26 27	07651 14:00	2 8 12	14	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, TRACE SILT, SAND, AND FINE GRAVEL - MOIST.	CH	.75	HNU - 0PPM Bq - 40CPM γ - 0CPM
28	07652 14:45	1 4 7	5	STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, ~~TRACE~~ SOME GRAVEL, TRACE SILT AND SAND MOIST.	CH	.75	HNU - 0PPM Bq - 40CPM γ - 0CPM
29 30	07653 15:00	5 9 9	13	VERY STIFF GRAYISH BROWN (2.5Y, 5/2) CLAY, TRACE SAND, GRAVEL, AND SILT, MOIST	CH	.5	HNU - 0PPM Bq - 40CPM γ - 0CPM

NOTES:

8

402-11-86

FERNALD RI/FS

PAC

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD	
BORING NUMBER: 121	COORDINATES:	DATE: 12.2.87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/.87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 12.2.87
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
31	07654 15:40	4 7 10	14	VERY STIFF GRAYISH BROWN (2.5Y 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CH	1.0	HNU - 0PPM βα - 60CPM γ - 0CPM
32	07655 15:55	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 βα - 50CPM γ - 0CPM
33				WELL TD 33.0 FT. Bottom of Boring			

NOTES:

402-11-86

PAC

2656

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 182	COORDINATES:	DATE: 12-4-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-4-87
ENGINEER/GEOLOGIST: D. OAHLEY	Depth Date/Time	DATE COMPLETED: 12-4-87
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 2

DEPTH (6/N)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6/N)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	07657 9:50	5 6 23	8	VERY STIFF YELLOWISH BROWN (10YR, 5/4) SILT, SOME CLAY, TRACE SAND AND GRAVEL- ~~DRY~~, MOIST.	ML	2.25	HNU- 0PPM Bα - 200CPM γ - 0CPM
				18 STIFF YELLOWISH BROWN ~~SILT~~ (10YR/5/4) SILT, SOME CLAY, TRACE SAND - MOIST	ML	–	
2 3	07658 10:00	8 5 5	11	STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND - MOIST	CL	1.25	HNU- 0PPM Bα - 100CPM γ - 0CPM
4	07659 10:10	5 4 6	8	STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT AND GRAVEL, TRACE SAND. MOIST.	CL	1.25	HNU- 0PPM Bα - 160CPM γ - 0CPM
5 6	07660 10:20	6 14 16	11	VERY STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) SILTY CLAY, ~~SOME~~ TRACE SAND- MOIST	CL	2.5	HNU- 0PPM Bα - 80CPM γ - 0CPM
7	07661 10:40	15 17 19	18	HARD LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT, TRACE SAND AND FINE GRAVEL.- DRY	CL	2.75	HNU- 0PPM Bα - 80CPM γ - 0CPM
8 9	07662 13:00	5 9 15	18	VERY STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - ~~MOIST~~ DRY.	CL	3.0	HNU- 0PPM Bα - 60CPM γ - 0CPM
10	ST 07663 13:15 / 07664 14:00	5 16 13	14	VERY STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND - MOIST	CL	3.5	HNU- 0PPM Bα - 60CPM γ - 0CPM
11 12	07665 14:30	3 10 15	14	VERY STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST	CL	4.0	HNU- 0PPM Bα - 60CPM γ - 0CPM
13	07666 14:45	6 20 22	12	VERY STIFF YELLOWISH BROWN (10YR, 5/4) CLAY, SOME SILT AND GRAVEL, TRACE SAND - MOIST	CL	3.5	HNU- 0PPM Bα - 60CPM γ - 0CPM
14 15	07667 15:00	7 16 25	14	HARD YELLOWISH BROWN (10YR, 5/4) CLAY, SOME SILT, TRACE GRAVEL AND SAND - MOIST	CL	4.25	HNU- 0PPM Bα - 80CPM γ - 0CPM

NOTES: CONTRACTOR: PENNDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYKES JR.
ASSISTANT: JOHN VANDINE
WATER ADDED TO HOLE 1 TICK = 10 GALLONS
HTT HH III

SAMPLES TAKEN USING ASTM STANDARD PENETRATION TESTS.
SOIL COLORS CLASSIFIED ACCORDING TO MUNSELL COLOR CHARTS.
BACKGROUND
HNU- 0PPM
LEL- 0%
Bα 100 (AIR) - 800 (GROUND) CPM
γ - 0 CPM

10

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 662 ~~FERNALD RI/FS~~	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 192	COORDINATES:	DATE: 12.~~4~~.87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-4-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED: 12-4-87
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	07668 15:10	15 18 20	18	HARD YELLOWISH BROWN CLAY, CLOSE SILT, TRACE GRAVEL AND SAND. 15.3 MOIST	CL	3.5	HNU-0PPM BZ-50CPM Z-0CPM
				HARD GRAY (10YR, 6/1) CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST	CL	2.5	
17	07669 16:00	4 10 21	8	HARD GRAY (10YR, 6/1) CLAY, TRACE GRAVEL, SILT, AND SAND - MOIST	CL	3.5	HNU-0PPM BZ-60CPM Z-0CPM
18							
19	07670 16:15	6 10 11	15	VERY STIFF GRAY (10YR, 5/1) CLAY, TRACE ~~GRAVEL~~, SILT, GRAVEL, AND SAND - ~~MOI~~ MOIST	CL	2.0	HNU-0PPM BZ-60CPM Z-0CPM
20	07671 16:30	5 10 12	12	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, ~~S~~ TRACE GRAVEL, SILT, AND SAND - MOIST	CL	2.0	HNU-0PPM BZ-50CPM Z-0CPM
21							
22	07672 16:45	5 7 12	13	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SILT, AND SAND - MOIST	CL	2.0	HNU-0PPM BZ-40CPM Z-0CPM
23	07673 17:00	2 4 7	7	STIFF OLIVE GRAY (5Y, 5/2 CLAY, SOME GRAVEL, TRACE SILT AND SAND - MOIST	CL	1.5	HNU-0PPM BZ-60CPM Z-0CPM
~~25~~ 24				WELL TD 24.0 FT.			
~~26~~							

NOTES:

11

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 111	COORDINATES:	DATE: 12/1/87	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/1/87 @ 0830	
ENGINEER/GEOLOGIST: B. Dunning	Depth Date/Time	DATE COMPLETED: 12/2/87	
DRILLING METHODS:		PAGE 1 OF 2	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (NA)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1				See all Sample-Soil descriptions obtained in boring # 311.			Background Levels Noted Below in Notes
3	ST 07612		2'	Pushed Shelby Tube	CL		Sealed with Wax 3-5' 0900
5							
7							
10							
12							
15							
17							
20							
22							
25	ST 07613	✓	1.9'	Pushed Shelby Tube	CL		23.5' - 25.4' 1535
27							End of Day 12/1/87
30'							

NOTES: 1.) Drilling Contractor: Pennsylvania Drilling
Driller: Tim Harris
Helper: Craig Coulter
Rig Make: "New" Speed King

2.) Water Added To hole For Drilling
12/1/87: 50 gallons
12/2/87: 8 gallons

12

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 111	COORDINATES:		DATE: 12/2/87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12/1/87
ENGINEER/GEOLOGIST: B. Dunning	Depth	Date/Time	DATE COMPLETED: 12/2/87
DRILLING METHODS: Cable Tool			PAGE 2 OF 2

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (Ft.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31							
35							
37				Bottom of Boring 36.5 Ft.			Completed Drilling at 1000, 12/2/87
40							

NOTES: Background Levels

1.) Hnu = 0

2.) α = 0

3.) γB = 40-50 c.p.m.

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: Nov 21, 1987
ELEVATION:	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 3/2 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 5/8 silty clay some sand and gravel slag - dry 4.6	NA NA	>5	HNU = 0 ppm βB = 80 cpm α = 2 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 = 2 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 = 2 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 = 2 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 = 2 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

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 HNU = 0 ppm
Nov 20, 1987 βB = 60 cpm
α = 2 cpm

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B367	COORDINATES:		DATE: Nov 21, 1987
ELEVATION:	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 1160 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 got 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 6/1 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	8 39	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
27							
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:

402-11-86

FERNALD RI/FS

PAC

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 60232	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B367	COORDINATES:		DATE: Nov 22, 1987
ELEVATION:	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 (1/2 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 some silt and sand, trace pebbles dry 31½	cl	3.5	HNU=0ppm γB=70cpm α=2cpm
32 33	11-22 810 7446	3 16 27	8	dense yellowish brown 10YR 5/8 sand, some silt and clay, trace gravel - dry	SP	NA	HNU=0ppm γB=60cpm α=0cpm
34	11-22 900 7447	8 12 13	12	dense brownish yellow 10YR 6/6 sand some silt and clay, trace gravel dry	SP	NA	HNU=0ppm γB=60cpm α=0cpm
35							
36	11-22 920 7448	8 18 19	12	dense brownish yellow 10YR 6/6 sand and fine gravel - some silt, trace clay and pebbles - dry	SP	NA	HNU=0ppm γB=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 γB=800cpm α=2cpm
42 43 44							

NOTES:

402-11-86

FERNALD RI/FS

2656

PAC

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 7602.32	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12/1/87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: Nov 20, 1987
ENGINEER/GEOLOGIST: Lowell Wille	Depth Date/Time	DATE COMPLETED: 12/2/87
DRILLING METHODS: Cable tool		PAGE 4 OF 10

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1½ ft	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	12-1 1340 7450	26 36 37	12	dense yellowish brown 10YR6/8 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 10yr6/8 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 = 90 cpm α = 2cpm
56				brown-gray 10YR 6/3 med. sand, some silt, clay, gravel, dry.	SM		
57							
58							
59							

NOTES:

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.7	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12/2/87
ELEVATION:	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							
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 γB = 80cpm α = 2 cpm
62							
63							
64							
65							
66	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
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 γB = 60cpm α = 2 cpm
72							
73							
74							
75							

NOTES:

402-11-86

PAC

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12/2/87
ELEVATION:	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							
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 γB = 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 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:

402-11-86

FERNALD RI/FS

PAC

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: B367	COORDINATES:		DATE: 12-3-87
ELEVATION:	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 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				101 medium dense gray 10YR 4/1 sandy gravel, some silt and clay, trace pebbles	GM		
102							
103							
104							

NOTES:

20

402-11-86

FERNALD RI/FS

PAC

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12-4-87
ELEVATION:	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				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 RB = 80 cpm α = 2 cpm NO RETURN 1st Try, 11 in second try blowcounts first 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 115½	gm	NA	HNU = 0 ppm RB = 80 cpm α = 2 cpm
				very dense gray 10YR 4/1 sand with some gravel, silt and clay - wet	gm		
117							
118							
119							

NOTES:

21

402-11-88

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12-5-87
ELEVATION:	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, gravel and pebbles, wet.	gm	NA	HNU=0ppm, ∂B = 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 ∂B = 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 ∂B = 80cpm α = 2cpm
131							
132							
133							
134							
135							

NOTES:

22

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B367	COORDINATES:	DATE: 12/5/87-12/6/87
ELEVATION:	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=0ppm γB=100cpm 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 γB=100 cpm α=2 cpm
141							
142				E.O.B. 141.5 ft.			

NOTES:

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

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 0761 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 c.p.m. (Time Sample Collected) (0800)
2	S 0761 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 c.p.m (0810)
3 4	S 0761 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 c.p.m. (0835)
5 6	S 0761 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 c.p.m. (0840)
7	S 0761 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 c.p.m. (0850)
8 9	S 0761 9	10 10 10	18"		CL		a/a (1055)
10	S 0762 0	7 8 11	18"	Medium stiff, olive-yellow clay (2.5 Y, 6/8) Damp; 10' Stiff Olive-brown clay (2.5 Y, 4/4) Moist 10.5'	CL	1.0	a/a (1105)
11	S 0762 1	12 11 13	18"	11' Medium stiff, light olive-brown clay (2.5 Y, 5/6) Dry 11'; 11.7' Stiff, dark grayish-brown clay (2.5 Y, 4/2) 11.7'	CL	1.5	Hnu = 0, α = 0, γB = 20-50 c.p.m. (1120)
12 13	S 0762 2	3 7 4	18"	12.5' Medium dense, light olive brown silty sand (2.5 Y, 5/6) Damp 12.5'; 13' Medium dense, grayish-brown sand (2.5 Y, 5/2) 13'; Medium dense, light olive-brown sand (2.5 Y, 5/6)	SM; SC; SP		Hnu = 0, α = 0, γB = a/a (1130)
14 15	S 0762 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 c.p.m.

III. WATER USED 12/4
20 gallons.

IV. a/a = As Above

V) Samples via Munsell Colors, ASTM

24

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

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 γβ = 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 γβ = 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 γβ=50 cpm (0830)
20	S 0 7 6 2 7	14 22 27	15"				Hnu = 0 α = 0 γβ = 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 γβ = 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 γβ = 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 γβ = 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	1.5-2.0	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 12/5/87
1.) Hnu = 0
2) α = 0
3.) γβ = 20-60 c.p.m.

II.) Water Used 12/5/87 = 37 gallons

III.) a/a = as above

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

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				33' 33.2 Dark gray, dense, fine gravel (2.5 Y, N 4) 33.2 33'	GW		
34	S 0776	11 14 15	18"	Medium dense, yellowish-brown sand (10 YR, 5/8) with a trace of fine gravel. Dry.			Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1440)
35							
36				Upper Sand & Gravel contact @ 33.2 Ft.			Began collecting 5' Sample
37							
38							
39							
40				Very dense, multicolored brown, 40.5 loose, fine gravel 40.5			
41	S 0777	10 22 33	18"	Very dense, yellowish-brown sand (10 YR, 5/6) with a trace of fine gravel. Dry			Hnu = 0 α = 0 γβ = 40-60 c.p.m. (1657)
42							
43							
44							
45							

NOTES:

I.) Background Measurements 12/7/87

Hnu = 0

α = 0

γβ = 20-80 c.p.m.

II.) Water Used 12/7/87 = 23 gallons

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FMPC RI/FS		
BORING NUMBER: 343	COORDINATES:		DATE: 12/9/87
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 γβ = 20 -50 c.p.m. 0940
47							
48							
49							
50	S 0 7 7 9	12 22 26	18"	Dense, yellowish-brown sand as above. Damp but not saturated.	SW		Hnu = 0 α = 0 γβ = 30 c.p.m. 1006
51							
52							
53							
54							
55	S 0 7 7 8 0	12 23 29	18"	56' 56'			Hnu = α = γβ = 1032
56				Very dense, dark grayish-brown (25Y, 4/2) sand gray sand fairly moist	SW		
57							
58							
59							
60							

gray-y

NOTES: Background Measurements for 12/8/87

1.) Hnu = 0

2.) α = 0

3.) γβ = 20 - 50 c.p.m.

27

402-11-86

FERNALD RI/FS

2656

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 γβ = 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.	SW		Hnu = 0 α = 0 γβ = 40-60 c.p.m. 1316
66				66.2 66.2 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 γβ = 40-60 c.p.m. 1456
71				Very dense, dark gray (5Y, 4/1) clayey gravel	GC		
72							
73							
74							
75							

NOTES:

28

402-11-86

FERNALD RI/FS

2656

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 γB = 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 γB = 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 γB = 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

γB = 30 - 60 c.p.m.

29

402-11-86

FERNALD RI/FS

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				WET			
98							
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:

402-11-86

FERNALD RI/FS

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 07790	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 07791	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.) 116.5' End of Day 12/8/87 Start of Day 12/9/87
118							
119	S 07792	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 or 12/9

1.) Hnu = 0

2.) α = 0

3.) γB = 20-50 c.p.m.

402-11-88

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

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' Medium dense, bluish-green to dark olive-gray clayey gravel. (5Y, 3/2). 120'	GC		Could not get below casing depth without blow sand coming into borehole (120'-) Had to catch sample @ 119'.
121							
122							
123							
124							
125	S 0 7 9 3	2 2 3	18"	Loose, olive-gray silty sand 125.6' (5Y, 5/2) 125.6'			Hnu = 0
126				Soft, "blue-gray" clay. (No Munsell color correlation) closest correlation is (5Y, 4/1).		<1.0	α = 0 γβ = 40 c.p.m. (1336)
127							
128				— Bottom of Borehole @ 126.5' —			
129							
130							
131							
132							
133							
134							
135							

NOTES:

TOTAL WATER ADDED TO WELL TO DRILL. = 80 gallons

402-11-86

FERNALD RI/FS

2656

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 (2 FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				SEE VISUAL CLASSIFICATION FOR WELL # 227.			
10	07805 18:37						12·22·87 8:30
20	07870 10:10						
30				WELL TD 31.5 FT.			

NOTES:

WATER ADDED TO HOLE

~~HH~~ ~~HH~~ III

33

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	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 KEGLEY/OAKLEY	Depth Date/Time	DATE COMPLETED: 12-17-87
DRILLING METHODS: CABLE & TOOL		PAGE 1 OF 6

DEPTH (IN)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (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) SILT, SOME SAND AND GRAVEL, TRACE CLAY - ~~TRAC~~ DRY 1.7	ML	~~3~~ 3.5	HNU-0PPM Bα-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 Bα-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 Bα 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 Bα-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 Bα-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 Bα-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 Bα-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 Bα-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 Bα-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 Bα-80CPM γ-0CPM

NOTES:

CONTRACTOR: PENNDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYMES JR.
ASSISTANT: JOHN VANDINE

WATER ADDED TO HOLE
1 = 10 GALLONS
~~||||~~ ~~||||~~ ~~||||~~
~~||||~~ ~~||||~~ ||

SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS.
COLORS CLASSIFIED USING 34 UNSELL COLOR CHARTS

402-11-86

FERNALD RI/FS

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) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST 15.4 VERY STIFF GRAY (5Y, 5/1) CLAY, TRACE SAND AND SILT - MOIST. 16.5	CL CL	3.5 1.5	HNU - 0 PPM Bα - 70 CPM γ - 0 CPM
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 - 0 PPM Bα - 70 CPM γ - 2 CPM
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 - 0 PPM Bα - 60 CPM γ - 0 CPM
20 21	07854 8:40	4 5 8	9	STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME SILT AND GRAVEL - MOIST 21.3 STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL AND SILT, TRACE SAND - WET	CH CH	1.0 1.25	HNU - 0 PPM Bα - 50 CPM γ - 0 CPM
22	07855 8:50	7 7 7	8	MEDIUM DENSE OLIVE GRAY (5Y, 5/2) SAND, SOME GRAVEL, TRACE CLAY - WET.	SW	-	HNU - 0 PPM Bα - 40 CPM γ - 0 CPM
23 24	07856 9:15	7 7 6	7	MEDIUM DENSE OLIVE GRAY (5Y, 5/2) SAND AND GRAVEL, TRACE CLAY - WET.	SW	-	HNU - 0 PPM Bα - 40 CPM γ - 0 CPM
25	07857 9:35	22 14 21	7	DENSE OLIVE GRAY (5Y, 5/2) SAND AND GRAVEL - WET. 25.4	SW	-	HNU - 0 PPM Bα - 50 CPM γ - 0 CPM
26 27	07858 10:40	11 31 37	5	HARD LIGHT OLIVE GRAY (5Y, 6/2) CLAY, SOME SAND, 26.7 AND GRAVEL, TRACE SILT - DRY VERY DENSE LIGHT OLIVE GRAY (5Y, 6/2) CLAYEY GRAVEL, SOME SAND - WET	CL GC	- -	DARKER THAN THIS MUNSELL COLOR. HNU - 0 PPM Bα - 40 CPM γ - 0 CPM
28	07859 11:00	24 44 27	16	27.4 VERY DENSE LIGHT OLIVE GRAY (5Y, 6/2) 28.1 SAND AND GRAVEL - MOIST. HARD GREENISH GRAY CLAY, SOME SILT - MOIST	SW CL	- 2.0	HNU - 0 PPM Bα - 60 CPM γ - 0 CPM
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 - 0 PPM Bα - 100 CPM γ - 0 CPM

NOTES:

① NOT CLOSE TO ANY MUNSELL COLOR.

402-11-86

FERNALD RI/FS

2656

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 in)	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	HWU - 0 PPM BX - 60 CPM γ - 0 CPM
32 33	07862 14:15	7 11 27	14	HARD OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT	CL	2.75	HWU - ? BX - 70 CPM γ - 0 CPM
34	07863 15:30	5 15 17	15	HARD OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND AND SILT - MOIST	CL	2.75	HWU - 0 PPM BX - 30 CPM γ - 0 CPM
35 36	07864 15:50	5 12 19	18	HARD OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT, - MOIST	CL	2.5	HWU - 0 PPM BX - 70 CPM γ - 0 CPM
37	07865 9:15	7 11 18	3	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY, TRACE GRAVEL, SAND, AND SILT - MOIST	CL	-	HWU - 12.15.87 9:00 0 PPM BX - 60 CPM γ - 0 CPM
38 39	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	HWU - 0 PPM BX - 80 CPM γ - 0 CPM
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	HWU - 0 PPM BX - 40 CPM γ - 0 CPM
				40.7	CL	1.5	
41 42	07868 11:05	7 9 13	16	VERY STIFF GRAY (5Y, 6/1) SILT WET.	ML	0.5	HWU - 0 PPM BX - 60 CPM γ - 0 CPM
				42.2 HARD GRAY (5Y, 6/1) SILT - MOIST	ML	-	
				42.7 HARD [illegible] SILT - MOIST	ML	-	
43	07869 13:35	16 24 40	15	VERY DENSE DARK YELLOWISH BROWN (10YR, 4/4) SAND AND GRAVEL DRY	SW	-	HWU - 0 PPM BX - 60 CPM γ - 0 CPM
44							
45							

NOTES:

402-11-86

FERNALD
RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 6002	PROJECT NAME: FERNALD 121/FS		
BORING NUMBER: 227	COORDINATES:		DATE: 12-15-8
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-
ENGINEER/GEOLOGIST: D. OAHEY	Depth	Date/Time	DATE COMPLETED: /
DRILLING METHODS: CABLE TOOL			PAGE 4

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARK
46	07870 M:20	50-12RF	5	VERY DENSE DARK YELLOWISH BROWN (10YR 4/4) ~~SANDY GRAVEL~~ MOIST GRAVEL AND SAND	GW	—	HNU-0 ppm
47							
48							
49							
50							
51	07871 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 8:1
54				54.5			
55							DRILLER'S CONTACT.
56	07872 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
57							
58							
59							
60							

NOTES:

FERNALD RI/FS

2656

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 (6 IN)	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 BX-100CPM γ-0CPM
				VERY DENSE GRAY (10YR, 5/1) SAND, SOME GRAVEL - MOIST.	SW	-	
62							
63							
64							
65							
66	07874 14:35	25 25 25	10	~~VERY~~ DENSE DARK GRAY (10YR, 4/1) SAND, SOME GRAVEL-WET.	SW	-	HNU-OPPM BX-70CPM γ-0CPM
67							
68							
69							
70							
71	07873 15:54	11 13 15	9	MEDIUM DENSE DARK GRAY (10YR, 4/1) FINE SAND, TRACE GRAVEL-WET.	SP	-	HNU-OPPM BX-50CPM γ-0CPM
72							
73							
74							
75							

NOTES: 1 7/8" x 1' 3" x 4"

38

402-

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

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/N)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76	07876 9:35	44 25 24	10	DARK DENSE GRAY (10YR, 4/1) SAND AND GRAVEL-WET 76.5 76.5	SW	-	HNU- OPPM Bx - 60 CPM S - 0 CPM
77				BOTTOM OF BORING			
78							

NOTES:

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS	
BORING NUMBER: 178	COORDINATES:	DATE: 12-7-87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12-7-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 3

DEPTH (6/N)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6/N)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	07675 10:15	2 3 7	13	STIFF BROWN (10YR, 5/3) SILT, SOME CLAY, TRACE SAND - DRY 1.4	ML	2.0	HNU - 0PPM BZ - 140CPM γ - 0CPM
2	07676 10:20	10 8 6	8	STIFF BLACK ASH - SILT TO ~~GRAVEL~~ FINE GRAVEL IN SIZE. - DRY. 2.6	ML	1.5	HNU - 0PPM BZ - 200CPM γ - 0CPM
3 4	07677 10:25	3 6 8	10	STIFF BLACK ASH SILT TO FINE GRAVEL IN SIZE - MOIST 4.1	ML	1.5	HNU - 1 PPM BZ - 250CPM (ASH) 60 CPM (CLAY) γ - 10 CPM (CLAY)
				4.6 STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME SILT, TRACE SAND AND FINE GRAVEL MOIST	CL	2.5	
5	07678 10:35	6 7 26	14	STIFF BLACK ASH, SILT TO FINE GRAVEL IN SIZE - ~~DRY~~ WET 5.2	ML	1.5	HNU 3 PPM BZ - 80CPM (CLAY) 350CPM (ASH) γ - 10CPM (CLAY)
6	07679 VCA 10:40			STIFF OLIVE GRAY CLAY, (5Y, 5/2) SOME SAND, TRACE ~~SAND AND~~ SILT AND FINE GRAVEL MOIST 6.2	CL	2.5	
	~~07679~~	10 13 11	18	6.6 VERY STIFF BLACK ASH - SILT TO FINE GRAVEL SIZE - ~~ASH~~ - WET.	ML	1.0	HNU - 0PPM BZ 60CPM (CLAY) 150CPM (ASH) γ - 0CPM
7	07680 13:50			VERY STIFF OLIVE (5Y, 5/3) CLAY, ~~SOME~~ SILT TRACE SILT, FINE GRAVEL, AND SAND MOIST	CH	2.75	
				7.6 VERY ~~MOIST~~ STIFF OLIVE (5Y, 5/3) SILT, SOME CLAY, TRACE SAND - MOIST	ML	—	
8 9	07681 16:15	2 3 5	14	MEDIUM STIFF OLIVE (5Y, 5/3) CLAY, SOME SILT, TRACE GRAVEL AND SAND. MOIST	CL	-	HNU - 0PPM BZ - 60CPM γ - 0CPM
10	07682 9:15 07683 8:20	3 4 7	4	MEDIUM STIFF OLIVE (5Y, 5/3) CLAY, SOME ~~GRAVEL~~ FINE GRAVEL, TRACE SILT AND SAND.	CH	—	HNU - 0PPM BZ - 60CPM γ - 0CPM 12-8-87 8:00
11	ST 07684 8:30	4 8 9	14	MEDIUM STIFF OLIVE (5Y, 5/3) CLAY, TRACE SILT, FINE GRAVEL AND SAND - WET.	CH	.25	HNU - 0PPM BZ - 40CPM γ - 0CPM
12				VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) SILTY CLAY, SOME GRAVEL, TRACE SAND - MOIST	CL	3.5	
13	07685 8:50	5 10 15	15	VERY STIFF LIGHT YELLOWISH BROWN (2.5Y, 6/4) CLAY, SOME SILT, TRACE FINE GRAVEL AND SAND - MOIST	CL	3.5	HNU 0PPM BZ - 60CPM γ - 0CPM
14 15	07686 9:00	6 14 15	8	VERY STIFF BROWNISH YELLOW (10YR, 6/6) CLAY, SOME SAND, TRACE ~~GRAVEL~~ SILT AND FINE GRAVEL - MOIST	CL	1.25	HNU - 0PPM BZ - 70CPM γ - 2CPM

NOTES: CONTRACTOR: PENDRILL
RIG: CYCLONE 42
DRILLER: HARRY DYKES JR.
ASSISTANT: JOHN VANDINE.
WATER ADDED TO HOLE: 1 TICK = 10 GALLONS

SAMPLES TAKEN ACCORDING TO ASTM STANDARD PENETRATION TESTS.
COLORS CLASSIFIED USING MUNSELL COLOR CHARTS.
*PIECES OF ORANGE TARP FOUND IN NUMBERS 07677 AND 07678 IN ASH.
0-6 FT - SAMPLES FROM FIRST LOCATION 10 FT. SOUTH OF PERMANENT WELL.

40

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 178	COORDINATES:		DATE: 12-8-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-7-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED:
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
				MEDIUM DENSE BROWN (10YR 5/3)			
16	07688 10:10	11 9 7	15	~~VERY STIFF~~ CLAYEY SAND, SOME GRAVEL - MOIST. 16.3	SC	—	HNU - 0PPM Bd - 60CPM γ - 0 CPM
17	07689 10:35	3 6 11	9	VERY STIFF BROWN (10YR, 5/3) CLAY, ~~SOME~~ FINE GRAVEL AND SAND - MOIST.	CL	1.75	
18				VERY STIFF LIGHT YELLOWISH BROWN (10YR, 6/4) CLAY, SOME GRAVEL AND SAND - MOIST	CL	3.5	HNU - 0PPM Bd 70CPM γ - 0 CPM
19	07690 10:45	6 9 17	9	VERY STIFF BROWN (10YR, 5/3) CLAY, SOME SAND AND GRAVEL - MOIST	CL	1.75	HNU - 0PPM Bd - 40CPM γ - 0CPM
20	07690 13:10	2 2 2	3	VERY STIFF BROWN (10YR, 5/3) CLAY, SOME GRAVEL AND SAND - MOIST SOFT GRAY (5Y, 5/1) CLAY, TRACE GRAVEL AND SAND - MOIST	CH	.1	HNU - 0PPM Bd - 60CPM γ - 0CPM
21							
22	07691 13:20	1 3 6	11	~~MEDIUM~~ STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND, ~~MOIST~~ ~~WET~~ MOIST	CH	.1	HNU - 0PPM Bd - 60 CPM γ - 0 CPM
23	07692 13:30	3 3 7	14	~~MEDIUM~~ STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME GRAVEL, TRACE SAND. ~~WET~~ MOIST	CH	.1	HNU - 0PPM Bd - 60CPM γ - 0CPM
24							
25	07693 14:45	6 7 8	8	STIFF OLIVE GRAY (5Y, 5/2) GRAVELLY CLAY, SOME SAND - ~~WET~~ MOIST 25.6	CH	—	HNU - 0PPM Bd - 40CPM γ - 0CPM
26	07694 15:00	7 7 6	12	MEDIUM DENSE OLIVE GRAY (5Y, 5/2) GRAVELLY SAND, SOME CLAY - MOIST. 26.9	SC	—	HNU - 0PPM Bd - 80CPM γ - 0CPM
27				STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME SAND, TRACE GRAVEL - MOIST.	CH	—	
28	07695 15:00	3 5 6	3	STIFF OLIVE GRAY (5Y, 5/2) CLAY, SOME FINE GRAVEL AND SAND, 28.3 MOIST.	CH	—	HNU - 0 PPM Bd - 70 CPM γ - 0 CPM
29	07696 15:50	2 4 5	4	MEDIUM DENSE OLIVE GRAY ~~GRAVEL~~ (5Y, 5/2) GRAVEL AND CLAY, TRACE SAND - MOIST.	GC	—	HNU - 0PPM Bd - 60CPM γ - 0 CPM
30							

NOTES:

BACKGROUND

HNU - 0PPM
LEL - 0 %
Bd - 100CPM (AIR) - 200 CPM (GROUND)
γ - 0CPM

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 178	COORDINATES:		DATE: 12-8-87
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 12-7-87
ENGINEER/GEOLOGIST: D. OAKLEY	Depth	Date/Time	DATE COMPLETED:
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
31	07647 16:10	2 4 14	11	VERY STIFF OLIVE GRAY (5Y, 5/2) CLAY AND GRAVEL + TRACE SAND MOIST 31	CL	—	HNU - 0 PPM Bd - 70 CPM γ - 0 CPM
32	07648 16:30	7 11 15	14	~~SOME~~ DENSE GRAY (5Y, 5/1) FINE SAND, TRACE CLAY. DENSE GRAY (5Y, 5/1) FINE SAND, TRACE CLAY AND GRAVEL - MOIST,	SP SP	— —	HNU - 0 PPM Bd - 70 CPM γ - 0 CPM
33 34	07649 17:15	15 11 20	8	33.6 HARD OLIVE GRAY (5Y, 5/2) CLAY, SOME SILT, TRACE ~~[illegible]~~ SAND AND FINE GRAVEL - MOIST	CL	1.25	HNU - 0 PPM Bd - 80 CPM γ - 0 CPM
35				WELL TD - 34.6 FT.			

NOTES:

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

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 3

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 07796	12 11 13		Duplicate SAMPLE TAKEN	CL	1.5	Anu=0 BB=20-40 α=0 (1348)
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
Anu = 0
BB = 40-60 c.p.m.

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

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

43

402-11-86

FERNALD RI/FS

2656

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				See Descriptions on Soil log 343.			
32							
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

$\beta\gamma$ = 40-50 c.p.m.

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

44

402-11-88

FERNALD RI/FS

2656

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 @1700	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	S 07798	9 14 17	36"	Duplicate Sample Taken	SW		Hnu = 0 γB = 40-60 cp.m. α = 0 (1452)
68							Drilled Well To 69.3'.
70							Had to Drive 10" casing to 73' & keep a full hydrostatic head to keep sand from coming into borehole.
75							
80							

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/14/87
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 12/11/87
ENGINEER/GEOLOGIST: T. Sullivan	Depth Date/Time	DATE COMPLETED: 12/19/87
DRILLING METHODS: Cable Tool		PAGE 1 OF 10

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 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 βB = 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	HNU = 0ppm βB = 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	NA	HNU = 0 ppm βB = 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 βB = 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 βB = 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 βB = 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 βB = 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 βB = 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 βB = 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 βB = 120 cpm α = 2cpm

NOTES: Pennsylvania Drilling Co.
Bucyrus Erie 24-W drilling rig.
Driller: Dave Newman
Helper: Bob Johnson

Background Dec. 14, 1987: HNU = 0 ppm, βB = 140 cpm, α = 2 cpm

46

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.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/14/87
ELEVATION:	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 (1/6 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
17–18	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
19–20	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
21–22	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
23–24	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
25–26	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
27–28	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 = 120 cpm α = 2 cpm
29–30	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
	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.
	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

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/15/87
ELEVATION:	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 (1/2 ft)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31	07736 1125 12/15	50 - -	2	gray 7.5YR 5/0 gravelly clay, some silt, dry 31.5	cl	Unk	HNU=0ppm γB=100cpm α=2cpm / 50 blows/2 in. Insufficient sample for consistency.
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	sw	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							
41	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
42							
43							
44							
45							

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3-2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/16/87
ELEVATION:	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

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 1/2 ft.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
46	07741 1620 12/15	27 32 30	14	med. dense gray 10YR 5/1 sand with some gravel and silt, dry.	SM	NA	HNU=0ppm γB=160cpm α=2cpm
47							
48							
49				49			
50							
51	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
52							
53							
54							
55							
56	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=0ppm γB=110 cpm α=2cpm
57							
58							
59							
60							

NOTES:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE:
ELEVATION:	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 (½ ft.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61	07744 1140 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							
66	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							
71	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
72							
73							
74							
75							

NOTES:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/17/87
ELEVATION:	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	0930 12/17	26 28	8	some gravel and silt, trace clay, wet.	sm	NA	HNU=0ppm γB=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 γB=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 γB=120cpm α=2cpm
87							
88							
89							
90							

NOTES:

402-11-86

FERNALD RI/FS

2656

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602-3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/18/87
ELEVATION:	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	gp	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.	gp		
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	28 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:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/ /87
ELEVATION:	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							
106	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
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 = 100cpm 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:

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/18/87
ELEVATION:	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							
121	07756 1530 12/18	15 14 13	6	med. dense gray 10YR4/1 sand and gravel, some silt, trace pebbles and clay, wet.	gm	NA	HNU=0ppm ∂B=110cpm α=2cpm
122							
123							
124							
125	07757 1630 12/18	4 8 9	2	loose gray 10YR4/1 sand and gravel, some silt, trace clay, wet.	gm	NA	HNU=0ppm ∂B=130cpm α=3cpm
126							
127							
128							
129				129			
130	07758 1720 12/18	6 7 10	12	loose gray 10YR4/1 sand, some silt and clay, trace gravel, wet.	sm	NA	HNU=0ppm ∂B=120cpm α=2cpm
131							
132							
133							
134							
135							

NOTES:

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 602.3.2	PROJECT NAME: Fernald RI/FS	
BORING NUMBER: B364	COORDINATES:	DATE: 12/19/87
ELEVATION:	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							
136	07759 0920 12/9	3 9 12	11	med. dense gray 10YR 4/1 sand, some silt and gravel, trace clay, wet.	SM	NA	HNU = 0 ppm β = 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 β = 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.			

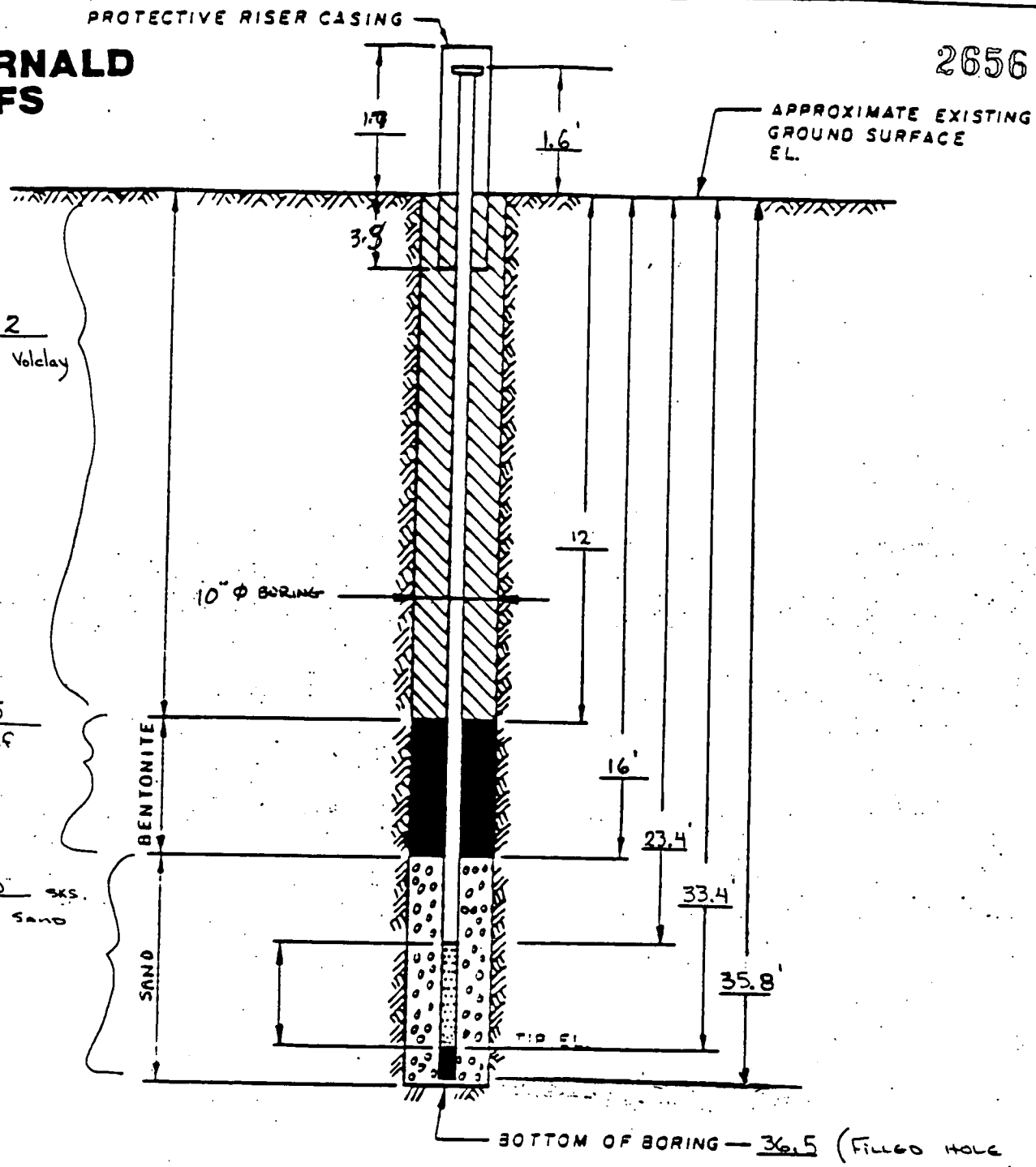
NOTES:

402-11-86

Borehole # 111 #2

FERNALD RI/FS

2656



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

NOTES:

1. RISER PIPE IS IN 1.0 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

PREPARED FOR

RNALD
RI/FS

PAC

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC A1/FS FIELD ENG./GEO. Brad Dunning DATE 12/9/87
PROJECT NO. 602 Task 3.2 CHECKED BY _____ DATE _____
BORING NO. 111
PIEZOMETER NO. ~~[illegible]~~ 111 DATE OF INSTALLATION x 12/2/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 36.5'
FLUID NA FROM NA TO NA

TYPE OF BIT hammer type
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 36.5'
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 .01" inches
TOTAL PERFORATED AREA 10' Ft.

RISER PIPE MATERIAL Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4"
LENGTH OF PIPE SECTIONS 10 Ft.
JOINING METHOD Flush-joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 Ft.
PROTECTIVE PIPE O.D. 10 Inches (mm)

OTHER PROTECTION ~~STEEL~~ PROTECTIVE CASING WITH LOCKING lid AND lock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (~~FT~~)		ELEVATION (Ft) MSL	
TOP OF RISER PIPE	1.6 Ft.			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.3 Ft.			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP Surface	BOTTOM 12'	TOP	BOTTOM
BENTONITE	TOP 12'	BOTTOM 16'	TOP	BOTTOM
SAND	TOP 16'	BOTTOM 36.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 23.4	BOTTOM 33.4'	TOP	BOTTOM
PIEZOMETER TIP	35.8'			
BOTTOM OF BOREHOLE	36.5			
GWL AFTER INSTALLATION				

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

57

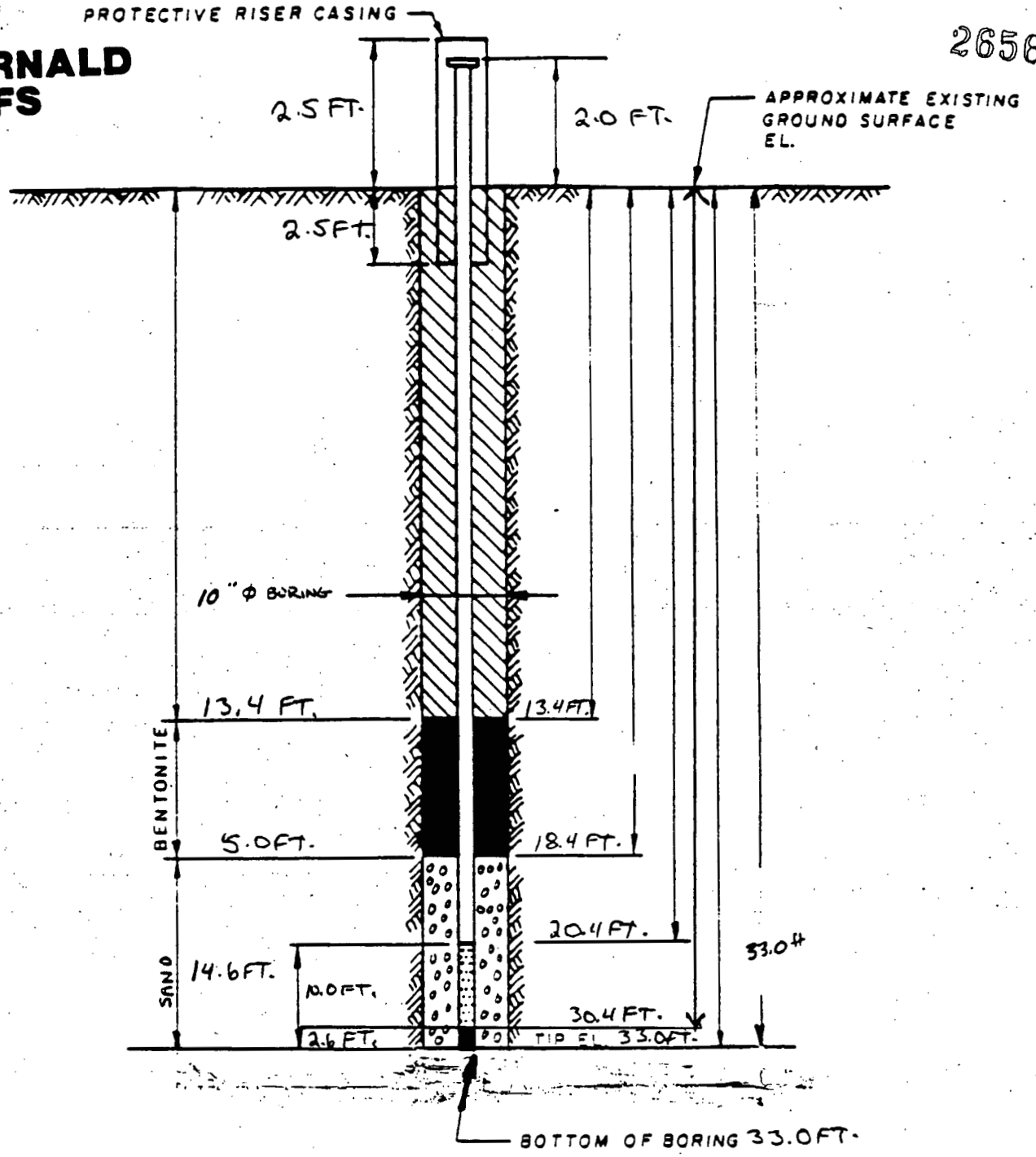
REMARKS _____

409-11-86

WELL # 181 #29

2656

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 181

PREPARED FOR

FERNALD RI/FS

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD
PROJECT NO. 602
BORING NO. 181
PIEZOMETER NO. NA

FIELD ENG./GEO. D. OAKLEY DATE 12-3-87
CHECKED BY DATE
DATE OF INSTALLATION 12.3.87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 4 TO 33 FT.
FLUID NA FROM NA TO NA

TYPE OF BIT FLATHEAD
CASING SIZE (S) USED:
SIZE 10" FROM 0 TO 30 FT.
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING
DIAMETER OF PERFORATED SECTION 4 INCH
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 INCH
TOTAL PERFORATED AREA 10.0 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN. I.D. 4 IN
LENGTH OF PIPE SECTIONS 10.0 FT.
JOINING METHOD THREAD AND COUPLE (FLUSH JOINT THREAD)

PROTECTION SYSTEM

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

OTHER PROTECTION LOCKING CAP 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			

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

59

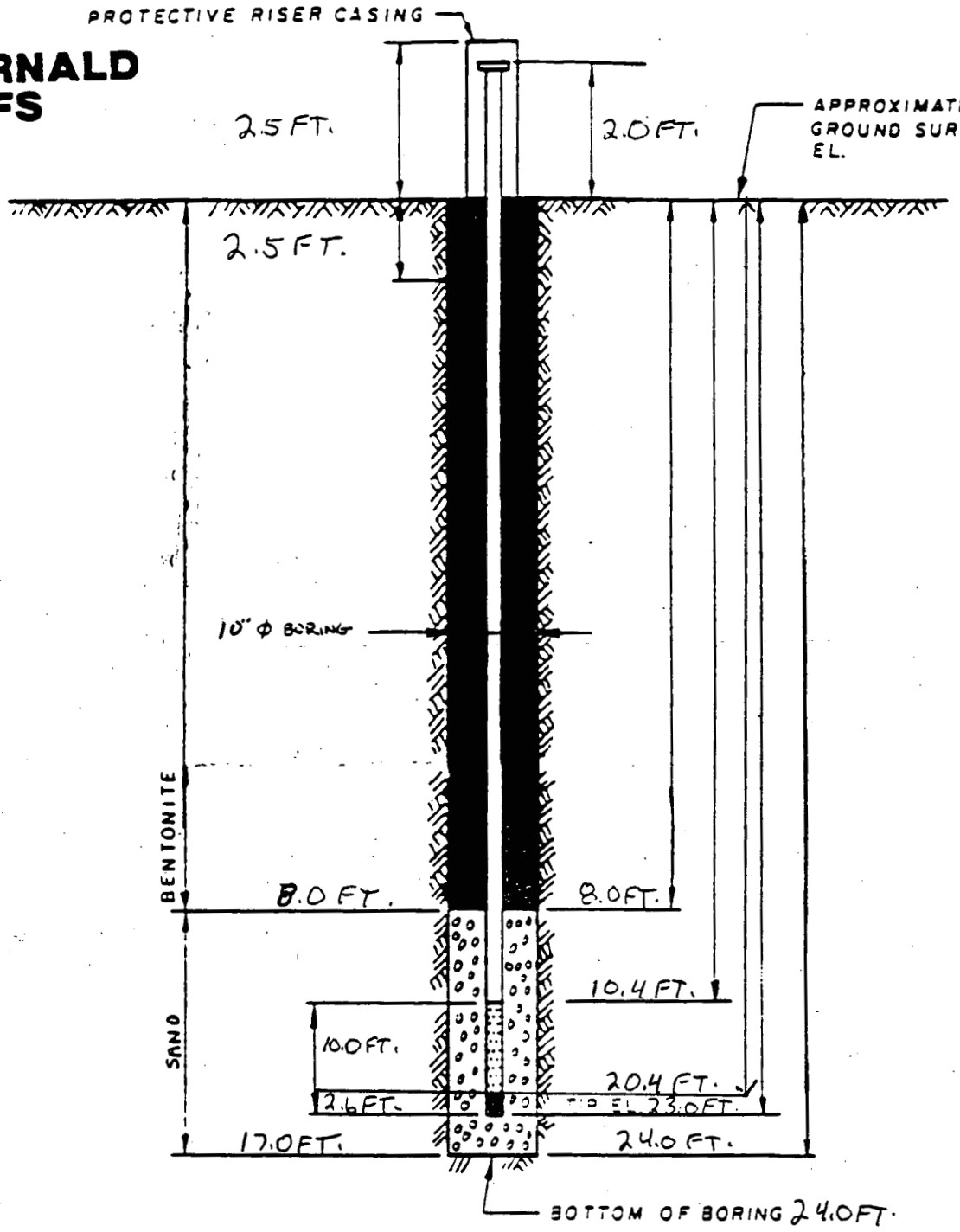
REMARKS

409-11-86

WELL # ~~[illegible]~~ 182 #30

2656

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY DRO

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 182

PREPARED FOR

FERNALD RI/FS

PAC

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
PROJECT NO. 602
BORING NO. 182
PIEZOMETER NO. NA

FIELD ENG./GEO. D. OAKLEY DATE 12-5-87
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 12-5-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 4 TO 24 FT.
FLUID NA FROM NA TO NA

TYPE OF BIT FLATHEAD
CASING SIZE (S) USED:
SIZE 10 IN FROM 0 TO 20 FT.
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING
DIAMETER OF PERFORATED SECTION 4 IN.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 SLOT
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 THREAD AND COUPLE
FLUSH JOINT THREAD

PROTECTION SYSTEM

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

OTHER PROTECTION LOCKING 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~~	TOP NA	BOTTOM	TOP	BOTTOM
BENTONITE	TOP 0.0 FT.	BOTTOM 8.0 FT.	TOP	BOTTOM
SAND	TOP 8.0 FT.	BOTTOM 24.0 FT.	TOP	BOTTOM
~~GRAVEL~~	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 10.4 FT.	BOTTOM 20.4 FT.	TOP	BOTTOM
PIEZOMETER TIP	23.0			
BOTTOM OF BOREHOLE	24.0 FT.			
GWL AFTER INSTALLATION	NA - DRY			

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

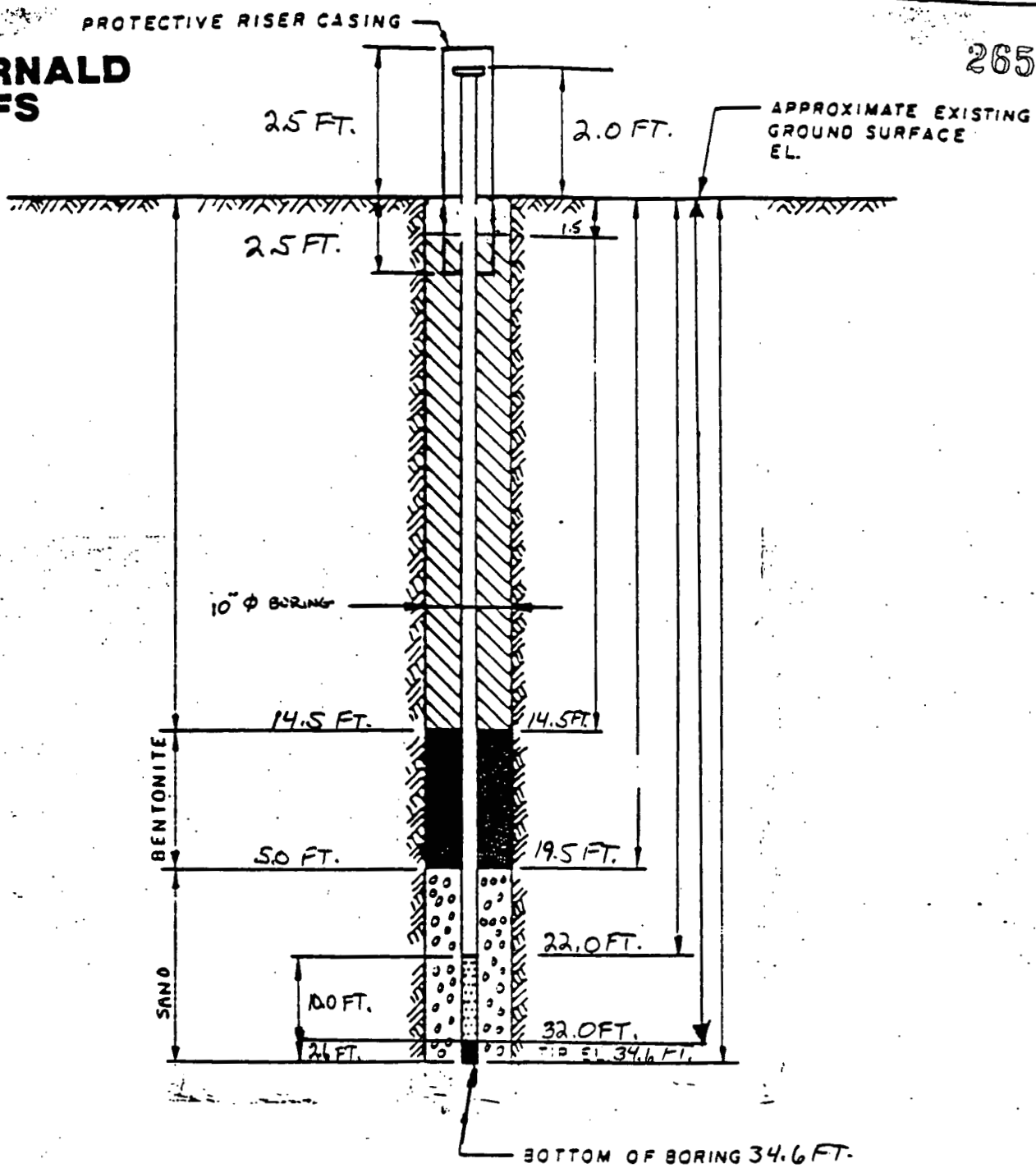
61

REMARKS _____

WELL # 178 #31

2656

FERNALD RI/FS



DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY VGO

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 178

PREPARED FOR

62

ERNALD
RI/FS

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. D. OAKLEY DATE 12.9.87
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 178
PIEZOMETER NO. NA DATE OF INSTALLATION 12.9.87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 4 FT. TO 34.6 FT.
FLUID NA FROM NA TO NA

TYPE OF BIT FLATHEAD
CASING SIZE (S) USED:
SIZE 10 IN. FROM 0 TO 34.5 FT.
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING
DIAMETER OF PERFORATED SECTION 4 IN
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 IN.
TOTAL PERFORATED AREA 10 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT.
JOINING METHOD THREAD AND COUPLE

PROTECTION SYSTEM

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

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	TOP 1.5 FT.	BOTTOM 14.5 FT.	TOP	BOTTOM
BENTONITE	TOP 14.5 FT.	BOTTOM 19.5 FT.	TOP	BOTTOM
SAND	TOP 19.5 FT.	BOTTOM 34.6 FT.	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 22.0 FT.	BOTTOM 32.0 FT.	TOP	BOTTOM
PIEZOMETER TIP	34.6 FT			
BOTTOM OF BOREHOLE	34.6 FT.			
GWL AFTER INSTALLATION	NA			

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

63

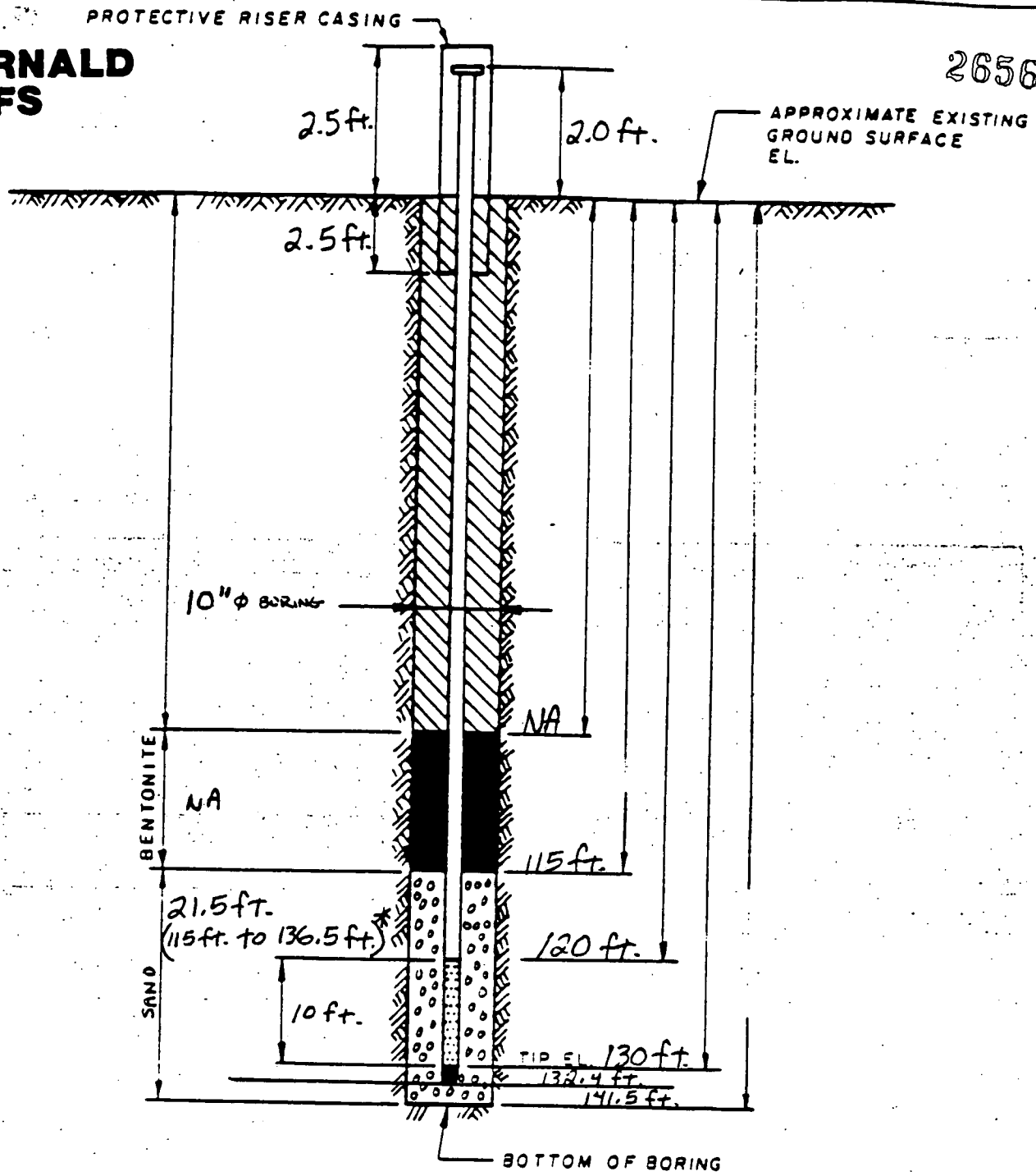
REMARKS _____

409-11-86

367

FERNALD RI/FS

2656



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 (77.75 ft. below T.O.C.)
5. WATER LEVEL READING ON 12/10/87 0725

INSTALLATION DETAILS
MONITORING WELL 367

PREPARED FOR

64

*Bottom 5 ft. of hole caved in, sand is placed above 136.5 ft.

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

RNALD
RI/FS

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fernald RI/FS FIELD ENG./GEO. L. Wille/ T. Sullivan DATE 12/10/87
PROJECT NO. 602.3.2 CHECKED BY _____ DATE _____
BORING NO. B367
PIEZOMETER NO. 367 DATE OF INSTALLATION 12/7-9/87

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT FLATHEAD HAMMER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM _____ TO _____	SIZE 10 FROM 0 TO 141.5'
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
TOTAL PERFORATED AREA 3 in² /ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft.	OTHER PROTECTION LOCKING CAP
PROTECTIVE PIPE O.D. 10" (NOM)	WITH 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 0	BOTTOM 115	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 115	BOTTOM 136 1/2	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 0725 12/10/87		

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

65

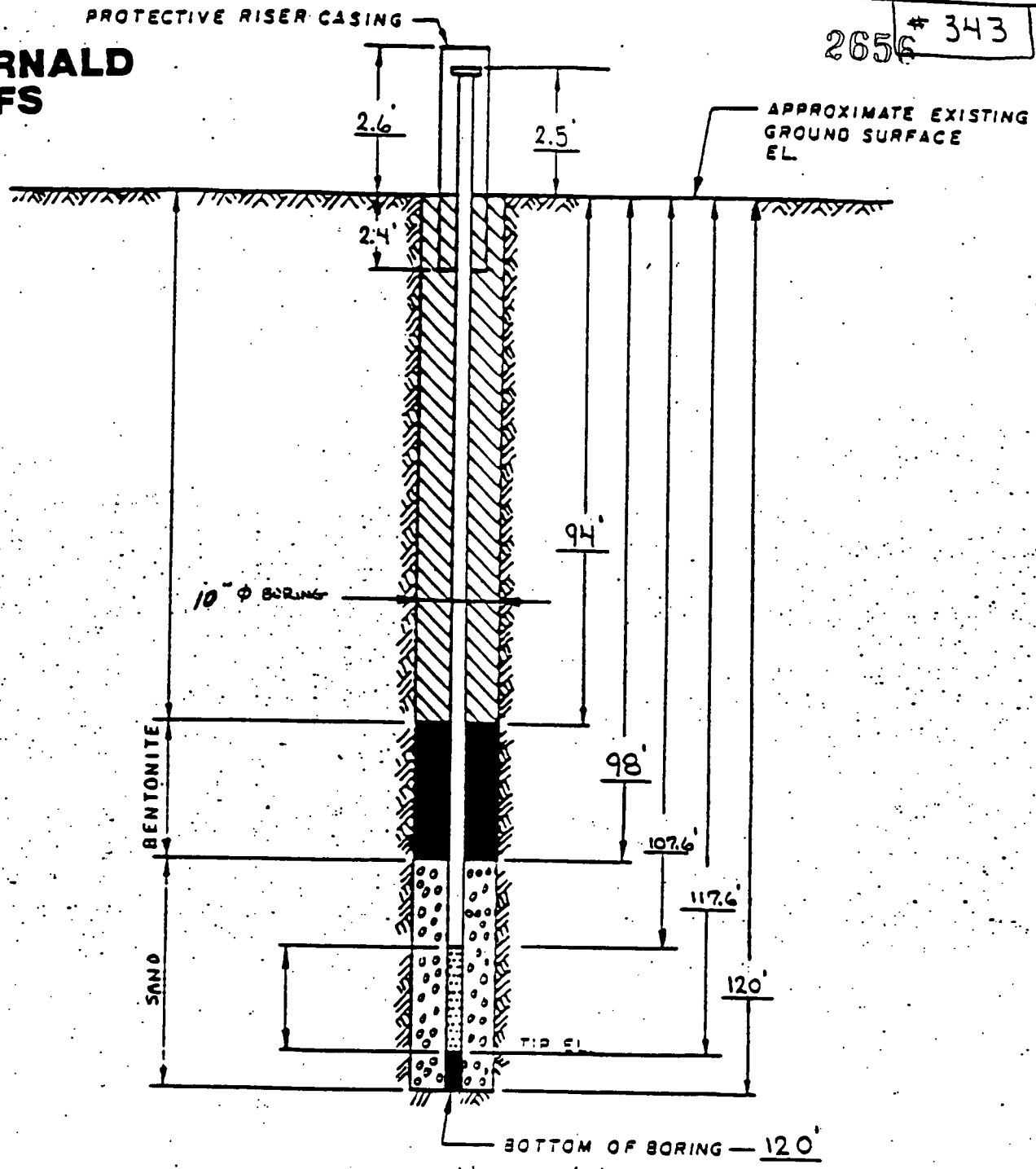
REMARKS _____

409-11-86

Borehole - Monitor We # 3

2656 # 343

FERNALD RI/FS



Note: Well was drilled to 126.5' to tag the "Blue clay" then allowed to collapse in to 120'.

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

PREPARED FOR

FMPC RI/FS

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY

66

FERNALD RI/FS

2656

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
DRILLING FLUID (S) USED:
FLUID Water FROM 0 TO 126.5'
FLUID NA FROM NA TO NA

TYPE OF BIT Hammer - Type
CASING SIZE (S) USED:
SIZE 10" FROM 0' TO 125'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless Steel
DIAMETER OF PERFORATED SECTION 4" Ø
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' & 2 1/2'
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	+ 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'			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑ 67

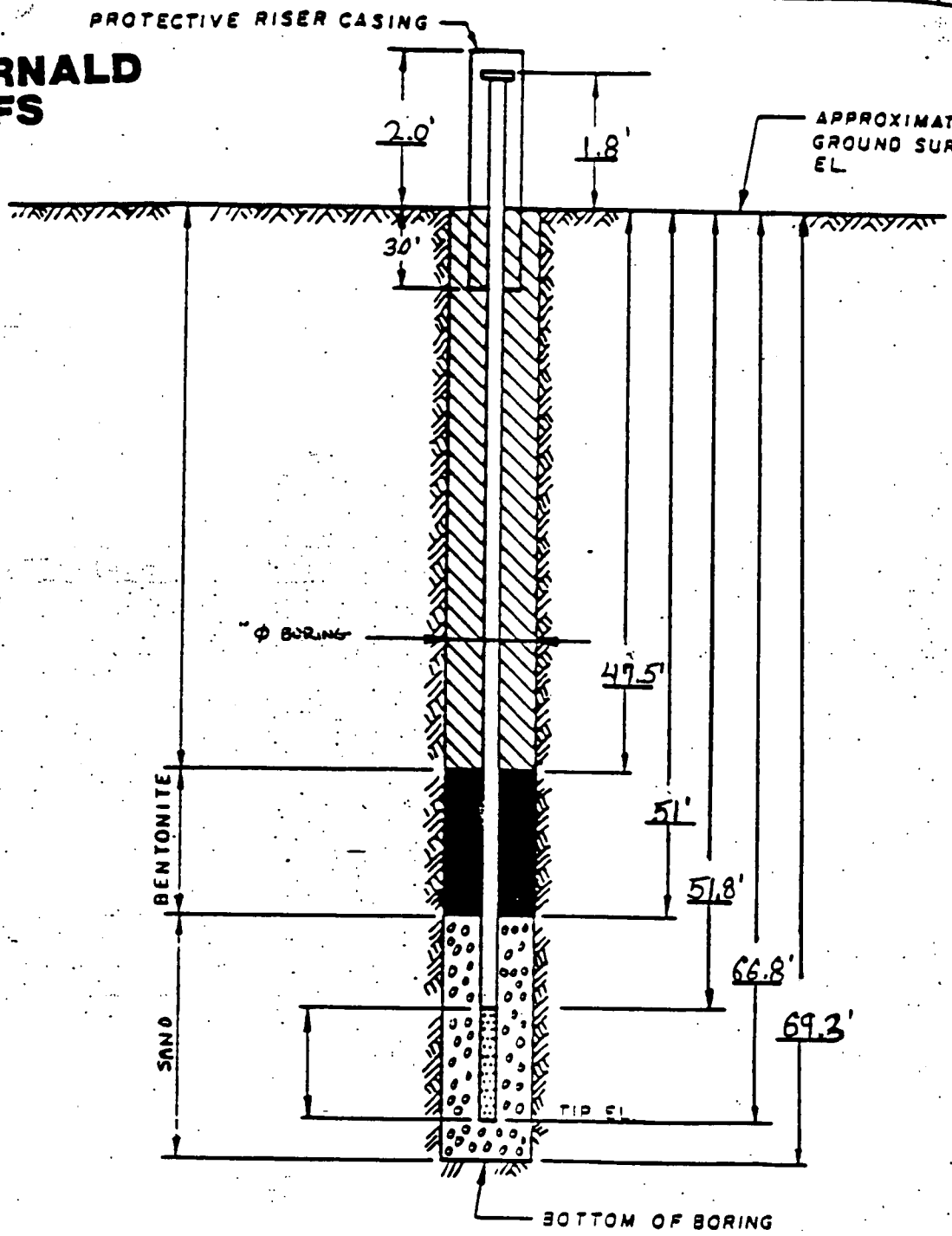
REMARKS This well was drilled to a total depth of 126.5' thus penetrating the "Blue Clay". It was allowed to collapse to 120' and the well was completed from that depth.

[redacted] # 34

Monitor Well 243

FERNALD RI/FS

2656



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 243

PREPARED FOR

FMPC RI/FS

ERNALD
RI/FS

2656

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" Ø
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 ☑

69

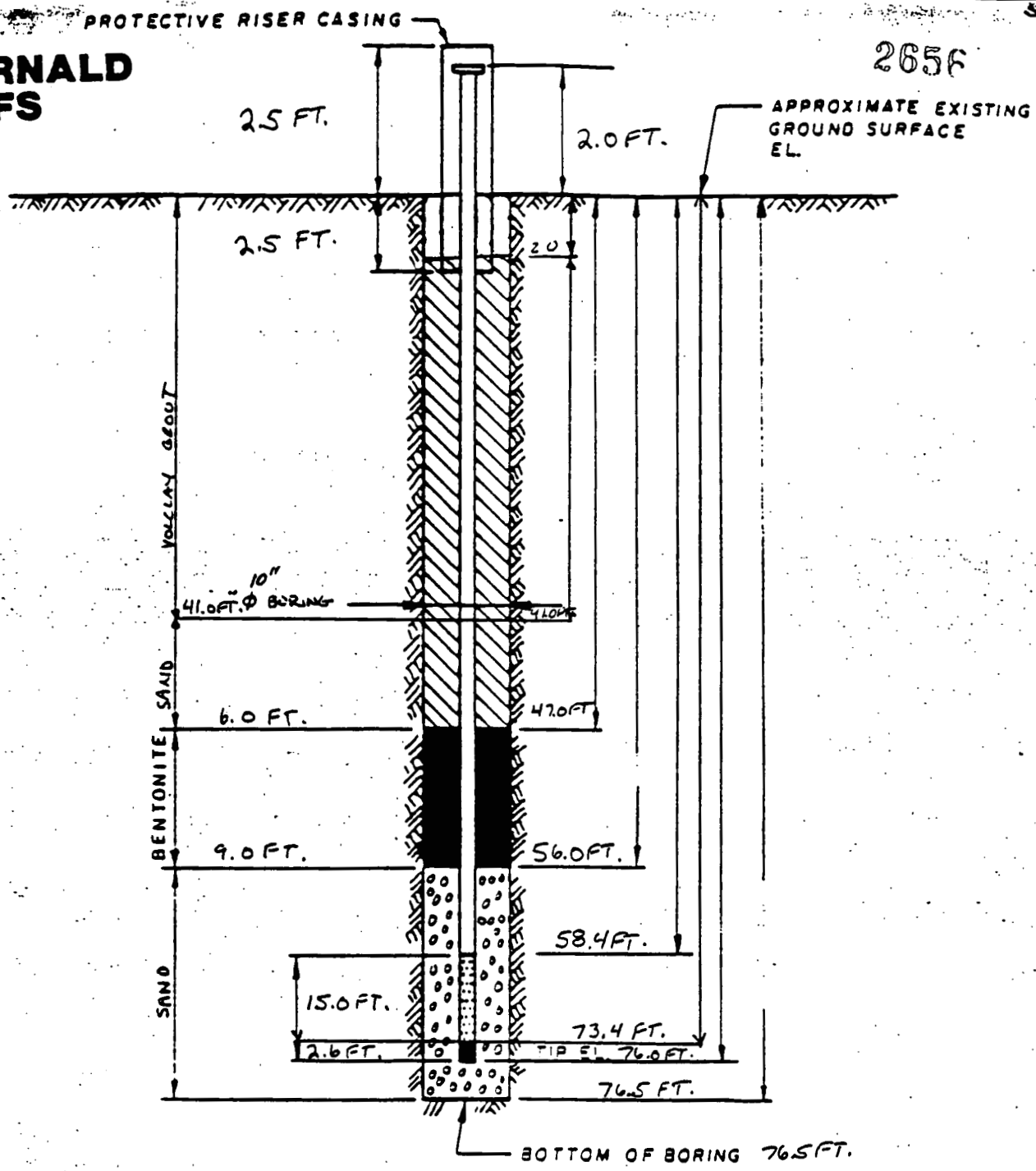
REMARKS

409-11-86

WELL # 227 # 35

265F

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 227

PREPARED FOR

DRAWING NUMBER

CHECKED BY

APPROVED BY

DRAWN BY DBO

70

FERNALD
RI/FS

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. OAKLEY/KEGLEY DATE 12-18-87
PROJECT NO. 602 CHECKED BY _____ DATE _____
BORING NO. 227
PIEZOMETER NO. NA DATE OF INSTALLATION 12-18-87 TO 12-20-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT FLATHEAD
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID WATER FROM 3.0 TO 76.5 FT.	SIZE 10 IN. FROM 0 TO 75
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE _____	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 COUPLE
TOTAL PERFORATED AREA 15 FEET	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FEET	OTHER PROTECTION LOCKING CAP AND LOCK
PROTECTIVE PIPE O.D. 10 INCH	

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 2.0 FT.	BOTTOM 41.0 FT.	TOP	BOTTOM
~~BENTONITE~~ SAND	TOP 41.0 FT.	BOTTOM 47.0 FT.	TOP	BOTTOM
~~SAND~~ BENTONITE	TOP 47.0 FT.	BOTTOM 56.0 FT.	TOP	BOTTOM
~~GRAVEL~~ SAND	TOP 56.0 FT.	BOTTOM 76.5 FT.	TOP	BOTTOM
PERFORATED SECTION	TOP 58.4 FT.	BOTTOM 73.4 FT.	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	76.5 FT.			
GWL AFTER INSTALLATION	64.0 FT.			

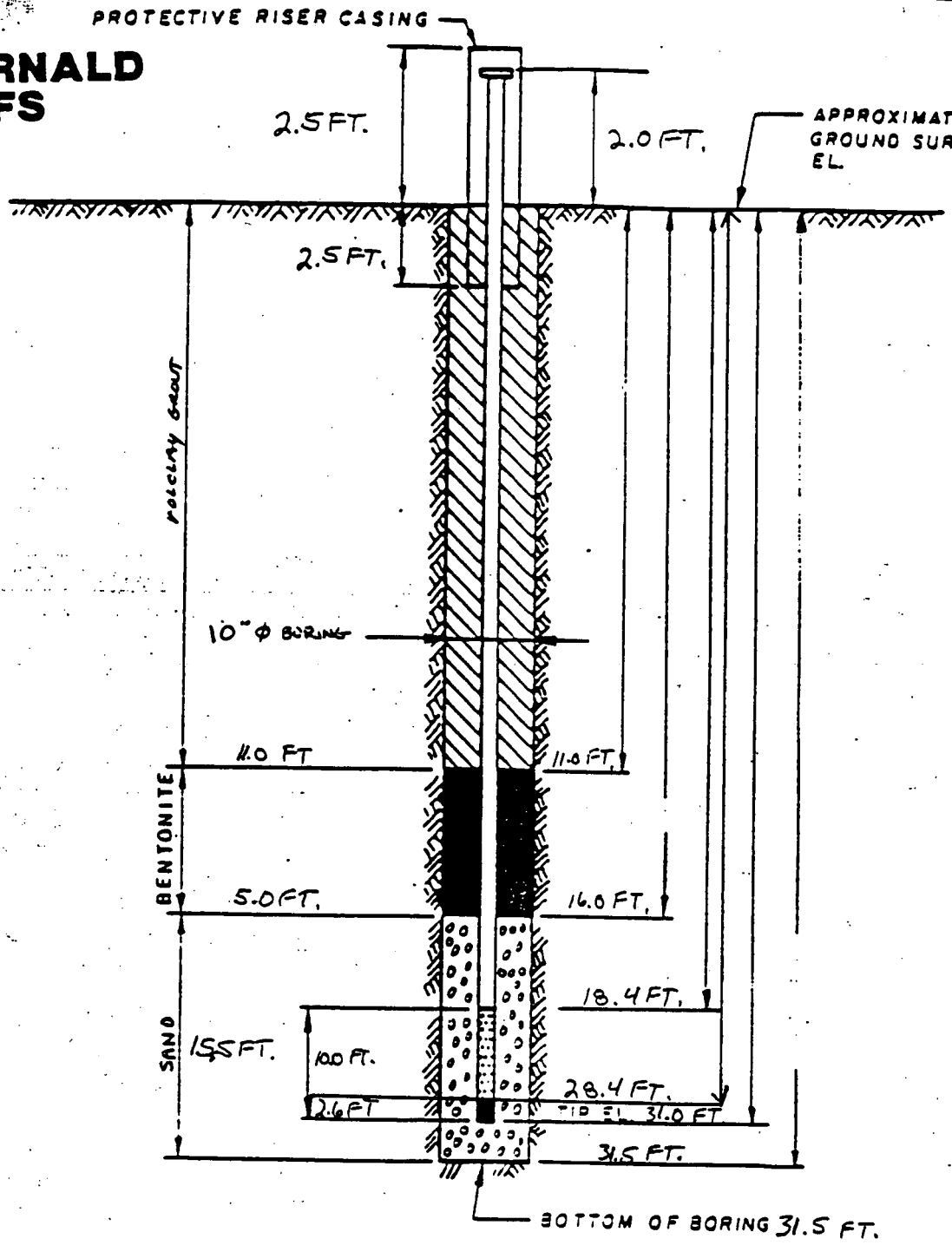
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒ 71
REMARKS _____

409-11-86

WELL # 127

FERNALD RI/FS

265F



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

DRAWING NUMBER

CHECKED BY

APPROVED BY

D130

DRAWN BY

FERNALD RI/FS

2656

PIEZOMETER INSTALLATION SHEET

PROJECT NAME FERNALD RI/FS
PROJECT NO. 692
BORING NO. 127
PIEZOMETER NO. N/A

FIELD ENG./GEO. D. OAKLEY DATE 12-23-87
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 12-22-87 - 12-23-87

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 4.0 TO 31.5 FT
FLUID _____ FROM _____ TO _____

TYPE OF BIT FLATHEAD
CASING SIZE (S) USED:
SIZE 10 IN FROM 0 TO 30 FT.
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE MONITORING
DIAMETER OF PERFORATED SECTION 4 IN
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 10 FT.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4 IN
LENGTH OF PIPE SECTIONS 10 FT.
JOINING METHOD THREAD AND COUPLE

PROTECTION SYSTEM

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

OTHER PROTECTION LOCKING CAP

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.8 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 ☒

73

REMARKS _____

409-11