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**CONSOLIDATED CONSENT AGREEMENT/  
FEDERAL FACILITIES COMPLIANCE  
AGREEMENT MONTHLY PROGRESS REPORT  
PERIOD ENDING MAY 31, 1990**

**05/31/90**

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ENCLOSURE**

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**Introduction**

The Consent Agreement (CA) under CERCLA Section 120 and 106(a) and the Federal Facilities Compliance Agreement (FFCA) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (USEPA), signed April 9, 1990, and July 18, 1986, respectively, require that monthly reports be submitted to the USEPA regarding progress made to meet the provisions of those agreements. This report fulfills those requirements by describing actions undertaken at the Feed Materials Production Center (FMPC) during the period May 1 through May 31, 1990, and proposed actions for the period June 1 through June 30, 1990.

Highlights of work performed in May include:

- o Work Plans for Plant 2/3 and Plant 9 removal actions were submitted to the USEPA on May 4, 1990.
- o The Engineering Evaluation/Cost Analysis for the Waste Pit Runoff Control removal action was submitted to the USEPA and for public review on May 30, 1990.
- o One Engineering Estimate/Cost Analysis (EE/CA) Workshop, to discuss the South Plume, was conducted on May 30, 1990.
- o Two Roundtable discussions were held. The first discussion was about hazardous waste, and was held on May 8, 1990, at ASI. The second discussion held on May 23, 1990, also at ASI, focused on the K-65 efforts.
- o Five monitoring wells were completed in May. The wells are part of the 31 Well Programs and are as follows:

| <u>Well No.</u> | <u>Date Complete</u> |
|-----------------|----------------------|
| MW-2386         | 5/02/90              |
| MW-3391         | 5/15/90              |
| MW-3045         | 5/17/90              |
| MW-2028         | 5/19/90              |
| MW-2394         | 5/21/90              |

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INTRODUCTION (CONT.)

- o Three borings were completed as part of the Facilities Testing Program. They are as follows:

| <u>Boring No.</u> | <u>Date Completed</u> | <u>As Piezometer</u> |
|-------------------|-----------------------|----------------------|
| 1516              | 5/19/90               | Yes                  |
| 1517              | 5/21/90               | Yes                  |
| 1518              | 5/22/90               | Yes                  |

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**WORK ASSIGNMENTS AND PROGRESS**

Descriptions of ongoing work progress are presented in the following sections and/or attachments of this report:

- o CA Section IX - Removal Action
- o CA Section X - Remedial Investigation/Feasibility Study
- o Attachment A - Wastewater flows and radionuclide concentrations under CA Section XXIII.B
- o Attachment B - FFCA: Initial Remedial Measures and Other Open Actions
- o Attachment C - Drilling/Boring Logs

**Section IX. Removal Actions**

Section IX provides a status update of activities associated with the implementation of Removal Actions (RAs) at the FMPC for May 1990. The information is presented for each of the four removal actions identified in the Consent Agreement, including:

- o RA No. 1, Contaminated Water Beneath FMPC Buildings
- o RA No. 2, Waste Pit Area Runoff Control
- o RA No. 3, South Groundwater Contamination Plume
- o RA No. 4, Silos 1 and 2

**Contaminated Water Beneath FMPC Buildings**

Plant 6 - The ongoing pumping activity from three wells and the clarifier pit was curtailed in late April due to the presence of HSL/VOC constituents in a water sample of well #1149. Subsequent to the notification of the USEPA concerning this action, a letter was received requesting that a modified work plan be submitted for the restart of Plant 6 pumping. A modified work plan was developed and will be transmitted for USEPA approval in June 1990. This work plan identifies the testing, sampling/analysis, and design/procurement/construction actions necessary to restart the Plant 6 perched water pumping system. All succeeding schedules are tied to receipt of USEPA approval of the modified work plan.

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Plant 2/3 and Plant 9 - On April 2, 1990, the USEPA notified the Department of Energy that RA No. 1 should be expanded to include contaminated water found by the RI/FS investigation team beneath FMPC Plants 2/3 and Plant 9. The USEPA letter requested that Work Plans be developed and submitted for their review and approval within 30 days.

Work Plans for Plants 2/3 and Plant 9 were prepared and submitted by DOE to the USEPA on May 4, 1990; the CA specifies a thirty-day USEPA review/approval period, closing on June 6, 1990.

Activities for the month of June will center around responding to USEPA's comments and on the planning and engineering necessary to implement the activity. Future deliverables are tied to USEPA's approval of the Work Plans.

| <u>KEY MILESTONES</u>                                       | <u>STATUS</u> | <u>DATE</u>  |
|---|---------------|--------------|
| - Issue Plant 2/3 Work Plan to USEPA for review/approval    | Completed     | May 4, 1990  |
| - Issue Plant 9 Work Plan to USEPA for review/approval      | Completed     | May 4, 1990  |
| - Receive USEPA's comments/approval on Plants 2/3 Work Plan | Open          | June 6, 1990 |
| - Receive USEPA's comments/approval on Plant 9 Work Plan    | Open          | June 6, 1990 |
| - Issue revised Plant 6 Work Plan for USEPA review/approval | Open          | June 8, 1990 |

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**RA No. 2, Waste Pit Runoff Control**

The Engineering Evaluation/Cost Analysis (EE/CA) was prepared and submitted for USEPA and public review on May 30, 1990. The USEPA and public review period is scheduled to close on June 30, 1990. A public Waste Pit EE/CA Workshop is scheduled to be held on June 6, 1990, at the Crosby Elementary School. At this workshop, the EE/CA process and alternatives will be discussed followed by an informal question and answer session and a formal verbal comment period.

The Community Relations Plan (CRP) is being prepared for placement into the Administrative Record (AR) file on June 6, 1990. The AR file for this removal action was established on May 7, 1990. The Removal Site Evaluation (RSE) for this removal action was prepared and issued on May 21, 1990.

No issues or problem areas have been identified.

**RA No. 3, South Groundwater Contamination Plume**

Comments were received on the South Plume EE/CA from both the USEPA and Ohio EPA. Both agencies questioned the validity of the proposed action (pumping of plume with discharge to the Great Miami River without treatment). Members of the general public requested and received a thirty-day extension on the closure of the public comment period. The revised closure of the public comment period is now June 18, 1990. In order to assist the public in their review of the EE/CA, an EE/CA Review Workshop was held on May 30, 1990 at Crosby School. At this meeting, the EE/CA process and alternatives were discussed followed by an informal question and answer session and a formal comment period. All comments received during the formal comment period will be addressed in the EE/CA responsiveness summary.

Consistent with the language of the CA, DOE was scheduled to provide a revised EE/CA incorporating the USEPA's comments by June 16, 1990. The DOE will formally request an extension to allow for receipt and simultaneous incorporation of public comments. Work in the upcoming month will center around the receipt and reconciliation of the comments on the EE/CA and the reissuance of an approval issue of the EE/CA. The revised EE/CA document will be submitted to U.S. EPA and Ohio EPA on August 1, 1990.

No problem areas have been identified to date.

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**RA No. 4, Silos 1 & 2**

Work is progressing on the EE/CA document for this removal action. During the last month, an internal draft of the subject EE/CA was issued for internal comments. Work is progressing on schedule to meet the August 1, 1990, EE/CA submittal to EPA.

No problem areas have been identified.

**Section X. Remedial Investigation and Feasibility Study**

Section X provides an FMPC operable unit and RI/FS community relations update of activities for May 1990. Status information is presented for each of the five operable units identified in the Consent Agreement. The five operable units are:

- o Operable Unit 1: Waste Pits 1-6, Clearwell, and burn pit;
- o Operable Unit 2: Other Waste Units (fly ash piles, lime sludge ponds, solid waste landfill, south field area, and scrap metal piles);
- o Operable Unit 3: Production area and suspect areas outside production area (including effluent line to Great Miami River);
- o Operable Unit 4: Silos 1, 2, 3, and 4;
- o Operable Unit 5: All environmental media (i.e., including groundwater, surface water, soils, air, flora, fauna, etc.);

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**Operable Unit 1: Waste Pits**

**1.1 Remedial Investigation**

**a. Status of Work - Key Milestones**

The Draft RI Report is 35 percent complete.

**b. Issues/Policies**

Internal comments on the OU4 RI Report are also applicable to the OU1 Report and are currently being resolved. Issues include:

- QA review of RI data
- Focus of RI - highlight accomplishments or data deficiencies
- Cut-off date for inclusion of new data
- Handling of pending RI activities not yet conducted
- RI report approach to NEPA requirements
- Need to acquire more data
- Lack of timely preparation of data tables and maps from master database

**c. Corrective Actions**

The issues described above will be resolved between organizations involved.

To resolve internal issues relative to data management, the project team developed a system of data base, table, and map request priorities and a production management structure to provide timely support.

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Operable Unit 1: Waste Pits

d. Planned Activities for June 1990

Activities will center around continued preparation of the Draft RI Report and resolution of internally generated comments.

1.2 Feasibility Study

a. Status of Work - Key Milestones

| <u>Activity</u>                 | <u>Comment</u>             |
|---------------------------------|----------------------------|
| Bench scale testing plan        | Internal Review            |
| Prepare Revised Task 12* Report | 78% of total task complete |
| Task 13**                       | 50% of total task complete |
| NEPA Input Task 13              | No activity to date        |

b. Issues/Problems

None

c. Corrective Actions

None required

d. Planned Activities for June 1990

Activities will center around preparation of the Detailed Analysis of Alternatives and issuing the Revised Task 12 (Initial Screening of Alternatives) Report for DOE review by June 6.

1.3 Risk Assessment

a. Status of Work - Key Milestones

Sub-tasks completed:

- Chapter 1 of the Baseline Risk Assessment Report for OU1 was drafted.

\* Initial Screening of Alternatives

\*\* Detailed Analysis of Alternatives

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**Operable Unit 1: Waste Pits**

a. **Status of Work - Key Milestones (cont.)**

- Chemicals and radionuclides of concern have been identified.
- Quantities of radionuclides and hazardous chemicals within OUI have been estimated.
- Environmental sampling data for hazardous chemicals have been collected and stored.

Sub-tasks in process:

- Compilation of environmental sampling data for radionuclides.
- Fate and transport calculations for groundwater pathways.
- Review of calculational models for transport via surface water and air pathways.
- Calculation of exposure concentrations for each pathway.
- Estimation of contaminant intake for each pathway.
- Toxicity assessment.
- Preliminary drafting of chapters of a working draft Baseline Risk Assessment Report.

FS risk assessment sub-tasks in process:

- The RA team is working directly with the FS engineering task teams for all operable units on a routine basis. The FS RAs are in the initial phases and are proceeding on schedule as an integral part of FS activities. Risk assessment involvement in determination of remedial objectives and goals is proceeding. A method of incorporation of risk assessment activities into the evaluation of "Detailed Analysis of Alternatives" has been developed and adopted to ensure consistency for all operable units.

b. **Issues/Problems**

None

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**Operable Unit 1: Waste Pits**

**c. Corrective Actions**

None required

**d. Planned Activities for June 1990**

See Section 1.3.a, "Sub-tasks in progress" and "FS risk assessment sub-tasks in progress."



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**Operable Unit 2: Other Waste Units**

**2.1 Remedial Investigation**

**a. Status of Work - Key Milestones**

The draft RI report is currently scheduled for submission to DOE on June 29.

**b. Issues/Problems**

Relevant groundwater information is currently being evaluated for incorporation into the RI Report and Risk Assessment. This information is being progressively reviewed and is scheduled for completion on July 30, 1990. It is likely that the groundwater information incorporation will be completed too late for inclusion in the initial draft of the RI report submitted for DOE site review. It will, however be incorporated in the next revision for DOE review.

**c. Corrective Actions**

If the groundwater information is not received by June 11, the RI report will have to be submitted without it. The report will incorporate the groundwater information along with comments by DOE site.

**d. Planned Activities for June 1990**

The draft RI report will be forwarded to the ASI Peer Review team the week of June 11 for review. Their comments will be returned by June 18.

**2.2 Feasibility Study**

**a. Status of Work - Key Milestones**

The Task 12 Report was submitted to DOE HQ on May 29. Comments are scheduled to be forwarded to ASI by June 29.

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**Operable Unit 2: Other Waste Units**

**a. Status of Work - Key Milestones (cont.)**

The Task 13 presentation is scheduled for the end of July. The major effort during this month was the development of the cost estimates for each alternative. The packaging and transportation requirements were determined for each alternative.

The preliminary evaluation conducted for the fate and transport modeling for groundwater is complete; the final work is under quality-control review. Changes will be incorporated into the deliverables as the process continues.

**b. Issues/Problems**

None

**c. Corrective Actions**

None required

**d. Planned Activities for June 1990**

During June, the cost estimates and the packaging and transportation requirements will be completed. The analysis of the fate and transport work is ongoing; results will be incorporated into Task 13. Since comments on the Task 12 document are due at the end of the month, incorporation of these comments will occur during July.

**2.3 Risk Assessment**

Risk Assessment work will be initiated in June 1990.

**FMPC RI/FS FFA TRACKING  
OPERABLE UNIT 2 - OTHER WASTE UNITS**

| ACTIVITY                                 | FY 1990                        |   |   |   |   |   |   |   |   |   |   |   | FY 1991                        |   |   |   |   |   |   |   |   |   |   |   | FY 1992                        |   |   |   |   |   |   |   |   |   |   |   | % COMPL |     |
|--|--------------------------------|---|---|---|---|---|---|---|---|---|---|---|--------------------------------|---|---|---|---|---|---|---|---|---|---|---|--------------------------------|---|---|---|---|---|---|---|---|---|---|---|---------|-----|
|  | O                              | N | D | J | F | M | A | M | J | J | A | S | O                              | N | D | J | F | M | A | M | J | J | A | S | O                              | N | D | J | F | M | A | M | J | J | A | S | PLN     | ACT |
|  | [Gantt chart bars for FY 1990] |   |   |   |   |   |   |   |   |   |   |   | [Gantt chart bars for FY 1991] |   |   |   |   |   |   |   |   |   |   |   | [Gantt chart bars for FY 1992] |   |   |   |   |   |   |   |   |   |   |   |         |     |
| RI REPORT/RISK ASSESSMENT *              | [Solid black bar from J to J]  |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 33      | 38  |
| TASK 12 * :<br>INITIAL SCREENING OF ALTs | [Solid black bar from J to J]  |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 73      | 84  |
| TASK 13 + :<br>DETAILED ANALYSIS OF ALTs | [Solid black bar from J to J]  |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 45      | 45  |
| TASK 14 -<br>SELECTION OF PREFERRED ALT  | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 0       | 0   |
| TASK 15/16 * **<br>FS REPORT             | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 0       | 0   |
| TASK 17 * :<br>PROPOSED PLAN             | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 0       | 0   |
| TASK 18 + :<br>RESPONSIVENESS SUMMARY    | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 0       | 0   |
| TASK 19 -<br>DRAFT RECORD OF DECISION    | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | [Gantt bar from J to J]        |   |   |   |   |   |   |   |   |   |   |   | 0       | 0   |

**LEGEND :**  
 PLANNED  
 PROGRESS  
 - AS/IT MILESTONE  
 - DEL TO EPA  
 - DOE MILESTONE  
 - DOE MILESTONE

**NOTES :**  
 \* - PRIMARY DOCUMENT  
 \*\* DOE MAY EXTEND 20 DAYS  
 + - SECONDARY DOCUMENT/PRESENTATION

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**Operable Unit 3: Production Area**

**3.1 Remedial Investigation**

**a. Status of Work - Key Milestones**

A groundwater working group was formed during May. They will prepare text for direct incorporation into the Operable Unit 3 RI perched-groundwater section.

**b. Issues/Problems**

None

**c. Corrective Actions**

None required

**d. Planned Activities for June 1990**

During June, a geologist will be added to the site RI staff to accelerate RI completion schedule. Also, the draft groundwater report from the groundwater working group is expected to be available to OU3 before June 30, 1990.

**3.2 Feasibility Study**

**a. Status of Work - Key Milestones**

Comments were received and incorporated from the internal Task 12 report review.

**b. Issues/Problems**

None

**c. Corrective Actions**

None required

**d. Planned Activities for June 1990**

The Task 12 Report will be available for DOE Site Office review no later than June 8, 1990.

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**Operable Unit 3: Production Area**

**3.3 Risk Assessment**

**a. Status of Work - Key Milestones**

Reviews of relevant contamination data from the Renovation EIS Report, the DOE Baseline Survey report, and the FMPC Environmental Monitoring Program data were accomplished. RI/FS data have not yet been reviewed by RA personnel.

**b. Issues/Problems**

Flo Gemini database access to radiological and chemical data for RA staff is not available.

**c. Corrective Actions**

RA personnel are working to resolve the database access issue.

**d. Planned Activities for June 1990**

Field facilities testing radiological and chemical analytical data will be analyzed and tabulated.



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**Operable Unit 4: Silos 1, 2, 3, and 4**

**4.1 Remedial Investigation**

**a. Status of Work - Key Milestones**

The revision of the Draft RI Report is 70 percent complete.

**b. Issues/Problems**

Policy issues raised in OU4 RI Report comments need to be resolved. Issues include:

- QA review of RI data
- Cut-off date for inclusion of new data
- Incorporation of NEPA requirements into the RI Report
- Lack of previous preparation of data tables and maps from the master database

**c. Corrective Actions**

The project team has developed a system of data base, table, and map request priorities and a production management structure to provide timely support to RI/FS activities. Other corrective actions are being proposed. Corrective actions will be implemented.

**d. Planned Activities for June 1990**

Activities will center around continued revision of the Draft RI Report.

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Operable Unit 4: Silos 1, 2, 3, and 4

4.2 Feasibility Study

a. Status of work - Key Milestones

The following activities were completed or are in progress for this period:

- Task 12 Report to be submitted to EPA on June 1, 1990
- Tasks 14\* and 15\*\* underway
- Received draft EE/CA from Bechtel (K-65 silos)
- Updating Task 13 Presentation - Applicable, Relevant, and Appropriate Requirements (ARARs) & cost
- Meeting for OU4 ARARs development

b. Issues/Problems

- Sampling K-65 silos (residues & berm)

c. Corrective Actions

- Sampling plans are being completed

d. Planned Activities for June 1990

- Draft Task 12 Report to EPA by June 4th
- Task 13 presentation to DOE
- Sampling of K-65 silos (expected)
- Issue list of selected ARARs and To Be Considered Requirements (TBCs) for OU4

\* Selection of Preferred Alternatives

\*\*Draft FS Report

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4.3 Risk Assessment

a. **Status of Work - Key Milestones**

The Baseline Risk Assessment Report is being revised to address:

- DOE comments on the interim draft
- Analytical results of silo samples recently obtained under the OU4 supplemental Sampling and Analysis Plan
- Recently issued standard report guidelines for RI/FS
- Comments and suggestions to provide consistency with other operable unit reports and progress during the review period
- The RA team is working directly with the FS engineering task teams for all operable units on a routine basis. The FS RAs are in the initial phases and are proceeding on schedule as an integral part of FS activities. Risk assessment involvement in the determination of remedial objectives and goals is proceeding. A method of incorporation of risk assessment activities into the evaluation of "Detailed Analysis of Alternatives" has been developed and adopted to ensure consistency for all operable units.

b. **Issues/Problems**

Analytical results from planned berm and slant boring sampling under the supplemental Sampling and Analysis Plan for OU4 are not expected to be available for several months.

c. **Corrective Actions**

Any revisions to the Baseline Risk Assessment report resulting from these new data will be incorporated during the RI Report review cycle.

d. **Planned Activities for June 1990**

Continuation of activities noted in 4.3.a.



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**Operable Unit 5: All Environmental Media**

**5.1 Remedial Investigation**

**a. Status of Work - Key Milestones**

The focus of work on the OU5 RI Report has been shifted to the completion of the comprehensive site groundwater report. This report will become an integral part of the RI for OU5.

Work continues on completion of other media components (sediment, soil, air) within the OU5 RI.

The completion of the RI report is dependent upon the completion of the groundwater report and since OU5 is dominated by groundwater issues, it is important that progress on the groundwater report remain on schedule. The site office is closely monitoring the status.

**b. Issues/Problems**

None required

**c. Corrective Actions**

None required

**d. Planned Activities for June 1990**

Complete a working draft of the groundwater report in late June.

**5.2 Feasibility Study**

**a. Status of Work - Key Milestones**

Comments on the draft Task 12 Report were received on May 3, 1990.

A comment resolution meeting concerning the Task 12 comments was held on May 23, 1990.

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**Operable Unit 5: All Environmental Media**

a. **Status of Work - Key Milestones (cont.)**

b. **Issues/Problems**

The initiation of Task 13 has been delayed due to its dependency on the completion of the RI and baseline risk assessment. This task was initially scheduled to begin on April 20, 1990. The delay of Task 13 should not impact the completion date of this task.

c. **Corrective Actions**

None required

d. **Planned Activities for June 1990**

Start Task 13.

Submit a Revised Draft Task 12 Report to DOE headquarters during the first week of June 1990.

5.3 Risk Assessment

a. **Status of Work - Key Milestones**

The compilation of groundwater data has been completed.

The following sub-tasks are in progress:

- Internal review and editing of preliminary working drafts of Chapters 1, 2 and 3 of the Baseline Risk Assessment
- Exposure assessment
- Confirmation of preliminary list of contaminants of concern
- Selection of final list of chemicals and radionuclides of concern
- Toxicity assessment for contaminants of concern

Work on the initial phases of the FS risk assessment is proceeding.

b. **Issues/Concerns**

None

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**Operable Unit 5: All Environmental Media**

**b. Corrective Actions**

None required

**c. Planned Activities for June 1990**

Continue FS risk assessment.

Continue exposure and toxicity assessments.

Complete Chapters 1, 2 and 3 of the Baseline Risk Assessment.



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**RI/FS Community Relations**

**a. Status of Work - Key Milestones**

A RI/FS Community Meeting was held on May 22 at Stricker's Grove. Attendance was between 50-60 community members. Presentations were given on the following topics: site office update, the four removal actions (process, alternatives, schedules), RI/FS update, new findings of contaminated wells, overview of FS, FMPC Environmental Monitoring Program, community participation, and an update of issues from the February 20 meeting.

The first EE/CA workshop was held on May 30 in the Crosby School; the topic was the South Plume EE/CA. About 20 community members attended. The staff gave a 20 minute presentation, followed by group questions and answers. Less than 10 minutes of public testimony were presented. South Plume and Waste Pit EE/CAs and public comment forms were distributed.

Materials were developed and distributed for the RI/FS-EIS scoping meetings scheduled for June 12-13. The materials included a four-page fact sheet, a one-page flyer, a press release, and a comment response form. All but the press release were distributed during the May 22 Community Meeting.

Community Roundtables discussing hazardous waste issues and the K-65 silos were held on May 8 and May 23. RI/FS staff participated in the two meetings.

Site Office is expediting DOE/HQ approval of proposed RI/FS cleanup update, a periodical to inform the community about CERCLA and related environmental cleanup issues.

**b. Issues/Problems**

A commitment has been made to hold a workshop for each EE/CA. Two such workshops have been held; others will follow within the first two weeks of each comment period. In a related matter, we also need to develop a strategy for workshops for each operable unit. Schedule is an issue. If held, each workshop must take place at a point in each operable unit Feasibility Study schedule that is useful for public input.

The rationale for the large-scale RI/FS community meetings, now that the project is in a results mode (interim removal actions getting underway, major RI/FS documents published) needs to be reexamined. The public is expressing opposition to the increased number of meetings.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES  
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**1114**

Period Ending May 31, 1990

**c. Corrective Actions**

Project team will develop workshop and public meeting strategies.

**d. Planned Activities for June 1990**

DOE will submit the RI/FS and removal action Community Relations Plan to U.S. EPA on June 4, 1990.

**Public Comment Periods**

- EIS Scoping Meetings - June 12 and 13; comment period postmark deadline is June 22
- South Plume and Waste Pit EE/CA comment periods end June 17 & 30, respectively

Site Office will publish the first RI/FS cleanup update this summer.

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Attachment A with its accompanying tables provides (1) data on daily wastewater flows and radionuclide concentrations and loadings released to the Great Miami River and (2) an estimate of runoff and radionuclide concentrations to Paddy's Run during May 1990, in accordance with the requirements of Section XXIII.B of the Consent Agreement under CERCLA Section 120 and 106(a).

**Summary**

The attached tables summarize data on radioactivity and uranium in the effluent from the FMPC during May 1989. The total uranium discharged to the Great Miami River via Manhole 175 (Outfall 1I000004001) was 244.5/lbs (111.0 kilograms). The total uranium discharged from the Stormwater Retention Basin (Outfall 1I000004002) to Paddy's Run via the storm sewer outfall ditch was 2.7 lbs (1.2 kilograms).

Runoff flow and radionuclide concentrations to Paddy's Run from uncontrolled areas of the FMPC are not monitored on a regular basis. Random grab samples from the drainage courses discharging to Paddy's Run have been analyzed for total uranium only. Based on the annual average rainfall, an engineering estimate has been made of the runoff flow to Paddy's Run from uncontrolled areas of the FMPC. These data have been used to calculate a factor of 9.9 lbs (4.5 kilograms) per inch of rainfall for the uranium discharged to Paddy's Run. Based on 9.81 inches of rainfall in the month of May 1990, the uranium discharged to Paddy's Run from uncontrolled areas of the FMPC is estimated to be 97.1 lbs (44.1 kilograms).

EFFLUENT RADIATION REPORT

1114

FACILITY: Feed Materials Production Center  
U.S. Department of Energy  
7400 Willey Road, P.O.Box 398704  
Cincinnati, Ohio 45239 Hamilton  
8502 M 8612 801002

LOCATION: 1I000004001  
001 Total Discharge  
Manhole 175 (Effluent to Great Miami River)

DATE: MAY 1990

| Day   | Flow<br>(mgd) | Total<br>Alpha<br>(pCi/l) | Total<br>Beta<br>(pCi/l) | Total U<br>(mg/l) | Total U<br>(lbs) | Calculated<br>Total U-238<br>(pCi/l) (1) |
|-------|---------------|---------------------------|--------------------------|-------------------|------------------|--|
| 1     | 0.820         | 374                       | 77                       | 0.56              | 3.83             | 189                                      |
| 2     | 0.862         | 306                       | 68                       | 0.64              | 4.60             | 216                                      |
| 3     | 0.742         | 383                       | 104                      | 0.78              | 4.83             | 264                                      |
| 4     | 0.605         | 374                       | 113                      | 0.58              | 2.93             | 196                                      |
| 5     | 1.065         | 351                       | 86                       | 0.42              | 3.73             | 142                                      |
| 6     | 1.061         | 581                       | 72                       | 0.94              | 8.32             | 318                                      |
| 7     | 1.039         | 455                       | 77                       | 0.82              | 7.11             | 277                                      |
| 8     | 1.051         | 482                       | 72                       | 0.98              | 8.59             | 331                                      |
| 9     | 0.684         | 414                       | 113                      | 0.90              | 5.13             | 304                                      |
| 10    | 0.720         | 446                       | 126                      | 0.96              | 5.76             | 324                                      |
| 11    | 0.647         | 266                       | 126                      | 0.70              | 3.78             | 236                                      |
| 12    | 0.588         | 541                       | 347                      | 0.98              | 4.81             | 331                                      |
| 13    | 0.582         | 284                       | 135                      | 0.52              | 2.52             | 176                                      |
| 14    | 1.377         | 1676                      | 1369                     | 3.82              | 43.87            | 1291                                     |
| 15    | 0.917         | 464                       | 275                      | 0.78              | 5.97             | 264                                      |
| 16    | 1.105         | 608                       | 329                      | 1.00              | 9.22             | 338                                      |
| 17    | 1.368         | 401                       | 221                      | 0.62              | 7.07             | 209                                      |
| 18    | 1.170         | 595                       | 162                      | 0.76              | 7.42             | 257                                      |
| 19    | 1.323         | 1405                      | 914                      | 3.04              | 33.54            | 1027                                     |
| 20    | 0.828         | 604                       | 221                      | 0.98              | 6.77             | 331                                      |
| 21    | 0.760         | 626                       | 356                      | 0.98              | 6.21             | 331                                      |
| 22    | 1.103         | 410                       | 216                      | 0.80              | 7.36             | 270                                      |
| 23    | 1.112         | 554                       | 185                      | 0.62              | 5.75             | 209                                      |
| 24    | 1.115         | 505                       | 194                      | 0.72              | 6.70             | 243                                      |
| 25    | 0.995         | 401                       | 405                      | 0.66              | 5.48             | 223                                      |
| 26    | 1.041         | 378                       | 117                      | 0.58              | 5.04             | 196                                      |
| 27    | 0.988         | 401                       | 122                      | 0.58              | 4.78             | 196                                      |
| 28    | 0.994         | 387                       | 122                      | 0.60              | 4.97             | 203                                      |
| 29    | 1.069         | 320                       | 122                      | 0.70              | 6.24             | 236                                      |
| 30    | 1.140         | 356                       | 158                      | 0.66              | 6.28             | 223                                      |
| 31    | 1.208         | 342                       | 149                      | 0.60              | 6.04             | 203                                      |
| Total | 30.079        |                           |                          |                   |                  |  |

EFFLUENT RADIATION REPORT (cont.)

1114

FACILITY: Feed Materials Production Center

LOCATION: 001 Total Discharge

DATE: MAY 1990

|      | Flow<br>(mgd) | Total<br>Alpha<br>(pCi/l) | Total<br>Beta<br>(pCi/l) | Total U<br>(mg/l) | Total U<br>(lbs) | Calculated<br>Total U-238<br>(pCi/l) (1) |
|------|---------------|---------------------------|--------------------------|-------------------|------------------|--|
| Avg. | 0.970         | 537                       | 256                      | 0.98              | 7.89             | 329                                      |
| Max. | 1.377         | 1676                      | 1369                     | 3.82              | 43.87            | 1291                                     |
| Min. | 0.582         | 266                       | 68                       | 0.42              | 2.52             | 142                                      |

Comments: (1) The calculated total U-238 is based on a conversion factor of 337.84 applied to the measured value of total uranium.

EFFLUENT RADIATION REPORT

1114

FACILITY: Feed Materials Production Center  
U.S. Department of Energy  
7400 Willey Road, P.O.Box 398704  
Cincinnati, Ohio 45239 Hamilton  
8502 M 8612 801002

LOCATION: 1I000004002  
002 Discharge (Overflow) to Storm Sewer Outfall Ditch  
Stormwater Retention Basin Spillway (Effluent to Paddy's Run)

DATE: MAY 1990

| Day   | Flow<br>(mgd) | Total<br>Alpha<br>(pCi/l) | Total<br>Beta<br>(pCi/l) | Total U<br>(mg/l) | Total U<br>(lbs) | Calculated<br>Total U-238<br>(pCi/l) (1) |
|-------|---------------|---------------------------|--------------------------|-------------------|------------------|--|
| 1     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 2     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 3     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 4     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 5     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 6     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 7     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 8     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 9     | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 10    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 11    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 12    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 13    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 14    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 15    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 16    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 17    | 0.608         | 311                       | 117                      | 0.52              | 2.64             | 176                                      |
| 18    | 0.010         | 378                       | 72                       | 0.62              | 0.05             | 209                                      |
| 19    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 20    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 21    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 22    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 23    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 24    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 25    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 26    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 27    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 28    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 29    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 30    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| 31    | 0.000         | 0                         | 0                        | 0.00              | 0.00             | 0  |
| Total | 0.618         |                           |                          |                   |                  |  |

**1114**

EFFLUENT RADIATION REPORT (cont.)

FACILITY: Feed Materials Production Center

LOCATION: 002 Discharge (Overflow) to Storm Sewer Outfall Ditch

DATE: MAY 1990

|      | Flow<br>(mgd) | Total<br>Alpha<br>(pCi/l) | Total<br>Beta<br>(pCi/l) | Total U<br>(mg/l) | Total U<br>(lbs) | Calculated<br>Total U-238<br>(pCi/l) (1) |
|------|---------------|---------------------------|--------------------------|-------------------|------------------|--|
| Avg. | 0.309         | 312                       | 116                      | 0.52              | 1.35             | 176                                      |
| Max. | 0.608         | 378                       | 117                      | 0.62              | 2.64             | 209                                      |
| Min. | 0.010         | 311                       | 72                       | 0.52              | 0.05             | 176                                      |

-----  
 Comments: (1) The calculated total U-238 is based on a conversion factor of 337.84 applied to the measured value of total uranium.

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES  
COMPLIANCE AGREEMENT MONTHLY PROGRESS REPORT**

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Period Ending May 31, 1990

Attachment B describes actions undertaken at the Feed Materials Production Center (FMPC) during the period May 1 through May 31, 1990 that are not covered by the reporting requirements of the Consent Agreement under CERCLA Section 120 and 106(a).

**WORK ASSIGNMENTS AND PROGRESS**

Descriptions of ongoing work progress are presented in the following sections of this report. The status of both ongoing and completed work in support of the FFCA is summarized in Table 1 of Attachment B. In this portion of the report and in Table 1, descriptions of actions are presented in a format consistent with that of the FFCA.

**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND**

**LIABILITY ACT (CERCLA)**

1. Initial Remedial Measures

*Section C*

K-65 Silo Project - Internal review comments were submitted to ASI/IT on the work plan for the K-65 Silo embankment and subsoils sampling and analysis. The project team is currently revising the work plan to address the internal comments. The final work plan is scheduled to be issued in late June 1990.

A management review was performed on the procedure for the removal of the cracked T-section pipe from the Radon Treatment System (RTS). Arrangements have been made with a vendor to analyze the cracked T-section in order to ascertain the cause of the failure. Repairs on the cracked section are tentatively planned for late June 1990.

The work plan for the Treatability Testing on the K-65 materials retrieved in 1989 was reviewed. Review comments were forwarded to the vendor for incorporation into a revised work plan. Issuance of the revised work plan is tentatively scheduled for late June 1990.

2. Remedial Investigation/Feasibility Study (RI/FS)

Commencing with May's report, status information on the Remedial Investigation/Feasibility Study (RI/FS) normally reported in this section is being provided separately in accordance with the requirements of Section X of the Consent Agreement under CERCLA Section 120 and 106(a).

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES  
COMPLIANCE AGREEMENT MONTHLY PROGRESS REPORT**

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Period May 31, 1990

3. **Reports and Record Keeping**

*Section B*

The RI/FS Monthly Technical Progress Report for April 1990 was transmitted to USEPA on May 18, 1990.

**CLEAN AIR ACT (CAA)**

*Section D*

Stack Tests - The stack testing schedule for 1989 was submitted to USEPA on June 16, 1989. The USEPA was informed by letter (DOE-1615-89) on September 15, 1989, that due to the current uncertainty concerning resumption of production activities, the 1989 FFCA Stack Testing Program was being deferred. Notification of future stack testing dates will be provided to the USEPA following the restart of production activities at the FMPC.

*Section E*

The fourteenth Quarterly Particulate Emissions Report for the period January 3, 1989 through April 3, 1990 was transmitted to the USEPA on May 18, 1990.

**RADIATION DISCHARGE INFORMATION**

*Section A*

The fourteenth Quarterly Liquid Discharge Report covering the period January through March 1990 was transmitted to the USEPA on May 18, 1990.

**REPORTING REQUIREMENTS**

*Section B*

The Federal Facilities Compliance Agreement Monthly Progress Report for April 1990 was transmitted to the USEPA on May 18, 1990.

TABLE 1

STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON  
FEDERAL FACILITIES COMPLIANCE AGREEMENT ACTIONS

1114

STATUS OF ACTIONS AS OF  
May 31, 1990

| ACTION        | DESCRIPTION   | COMPLETION<br>TIME AFTER<br>FFCA SIGNED | FY90 STATUS  |
|---------------|---|---|--|
| <b>CERCLA</b> |   |   |  |
| 1.            | <b>INITIAL REMEDIAL MEASURES</b>  |   |  |
| 1.A           | Develop and implement O&M procedures and work practices to control radioactive emissions, including radon gas and decay products. | 60 days                                 | Completed.   |
| 1.B           | Develop and provide to EPA a plan and implementation schedule for the interim control of radon at the K-65 Silos.                 | 30 days                                 | Completed.   |
|               | Develop and provide to EPA a plan and implementation schedule for control of thorium compounds.                                   |   | Completed.   |
| 1.C           | Implement radon control plan approved by the EPA.   | -----                                   | No longer applicable. Progress on actions to address radon emissions from the K-65 Silos are being reported separately under Section IX-Removal Actions of the Consent Agreement/FFCA Monthly Progress Report. |
|               | Implement interim control plan for thorium compounds as approved by the USEPA.  |   | Completed.   |
| 2.            | <b>REMEDIAL INVESTIGATION/FEASIBILITY STUDY</b>   |   |  |
| 2.A           | RI/FS work is to be conducted in accordance with EPA guidelines.  | N/A                                     | No action required.  |
| 2.B           | -- No Action Required --  | -----                                   | Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement under CERCLA Section 120 and 106(a).   |
| 2.C           | Provide to EPA the analysis results for laboratory certification -- SOW Task 7b.  | 45 days                                 | Completed.   |
| 2.D           | Submit a work plan to EPA for a complete sitewide RI/FS.  | 90 days                                 | Completed.   |
| 2.E           | Amend and submit revised RI/FS Work Plan to EPA if deficiencies are found.  |   | Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement under CERCLA Section 120 and 106(a).   |

TABLE 1

STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON  
FEDERAL FACILITIES COMPLIANCE AGREEMENT ACTIONS

1114

STATUS OF ACTIONS AS OF  
May 31, 1990

| ACTION        | DESCRIPTION  | COMPLETION<br>TIME AFTER<br>FFCA SIGNED | FY90 STATUS  |
|---------------|--|---|--|
| 2.F           | Implement tasks detailed in the approved RI/FS Work Plan.  |   | Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement under CERCLA Section 120 and 106(a). |
| 3.            | REPORTS AND RECORD KEEPING   |   |  |
| 3.B           | Submit monthly RI/FS progress reports.   | monthly                                 | The RI/FS Monthly Progress Report for April 1990 was transmitted to the USEPA on May 18, 1990 (DOE-1105-90).   |
| CLEAN AIR ACT |  |   |  |
| A.            | -- No Action Required --   | -----                                   |  |
| B.1           | Install real-time alarm monitors on all MAJOR emission points. Also list non-alarmed emission points.  | 30 days                                 | Completed.   |
| B.2           | Establish and implement administrative controls for real-time monitors to ensure any unplanned releases will be detected and dealt with in 24 hours. | 30 days                                 | Completed.   |
| B.3           | Establish and implement sample collection and analysis procedures and a QA plan to monitor ALL radionuclide emission points.                         | 30 days                                 | Completed.   |
| B.4           | Establish schedule for the installation and replacement of emission control devices.   | 30 days                                 | Completed.   |
|               | Prepare annual progress report on installation and replacement of emission control devices.  | yearly                                  | The Third Annual Progress Report on installation and replacement of emission control devices was transmitted to the USEPA on February 22, 1990 (DOE-617-90).     |
|               | Respond to USEPA comments on Air Monitoring Network (WDF-JAR dated 12-May-87).   |   | Completed.   |
| C.            | Provide annual reports to EPA per 40 CFR 61.94(c).   | yearly                                  | The Annual Radionuclide Air Emission Report for CY-1988 was forwarded to USEPA on June 1, 1989.  |

TABLE 1

**STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON  
FEDERAL FACILITIES COMPLIANCE AGREEMENT ACTIONS**

1114

**STATUS OF ACTIONS AS OF  
May 31, 1990**

| ACTION      | DESCRIPTION  | COMPLETION<br>TIME AFTER<br>FFCA SIGNED | FY90 STATUS  |
|-------------|--|---|--|
| D.1         | Provide EPA with yearly stack-testing schedule.  | yearly                                  | The 1989 stack testing schedule was transmitted to USEPA on June 16, 1989. A letter (DOE-1615-89) was forwarded to the USEPA on September 15, 1989 indicating that due to the uncertainty concerning resumption of production at the FMPC, the 1989 FFCA Stack Testing Program was being deferred. Notification of future stack testing dates will be provided to the USEPA following the restart of production at the FMPC. |
| D.2         | Provide EPA with stack-test results for stacks tested that year.   | 45 days after test                      | Stack testing is currently on hold pending resumption of manufacturing operations. When production resumes, the USEPA will be notified of future stack testing dates.  |
| E.1         | Maintain records of monthly particulate matter emissions.  | -----                                   | Continuing.  |
| E.2         | Provide quarterly reports to EPA on these emissions.   | quarterly                               | The thirteenth Quarterly Particulate Emissions Report was transmitted to the USEPA on February 28, 1990. The fourteenth Quarterly Particulate Emissions Report for the period January 3, 1990 through April 3, 1990 was transmitted to the USEPA on May 18, 1990 (DOE-1121-90).  |
| F.          | Provide EPA with a list of environmental air monitoring equipment, including location and the O&M program. | 60 days                                 | Completed.   |
| G.          | Develop and provide EPA with an O&M program for air pollution control devices.                             | 90 days                                 | Completed.   |
| <b>RCRA</b> |  |   |  |
| A.          | Achieve compliance with interim status regulations.  | 30 days                                 | Completed.   |
| A.1         | Conduct a hazardous waste determination on all waste streams.  | 30 days                                 | Complete. Determination for known waste streams was completed on August 17, 1986 and submitted as a 30-day FFCA deliverable. Approximately 17,800 drums of suspect waste are to be representatively sampled by September 30, 1990.   |
| A.2         | Commence a hazardous waste analysis program for materials in the landfill and going to the incinerator.    | 30 days                                 | Complete. Operations of these units was discontinued and data on the waste which had gone to them was provided in a 30-day FFCA deliverable on August 17, 1986.  |
| A.3         | Update operating records pursuant to 40 CFR 265.73 and 265.309.  | 30 days                                 | Completed.   |
| A.4         | Include full name, signature, and date received on manifests pursuant to 40 CFR 265.71.                    | 30 days                                 | Completed.   |
| A.5         | Update the facility closure plan to reflect the year the facility expects to begin closure.                | 30 days                                 | The Facility closure date is dependent upon closure schedules for individual TSD units as presented most recently in Section 1 of the RCRA Part B Permit Application was submitted to the USEPA on September 22, 1989. Facility closure will be completed on the date the last TSD unit is closed.   |
| A.6         | Begin collection of all run-off from the active portions of Pit 4.   | 30 days                                 | Completed.   |

TABLE 1

STATUS OF ASSIGNMENTS FOR WORK REQUIRED ON  
FEDERAL FACILITIES COMPLIANCE AGREEMENT ACTIONS

1114

STATUS OF ACTIONS AS OF  
May 31, 1990

| ACTION                          | DESCRIPTION   | COMPLETION<br>TIME AFTER<br>FFCA SIGNED | FY90 STATUS  |
|---------------------------------|---|---|--|
| A.7                             | Prepare and maintain an outline for a groundwater quality assessment program.                               | 30 days                                 | Completed.   |
| B.                              | Submit to EPA for approval a detailed groundwater monitoring plan.  | 90 days                                 | Completed. Revision 1 of the Groundwater Quality Assessment Program Plan was submitted to EPA on March 24, 1989 to fulfill comments received from the USEPA in 2/89.   |
| B.1                             | Determine groundwater flow at the RCRA-regulated units.   | 90 days                                 | Completed.   |
| B.2                             | Provide a map showing the locations of all RCRA monitoring wells.   | 90 days                                 | Completed.   |
| B.3                             | Include design and construction specifications for all RCRA wells.  | 90 days                                 | Completed.   |
| B.4                             | Monitor for all Appendix VIII constituents, including radionuclides.  | 90 days                                 | Completed.   |
| B.5                             | Include a sampling and analysis plan to meet 40 CFR 265.92.   | 90 days                                 | Completed.   |
| C.1                             | Develop a closure plan for the landfill pursuant to 40 CFR 265.112.   | 60 days                                 | Completed.   |
| C.2                             | Develop a post-closure plan for the landfill pursuant to 40 CFR 265.118.                                    | 60 days                                 | Completed. The post-closure plan for Waste Pit 4 was submitted as part of RCRA Part B Permit Application which was transmitted to OEPA on September 22, 1989 (DOE-1653-89).  |
| RADIATION DISCHARGE INFORMATION |   |   |  |
| A.                              | Respond to USEPA comments on Items A.1. - A.3. (WDF-JAR dated May 12, 1987).                                |   | Completed.   |
| A.1                             | Provide EPA with existing offsite environmental monitoring program.   | 30 days                                 | Completed.   |
| A.2                             | Provide EPA the QA program associated with the environmental monitoring program.                            | 30 days                                 | Completed.   |
| A.3                             | Report to USEPA, OEPA and Ohio Department of Health the results of the continuous liquid discharge samples. | quarterly                               | The thirteenth Quarterly Liquid Discharge Report was transmitted to the USEPA on February 28, 1990. The fourteenth Quarterly Liquid Discharge Report for the period January through March 1990 was transmitted to the USEPA on May 18, 1990 (DOE-1121-90). |
| REPORTING REQUIREMENTS          |   |   |  |
| B.                              | Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.                 | monthly                                 | April's FFCA Monthly Progress Report was transmitted to the USEPA on May 18, 1990 (DOE-1105-90).   |

**CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES  
COMPLIANCE AGREEMENT MONTHLY PROGRESS REPORT**

**1114**

Period Ending May 31, 1990

**ATTACHEMENT C**

**FIELD DRILLING LOGS**

# FERNALD RI/FS

|            |         |            |            |            |
|------------|---------|------------|------------|------------|
| Dr.        | 5/19/90 |            |            |            |
| Dr. No.    | ST      |            |            |            |
| 1st Ref In |         | 1st Ref In | 2nd Ref In | 3rd Ref In |
| 4th Ref In |         |            |            |            |

## VISUAL CLASSIFICATION OF SOILS

1111

|  |  |
|--|--|
| PROJECT NUMBER: 602.03.07                                  | PROJECT NAME: FPC RI/FS - (Facility Testing Program) |
| BORING NUMBER: 1516  | COORDINATES:   |
| ELEVATION:   | GWL: Depth Date/Time                                 |
| ENGINEER/GEOLOGIST: M. GAYMAN                              | DATE: 5-19-90  |
| DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING) | DATE STARTED: 5-19-90                                |
|  | DATE COMPLETED: 5-19-90                              |
|  | PAGE 1 OF 5  |

| DEPTH (ft) | SAMPLE TYPE & NO      | BLOWSON SAMPLER | RECOVERY (%) | DESCRIPTION<br>SAA = SAME AS ABOVE<br>NR = NO RECOVERY                                    | USCS SYMBOL | MEASURED CONSISTENCY (TSF) | REMARKS                                  |
|------------|-----------------------|-----------------|--------------|---|-------------|----------------------------|--|
| 0.5        | SS371<br>5-19<br>1010 | 2               | 6            | LOOSE (104R, 4/2) DARK GRAYISH BROWN CLAYEY SILT. TRACE FINE SAND. SLIGHTLY MOIST.        | ML          | NA                         | lim = 0                                  |
| 1.0        | SS372<br>5-19<br>1010 | 3               | 6            | LOOSE (104R, 4/2) DARK GRAYISH BROWN SILTY FINE SAND. SLIGHTLY MOIST.                     | SM          | NA                         | $\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 1.5        | SS373<br>5-19<br>1010 | 2               | 2            | SAA   | SM          | NA                         |  |
| 2.0        | SS374<br>5-19<br>1026 | 20              | 6            | MEDIUM DENSE (104R, 5/4) YELLOWISH BROWN MEDIUM GRAINED SAND. TRACE SILT. LOW MOISTURE.   | SP          | NA                         | H <sub>max</sub> = 0                     |
| 2.5        | SS375<br>5-19<br>1026 | 15              | 5            | SAA   | SP          | NA                         | $\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 3.0        | SS376<br>5-19<br>1026 | 14              | 0            | NR  | NA          | NA                         |  |
| 3.5        | SS377<br>5-19<br>1030 | 16              | 6            | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE. | SW          | NA                         | H <sub>max</sub> = 0                     |
| 4.0        | SS378<br>5-19<br>1030 | 14              | 6            | SAA   | SW          | NA                         | $\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 4.5        | SS379<br>5-19<br>1030 | 17              | 2            | SAA   | SW          | NA                         |  |
| 5.0        | SS380<br>5-19<br>1046 | 2               | 6            | LOOSE (104R, 5/2) GRAYISH BROWN SILTY MEDIUM GRAINED SAND. LOW MOISTURE.                  | SM          | NA                         | H <sub>max</sub> = 0                     |
| 5.5        | SS381<br>5-19<br>1046 | 3               | 0            | NR  | NA          | NA                         | $\alpha = 0$<br>$\beta = 90 \text{ cpm}$ |
| 6.0        | SS382<br>5-19<br>1046 | 4               | 0            | NR  | NA          | NA                         |  |
| 6.5        | SS383<br>5-19<br>1050 | 6               | 6            | MEDIUM DENSE (104R, 5/2) GRAYISH BROWN SILTY MEDIUM GRAINED SAND. LOW MOISTURE.           | SM          | NA                         | H <sub>max</sub> = 0                     |
| 7.0        | SS384<br>5-19<br>1050 | 11              | 4            | MEDIUM DENSE (104R, 5/2) BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE.  | SW          | NA                         | $\alpha = 0$<br>$\beta = 90 \text{ cpm}$ |
| 7.5        | SS385<br>5-19<br>1050 | 14              | 0            | NR  | NA          | NA                         | 40                                       |

NOTES: Contractor: Pennsylvania Drilling  
 Driller: CRAIG COULTER  
 Driller's Assistant: GARY KREPPS  
 All samples collected according to ASTM STANDARDS Soil Colors described in Manual Soil Color Charts.

Background Readings/Level  
 H<sub>max</sub> = 0 gpm  
 Alpha (α) = 0 gpm  
 Gamma Beta = 40-80 gpm

**VISUAL CLASSIFICATION OF SOILS**

|  |   |           |                         |
|--|---|-----------|-------------------------|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMPC. RI/FS Facility Testing) |           |                         |
| BORING NUMBER: 1516  | COORDINATES:                                |           | DATE: 5-19-90           |
| ELEVATION:   | GWL: Depth                                  | Date/Time | DATE STARTED: 5-19-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                                | Depth                                       | Date/Time | DATE COMPLETED: 5-19-90 |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) |   |           | PAGE 2 OF 5             |

| DEPTH<br>FT | SAMPLE<br>TYPE & NO   | BLOWS ON<br>SAMPLER PER<br>16 IN. | RECOVERY<br>(%) | DESCRIPTION   | USCS SYMBOL | MEASURED<br>CONSISTENCY<br>(%) | REMARKS   |
|-------------|-----------------------|-----------------------------------|-----------------|---|-------------|--------------------------------|---|
|             |                       |                                   |                 | SAA = SAME AS ABOVE<br>NR = NO RECOVERY   |             |                                |   |
| 8.0         | 55386<br>5-19<br>1055 | 34                                | 6               | VERY DENSE (104R, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. TRACE GRAVEL. LOW MOISTURE.        | SW          | NA                             | $H_w = 0$<br>$\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 8.5         | 55387<br>5-19<br>1055 | 30                                | 6               | SAA   | SW          | NA                             |   |
| 9.0         | 55388<br>5-19<br>1055 | 22                                | 2               | SAA   | SW          | NA                             |   |
| 9.5         | 55389<br>5-19<br>1105 | 5                                 | 6               | MEDIUM DENSE (104R, 5/3) BROWN WELL GRADED SAND. LOW MOISTURE.  | SW          | NA                             | $H_w = 0$<br>$\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 10.0        | 55390<br>5-19<br>1105 | 12                                | 6               | SAA   | SW          | NA                             |   |
| 10.5        | 55391<br>5-19<br>1105 | 15                                | 2               | SAA   | SW          | NA                             |   |
| 11.0        | 55392<br>5-19<br>1110 | 6                                 | 6               | DENSE (104R, 5/3) BROWN WELL GRADED SAND. TRACE SILT. MOIST.  | SW          | NA                             | $H_w = 0$<br>$\alpha = 0$<br>$\beta = 90 \text{ cpm}$ |
| 11.5        | 55393<br>5-19<br>1110 | 20                                | 6               | SAA   | SW          | NA                             |   |
| 12.0        | 55394<br>5-19<br>1110 | 28                                | 3               | SAA   | SW          | NA                             |   |
| 12.5        | 55395<br>5-19<br>1126 | 20                                | 6               | VERY DENSE (104R, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. MOIST.               | SW          | NA                             | $H_w = 0$<br>$\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 13.0        | 55396<br>5-19<br>1126 | 31                                | 6               | SAA   | SW          | NA                             |   |
| 13.5        | 55397<br>5-19<br>1126 | 27                                | 0               | NR  | NA          | NA                             |   |
| 14.0        | 55398<br>5-19<br>1129 | 7                                 | 6               | MEDIUM DENSE (104R, 4/2) DARK GRAYISH BROWN WELL GRADED SAND (FINE TO MEDIUM GRAINED) SOME SILT. MOIST. | SW          | NA                             | $H_w = 0$<br>$\alpha = 0$<br>$\beta = 90 \text{ cpm}$ |
| 14.5        | 55399<br>5-19<br>1129 | 11                                | 6               | SAA   | SW          | NA                             |   |
| 15.0        | 55400<br>5-19<br>1129 | 12                                | 4               | SAA   | SW          | NA                             |   |

NOTES:

SEE PAGE 1

# FERNALD RI/FS

1114

## VISUAL CLASSIFICATION OF SOILS

|  |   |               |                         |
|--|---|---------------|-------------------------|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMBE RI/FS - (Facility Testing Program) |               |                         |
| BORING NUMBER: 1516  | COORDINATES:  | DATE: 5-19-90 |                         |
| ELEVATION:   | GWL: Depth  | Date/Time     | DATE STARTED: 5-19-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                                | Depth   | Date/Time     | DATE COMPLETED: 5-19-90 |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) | PAGE 3  |               | OF 5                    |

BEGIN  
H<sub>2</sub>O ZONE

| DEPTH (ft) | SAMPLE TYPE & NO      | BLOWS ON SAMPLER PER 1.0 FT | RECOVERY (%) | DESCRIPTION   | USCS SYMBOL | MEASURED CONSISTENCY (ITSE) | REMARKS   |
|------------|-----------------------|-----------------------------|--------------|---|-------------|-----------------------------|---|
| 15.5       | 55401<br>5-19<br>1332 | 6                           | 6            | DENSE (104R, S/2) GRAYISH BROWN WELL GRADED SAND, SOME SILT. VERY MOIST.        | SW          | NA                          | H <sub>max</sub> = 0<br>d = 0<br>f <sub>D</sub> = 80cpm |
| 16.0       | 55402<br>5-19<br>1332 | 18                          | 6            | DENSE (104R, S/2) GRAYISH BROWN WELL GRADED SAND, SOME GRAVEL. TRACE SILT. WET. | SW          | NA                          |   |
| 16.5       | 55403<br>5-19<br>1332 | 22                          | 0            | NR  | NA          | NA                          |   |
| 17.0       | 55404<br>5-19<br>1335 | 12                          | 6            | DENSE (104R, S/3) BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET.        | SW          | NA                          | H <sub>max</sub> = 0<br>d = 0<br>f <sub>D</sub> = 80cpm |
| 17.5       | 55405<br>5-19<br>1335 | 17                          | 6            | SAA   | SW          | NA                          |   |
| 18.0       | 55406<br>5-19<br>1335 | 18                          | 6            | SAA   | SW          | NA                          |   |
| 18.5       | 55407<br>5-19<br>1340 | 8                           | 6            | DENSE (104R, S/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. WET. | SW          | NA                          | H <sub>max</sub> = 0<br>d = 0<br>f <sub>D</sub> = 80cpm |
| 19.0       | 55408<br>5-19<br>1340 | 12                          | 6            | SAA   | SW          | NA                          |   |
| 19.5       | 55409<br>5-19<br>1340 | 17                          | 6            | DENSE (104R, S/2) BROWN WELL GRADED SAND. SOME SILT. TRACE GRAVEL. WET.         | SW          | NA                          |   |
| 20         | 55410<br>5-19<br>1340 | 20                          | 4            | SAA   | SW          | NA                          | H <sub>max</sub> = 0<br>d = 0<br>f <sub>D</sub> = 80cpm |
|            |                       |                             |              | 20.0 FT - BOTTOM OF BORING PIEZOMETER INSTALLED                                 |             |                             |   |

NOTES:

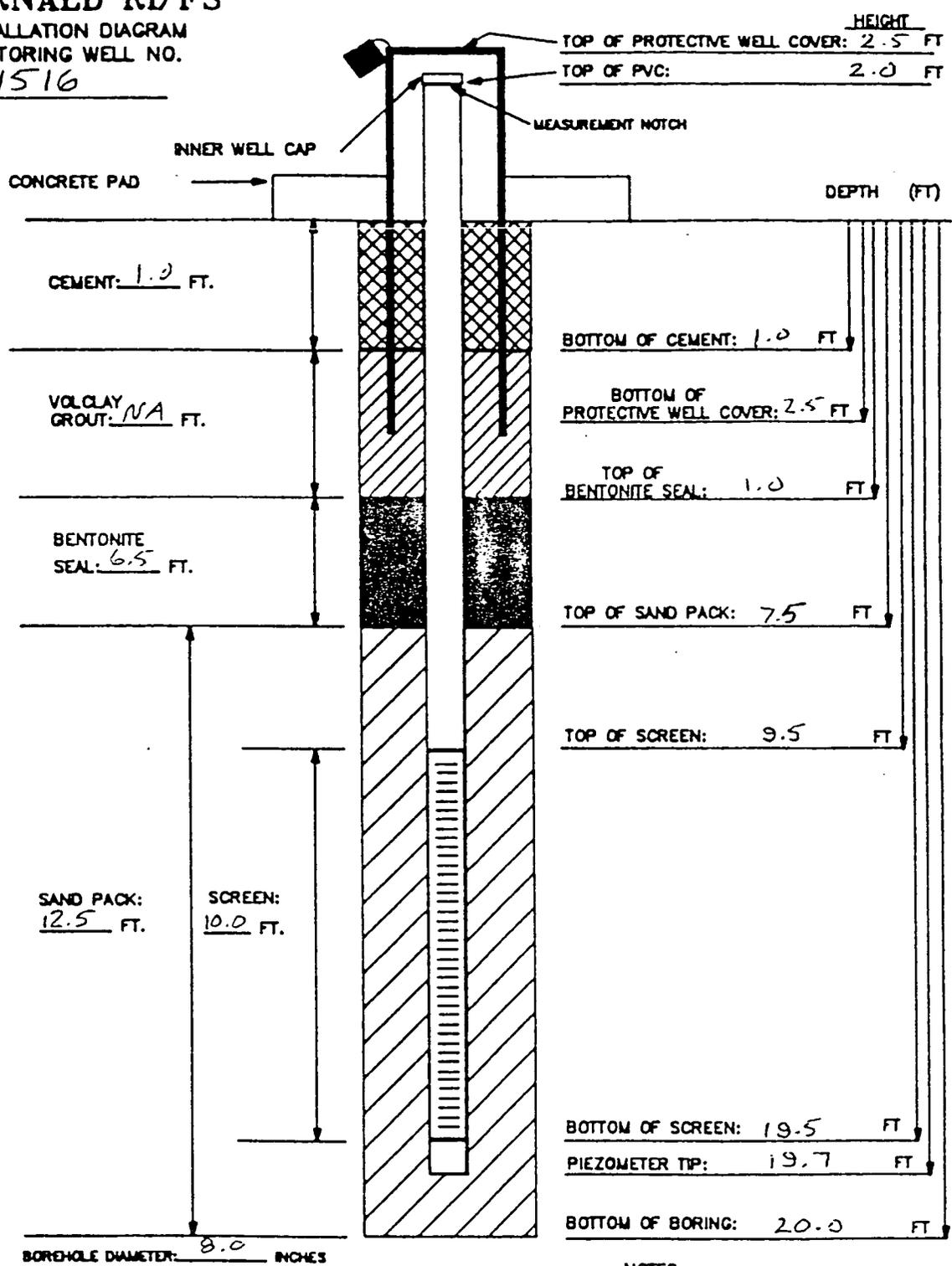
SEE PAGE 1

INSTALLATION DATE: 5-19-90

# FERNALD RI/FS

INSTALLATION DIAGRAM  
MONITORING WELL NO.

1516



**MATERIALS USED:**

- SAND TYPE AND QUANTITY: 3 BAGS 10/20 SAND (80 LBS. EACH)
- BENTONITE PELLETS (5-GALLON BUCKETS): 5-5 gal. BUCKETS
- BAGS OF VOLCLAY GROUT: NONE USED
- AMOUNT OF CEMENT: 0.5 BAGS (50 LBS. EACH)
- AMOUNT OF WATER USED: 2.5 gallons
- OTHER:

**NOTES:**

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

TASK: 602.3.7

GEOLOGIST/ENGINEER: [Signature]

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. GARMAN DATE 5-19-90  
 PROJECT NO. 602.37 CHECKED BY E. Tullinger DATE 5-30-90  
 BORING NO. 1516  
 PIEZOMETER NO. 1516 DATE OF INSTALLATION 5-19-90

**BOREHOLE DRILLING**

|  |   |
|--|---|
| DRILLING METHOD <u>HOLLOW STEM AUGER</u>   | TYPE OF BIT <u>AUGER</u>  |
| DRILLING FLUID (S) USED:<br>FLUID <u>NA</u> FROM _____ TO _____<br>FLUID <u>NA</u> FROM _____ TO _____ | CASING SIZE (S) USED:<br>SIZE <u>NA</u> FROM _____ TO _____<br>SIZE <u>NA</u> FROM _____ TO _____ |

**PIEZOMETER DESCRIPTION**

|   |   |
|---|---|
| TYPE <u>SCHEDULE 40 PVC</u>   | RISER PIPE MATERIAL <u>SCHEDULE 40 PVC</u>                        |
| DIAMETER OF PERFORATED SECTION <u>2.0 IN ID</u>   | RISER PIPE DIAMETERS:<br>O.D. <u>2 5/16 IN</u> I.D. <u>2.0 IN</u> |
| PERFORATION TYPE:<br>SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT, 1.7 FT</u>                    |
| AVERAGE SIZE OF PERFORATIONS <u>0.02 IN</u>   | JOINING METHOD <u>FLUSH JOINT</u>                                 |
| TOTAL PERFORATED AREA <u>10.0 FT</u>  | <u>THREADED</u>   |

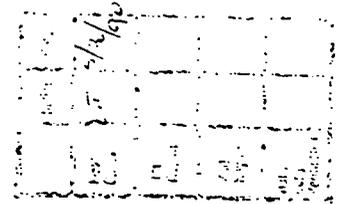
**PROTECTION SYSTEM**

|  |  |
|--|--|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HINGED LOCKING</u> |
| PROTECTIVE PIPE O.D. <u>4 3/8 IN</u>       | <u>COVER W/ PADLOCK</u>                |

| ITEM   | DISTANCE ABOVE / BELOW GROUND SURFACE (FT) |                                  | ELEVATION ( ) |        |
|--|--|----------------------------------|---------------|--------|
| TOP OF RISER PIPE  | 2.0  |                                  |               |        |
| GROUND SURFACE   | 0.0  |                                  |               |        |
| BOTTOM OF PROTECTIVE PIPE  | 2.5  |                                  |               |        |
| BOREHOLE FILL MATERIALS:<br><small>MG 5-19-90</small><br><del>GROUT / SLURRY - NONE USED</del><br>BENTONITE<br>SAND<br>GRAVEL <small>NONE USED</small> | TOP <sup>AC</sup> <u>2.0</u>               | BOTTOM <sup>I.D.</sup> <u>NA</u> | TOP           | BOTTOM |
|  | TOP <u>1.0</u>                             | BOTTOM <u>7.5</u>                | TOP           | BOTTOM |
|  | TOP <u>7.5</u>                             | BOTTOM <u>20.0</u>               | TOP           | BOTTOM |
|  | TOP <u>NA</u>                              | BOTTOM <u>NA</u>                 | TOP           | BOTTOM |
| PERFORATED SECTION   | TOP <u>9.5</u>                             | BOTTOM <u>19.5</u>               | TOP           | BOTTOM |
| PIEZOMETER TIP   | 19.7                                       |                                  |               |        |
| BOTTOM OF BOREHOLE   | 20.0                                       |                                  |               |        |
| GWL AFTER INSTALLATION   | N/A  |                                  |               |        |

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO  **44**  
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES  NO   
 REMARKS PIEZOMETER WAS TO BE SET AT 20.0 FT, BUT CAME UP 0.3 FT DURING INSTALLATION  
15.0 FT - BEGIN H<sub>2</sub>O ZONE

**FERNALD  
RI/FS**



**VISUAL CLASSIFICATION OF SOILS**

|  |   |           |                         |
|--|---|-----------|-------------------------|
| PROJECT NUMBER: 602.03.07                                  | PROJECT NAME: F.M.P.C. RI/FS - (Facility Testing Program) |           |                         |
| BORING NUMBER: 1517  | COORDINATES:  |           | DATE: 5-20-90           |
| ELEVATION:   | GWL: Depth  | Date/Time | DATE STARTED: 5-20-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                              | Depth   | Date/Time | DATE COMPLETED: 5-21-90 |
| DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING) |   |           | PAGE 1 OF 5             |

| DEPTH (FT) | SAMPLE TYPE & NO      | BLOWS ON SAMPLER PER (G. 1.13) | RECOVERY (mm) | DESCRIPTION  | USCS SYMBOL | MEASURED CONSISTENCY (USCS) | REMARKS                                  |
|------------|-----------------------|--------------------------------|---------------|--|-------------|-----------------------------|--|
| 0.5        | 55413<br>S-20<br>1040 | 3                              | 6             | MEDIUM DENSE (1041, 3/3) DARK BROWN SILT, SOME CLAY, TRACE SAND. LOW MOISTURE.                     | ML          | NA                          | lim = 0                                  |
|            | 55414<br>S-20<br>1040 | 7                              | 0             | NR   | NA          | NA                          | $\alpha = 0$<br>$\beta = 80 \text{ cpm}$ |
| 1.0        | 55415<br>S-20<br>1040 | 9                              | 0             | NR   | NA          | NA                          |  |
|            | 55416<br>S-20<br>1050 | 4                              | 4             | LOOSE (104R, 3/2) VERY DARK GRAYISH BROWN CLAYEY SILT. TRACE GRAVEL. LOW MOISTURE.                 | ML          | NA                          | lim = 0<br>$\alpha = 0$                  |
| 2.0        | 55417<br>S-20<br>1050 | 5                              | 0             | NR.  | NA          | NA                          | $\beta = 70 \text{ cpm}$                 |
|            | 55418<br>S-20<br>1050 | 5                              | 0             | NR   | NA          | NA                          |  |
| 3.0        | 55419<br>S-20<br>1054 | 5                              | 6             | MEDIUM DENSE (104R, 5/4) YELLOWISH BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE.                   | SM          | NA                          | lim = 0<br>$\alpha = 0$                  |
|            | 55420<br>S-20<br>1054 | 9                              | 6             | SAA  | SM          | NA                          | $\beta = 80 \text{ cpm}$                 |
| 4.0        | 55421<br>S-20<br>1054 | 9                              | 0             | NR   | NA          | NA                          |  |
|            | 55422<br>S-20<br>1119 | 8                              | 6             | MEDIUM DENSE (104R, 5/2) BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE.                             | SM          | NA                          | lim = 0<br>$\alpha = 0$                  |
| 5.0        | 55423<br>S-20<br>1119 | 9                              | 0             | NR   | NA          | NA                          | $\beta = 70 \text{ cpm}$                 |
|            | 55424<br>S-20<br>1119 | 9                              | 0             | NR   | NA          | NA                          |  |
| 6.0        | 55425<br>S-20<br>1123 | 7                              | 6             | MEDIUM DENSE (104R, 5/3) BROWN SILTY SAND. LOW MOISTURE.   | SM          | NA                          | lim = 0<br>$\alpha = 0$                  |
|            | 55426<br>S-20<br>1123 | 9                              | 6             | MEDIUM DENSE (104R, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. LOW MOISTURE. | SW          | NA                          | $\beta = 80 \text{ cpm}$                 |
| 7.0        | 55427<br>S-20<br>1123 | 9                              | 2             | SAA  | SW          | NA                          | 45                                       |

NOTES: Contractor: Pennsylvania Drilling  
 Driller: CRAIG COULTER  
 Driller's Assistant: JOHN VANDINE  
 All samples collected according to ASTM Standards Soil Tests described in Manual Soil Color Charts.

Background Readings/Lev.  
 lim = 0 mm  
 Alpha ( $\alpha$ ) = 0 gpm  
 Liquid Limit = 40-80

**VISUAL CLASSIFICATION OF SOILS**

|  |   |                         |
|--|---|-------------------------|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMPC: RI/FS Facility Testing) |                         |
| BORING NUMBER: 1517  | COORDINATES:                                | DATE: 5-20-90           |
| ELEVATION:   | GWL: Depth Date/Time                        | DATE STARTED: 5-20-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                                | Depth Date/Time                             | DATE COMPLETED: 5-21-90 |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) | PAGE 2 OF 5                                 |                         |

| DEPTH (ft) | SAMPLE TYPE & NO                        | BLOWSON SAMPLER PER 16 (in.) | RECOVERY (in.) | DESCRIPTION  | USCS SYMBOL | MEASURED CONSISTENCY (11SF) | REMARKS   |
|------------|---|------------------------------|----------------|--|-------------|-----------------------------|---|
|            | SAA = SAME AS ABOVE<br>NR = NO RECOVERY |                              |                |  |             |                             |   |
| 8.0        | 55428<br>5-20<br>1125                   | 7                            | 6              | MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME SILT. LOW MOISTURE.                          | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0<br>s <sub>p</sub> = 90cpn |
| 8.5        | 55429<br>5-20<br>1125                   | 6                            | 6              | SAA  | SW          | NA                          |   |
| 9.0        | 55430<br>5-20<br>1125                   | 6                            | 3              | SAA  | SW          | NA                          |   |
| 9.5        | 55431<br>5-20<br>1129                   | 7                            | 6              | SAA  | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0<br>s <sub>p</sub> = 80cpn |
| 10.0       | 55432<br>5-20<br>1129                   | 7                            | 6              | MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. SLIGHTLY MOIST TO MOIST. | SW          | NA                          |   |
| 10.5       | 55433<br>5-20<br>1129                   | 6                            | 4              | SAA  | SW          | NA                          |   |
| 11.0       | 55434<br>5-20<br>1315                   | 7                            | 6              | MEDIUM DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. LOW MOISTURE.                         | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0<br>s <sub>p</sub> = 90cpn |
| 11.5       | 55435<br>5-20<br>1315                   | 7                            | 0              | NR   | NA          | NA                          |   |
| 12.0       | 55436<br>5-20<br>1315                   | 7                            | 0              | NR   | NA          | NA                          |   |
| 12.5       | 55437<br>5-20<br>1319                   | 16                           | 6              | DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. LOW MOISTURE.                  | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0<br>s <sub>p</sub> = 90cpn |
| 13.0       | 55438<br>5-20<br>1319                   | 16                           | 4              | SAA  | SW          | NA                          |   |
| 13.5       | 55439<br>5-20<br>1319                   | 17                           | 0              | NR   | NA          | NA                          |   |
| 14.0       | 55440<br>5-20<br>1322                   | 16                           | 6              | DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET.                           | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0<br>s <sub>p</sub> = 80cpn |
| 14.5       | 55441<br>5-20<br>1322                   | 16                           | 5              | DENSE (10YR, 5/4) YELLOWISH BROWN SILTY FINE SAND. WET.  | SM          | NA                          |   |
| 15.0       | 55442<br>5-20<br>1322                   | 12                           | 0              | NR   | NA          | NA                          |   |

DESIGN  
AND ZONE

NOTES:

SEE PAGE 1

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

|  |   |
|--|---|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMBC RI/FS - (Facility Testing Program) |
| BORING NUMBER: 1517  | COORDINATES:  |
| ELEVATION:   | GWL: Depth Date/Time                                  |
| ENGINEER/GEOLOGIST: M. GARMAN                                | DATE STARTED: 5-20-90                                 |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) | DATE COMPLETED: 5-21-90                               |
|  | PAGE 3 OF 5   |

| DEPTH (ft.) | SAMPLE TYPE & NO.     | BLOWSON SAMPLER PER (ft.) | RECOVERY (in.) | DESCRIPTION  | USCS SYMBOL | MEASURED CONSISTENCY (TSF) | REMARKS                         |
|-------------|-----------------------|---------------------------|----------------|--|-------------|----------------------------|---------------------------------|
|             |                       |                           |                | SAA = SAME AS ABOVE<br>NR = NO RECOVERY                                    |             |                            |                                 |
| 15.5        | 55443<br>5-20<br>1333 | 5                         | 5              | MEDIUM DENSE (104R, 5/3) BROWN WELL GRADED GRAVEL. SOME SAND. WET.         | GW          | NA                         | Max = 0<br>α = 0<br>βB = 90 cpm |
| 16.0        | 55444<br>5-20<br>1333 | 12                        | 0              | NR   | NA          | NA                         |                                 |
| 16.5        | 55445<br>5-20<br>1333 | 15                        | 0              | NR   | NA          | NA                         |                                 |
| 17.0        | 55446<br>5-20<br>1337 | 8                         | 6              | MEDIUM DENSE (104R, 5/3) BROWN SANDY WELL GRADED GRAVEL. TRACE SILT. WET.  | GW          | NA                         | Max = 0<br>α = 0<br>βB = 80 cpm |
| 17.5        | 55447<br>5-20<br>1337 | 14                        | 3              | SAA  | GW          | NA                         |                                 |
| 18.0        | 55448<br>5-20<br>1337 | 12                        | 0              | NR   | NA          | NA                         |                                 |
| 18.5        | 55449<br>5-20<br>1343 | 8                         | 6              | MEDIUM DENSE (104R, 5/3) BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. WET. | SW          | NA                         | Max = 0<br>α = 0<br>βB = 90 cpm |
| 19.0        | 55450<br>5-20<br>1343 | 12                        | 6              | SAA  | SW          | NA                         |                                 |
| 19.5        | 55451<br>5-20<br>1343 | 14                        | 6              | MEDIUM DENSE (104R, 5/4) YELLOWISH BROWN WELL GRADED SAND. SOME SILT. WET. | SW          | NA                         |                                 |
| 20          | 55452<br>5-20<br>1343 | 15                        | 6              | SAA  | SW          | NA                         | Max = 0<br>α = 0<br>βB = 96 cpm |

NOTES:

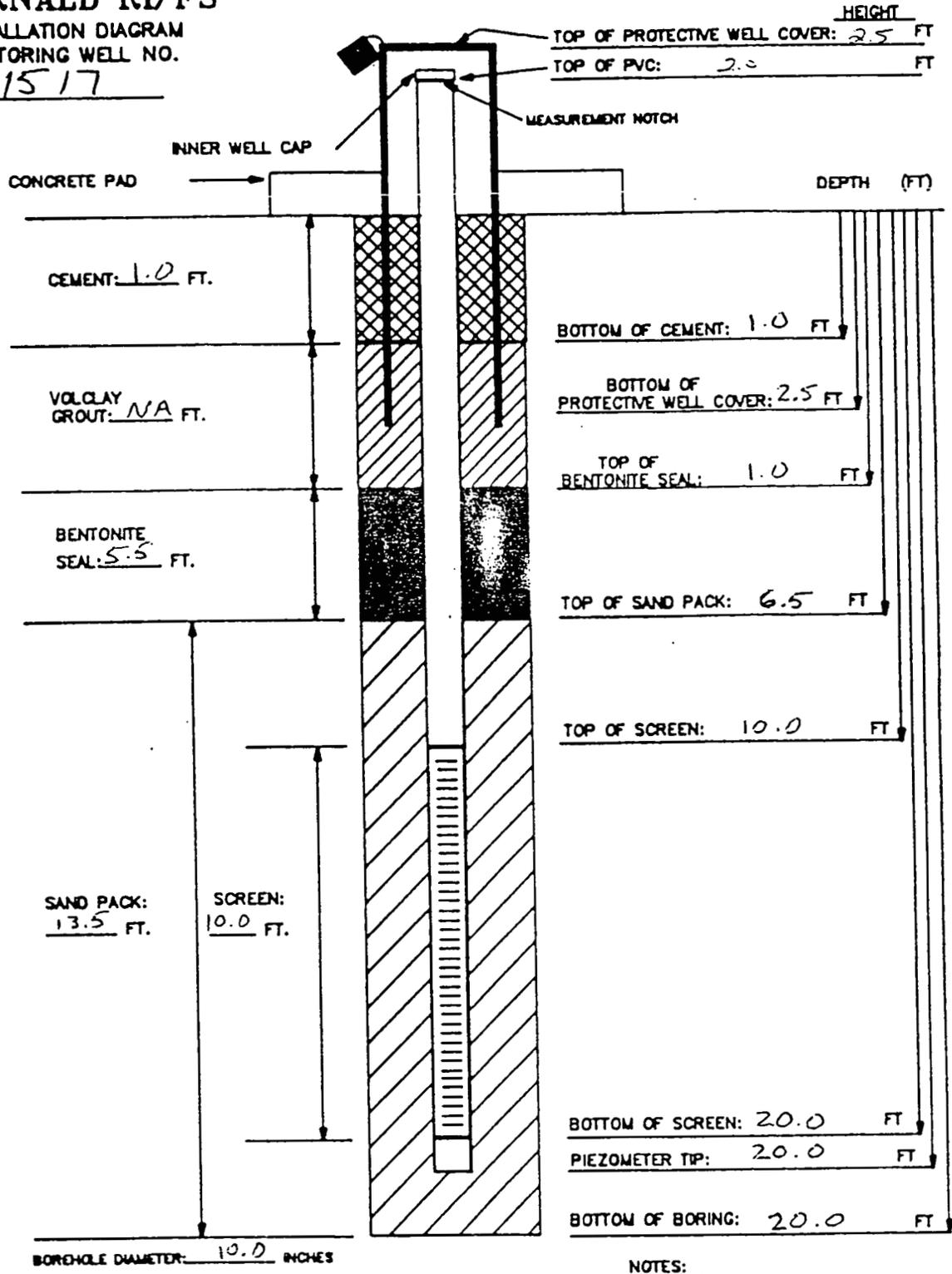
SEE PAGE 1

INSTALLATION DATE: 5-21-90

# FERNALD RI/FS

INSTALLATION DIAGRAM  
MONITORING WELL NO.

1517



**MATERIALS USED:**

- SAND TYPE AND QUANTITY: 8 BAGS 10/20 (20 lbs. each)
- BENTONITE PELLETS (5-GALLON BUCKETS): 6 - 5 gal BUCKETS
- BAGS OF VOLCLAY GROUT: NONE USED
- AMOUNT OF CEMENT: 0.5 - 90 lb. BAGS
- AMOUNT OF WATER USED: 5 gallons
- OTHER:

**NOTES:**

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

TASK: 602.3.7

GEOLOGIST/ENGINEER: *[Signature]*

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FMPG RI/FS \ 602.3.7 FIELD ENG./GEO. M. GARMAN DATE 5-21-90  
 PROJECT NO. 602.3.7 CHECKED BY E. Trolinger DATE 5/20/90  
 BORING NO. 1517  
 PIEZOMETER NO. 1517 DATE OF INSTALLATION 5-21-90

**BOREHOLE DRILLING**

|  |                                    |
|--|------------------------------------|
| DRILLING METHOD <u>HOLLOW STEM AUGER</u> | TYPE OF BIT <u>AUGER</u>           |
| DRILLING FLUID (S) USED:                 | CASING SIZE (S) USED:              |
| FLUID <u>NA</u> FROM _____ TO _____      | SIZE <u>NA</u> FROM _____ TO _____ |
| FLUID <u>NA</u> FROM _____ TO _____      | SIZE <u>NA</u> FROM _____ TO _____ |

**PIEZOMETER DESCRIPTION**

|  |  |
|--|--|
| TYPE <u>SCHEDULE 40 PVC</u>  | RISER PIPE MATERIAL <u>SCHEDULE 40 PVC</u>     |
| DIAMETER OF PERFORATED SECTION <u>2.0 IN I.D.</u>  | RISER PIPE DIAMETERS:                          |
| PERFORATION TYPE:  | O.D. <u>2 5/16 IN</u> I.D. <u>2.0 IN</u>       |
| SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT, 2.0 FT</u> |
| AVERAGE SIZE OF PERFORATIONS <u>0.02 IN</u>  | JOINING METHOD <u>FLUSH JOINT</u>              |
| TOTAL PERFORATED AREA <u>10.0 FT</u>   | <u>THREADED</u>                                |

**PROTECTION SYSTEM**

|  |  |
|--|--|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HINGED LOCKING</u> |
| PROTECTIVE PIPE O.D. <u>4 3/8 IN.</u>      | <u>COVER w/ PADLOCK</u>                |

| ITEM   | DISTANCE ABOVE / BELOW GROUND SURFACE (FT) |             | ELEVATION ( ) |        |
|--|--|-------------|---------------|--------|
|  | TOP  | BOTTOM      | TOP           | BOTTOM |
| TOP OF RISER PIPE                                      | 2.0  |             |               |        |
| GROUND SURFACE   | 0.0  |             |               |        |
| BOTTOM OF PROTECTIVE PIPE                              | 2.5  |             |               |        |
| BOREHOLE FILL MATERIALS:                               |  |             |               |        |
| GROUT/SLURRY <u>MS 5-21-90</u><br><u>NO. 10 CEMENT</u> | TOP 0.0                                    | BOTTOM 1.0  | TOP           | BOTTOM |
| BENTONITE  | TOP 1.0                                    | BOTTOM 6.5  | TOP           | BOTTOM |
| SAND   | TOP 6.5                                    | BOTTOM 20.0 | TOP           | BOTTOM |
| GRAVEL <u>NONE USED</u>                                | TOP NA                                     | BOTTOM NA   | TOP           | BOTTOM |
| PERFORATED SECTION                                     | TOP 10.0                                   | BOTTOM 20.0 | TOP           | BOTTOM |
| PIEZOMETER TIP   | 20.0                                       |             |               |        |
| BOTTOM OF BOREHOLE                                     | 20.0                                       |             |               |        |
| GWL AFTER INSTALLATION                                 |  |             |               |        |

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES  NO   
 REMARKS 10.0 IN. AUGER USED TO SET WELL BECAUSE OF

BLOW SAMPLES

13.5 FT - BEGIN H<sub>2</sub>O ZONE

# FERNALD RI/FS

1114

|      |         |  |  |
|------|---------|--|--|
| DATE | 5/22/90 |  |  |
| TIME | 12:00   |  |  |
| BY   |         |  |  |
| NO.  |         |  |  |

## VISUAL CLASSIFICATION OF SOILS

|  |  |               |                         |
|--|--|---------------|-------------------------|
| PROJECT NUMBER: 602.03.07                                  | PROJECT NAME: FPC RI/FS - (Facility Testing Program) |               |                         |
| BORING NUMBER: 1518  | COORDINATES:   | DATE: 5-22-90 |                         |
| ELEVATION:   | GWL: Depth   | Date/Time     | DATE STARTED: 5-22-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                              | Depth  | Date/Time     | DATE COMPLETED: 5-22-90 |
| DRILLING METHODS: HOLLOW STEM AUGER (SPLIT SPOON SAMPLING) | PAGE 1   |               | OF 5                    |

| DEPTH (ft) | SAMPLE TYPE & NO   | BLOWS ON SAMPLER PER (G. 1.1.1.3) | RECOVERY (%) | DESCRIPTION  | USCS SYMBOL | MEASURED CONSISTENCY (ISSI) | REMARKS                          |
|------------|--|-----------------------------------|--------------|--|-------------|-----------------------------|----------------------------------|
|            |  |                                   |              | SAA = SAME AS ABOVE<br>NR = NO RECOVERY                                |             |                             |                                  |
| 0.5        | SS454<br>5-22<br>0816  | 6                                 | 6            | MEDIUM DENSE (104R, 4/3) BROWN SILTY TRACE SAND. LOW MOISTURE.         | ML          | NA                          | H <sub>max</sub> = 0<br>α = 0    |
| 1.0        | SS455<br>5-22<br>0816  | 9                                 | 6            | MEDIUM DENSE (104R, 5/4) YELLOWISH BROWN SILTY SAND. LOW MOISTURE.     | SM          | NA                          | γ <sub>D</sub> = 100 cpm         |
| 1.5        | SS456<br>5-22<br>0816  | 9                                 | 2            | SAA  | SM          | NA                          |                                  |
| 2.0        | SS457<br>5-22<br>0818  | 6                                 | 6            | MEDIUM DENSE (104R, 5/3) BROWN SILTY SAND. TRACE GRAVEL. LOW MOISTURE. | SM          | NA                          | H <sub>max</sub> = 0<br>α = 0    |
| 2.5        | SS458<br>5-22<br>0818  | 11                                | 6            | SAA.   | SM          | NA                          | γ <sub>D</sub> = 90 cpm          |
| 3.0        | SS459<br>5-22<br>0818  | 12                                | 2            | SAA  | SM          | NA                          |                                  |
| 3.5        | SS460<br>5-22<br>0820  | 6                                 | 6            | SAA  | SM          | NA                          | H <sub>max</sub> = 0<br>α = 0    |
| 4.0        | SS461<br>5-22<br>0820  | 8                                 | 6            | SAA  | SM          | NA                          | γ <sub>D</sub> = 90 cpm          |
| 4.5        | SS462<br>5-22<br>0820  | 9                                 | 1            | SAA  | SM          | NA                          |                                  |
| 5.0        | SS463<br>5-22<br>0823  | 4                                 | 6            | LOOSE (104R, 5/4) BROWN SILTY SAND. LOW MOISTURE.                      | SM          | NA                          | H <sub>max</sub> = 0             |
| 5.5        | SS464<br>5-22<br>0823  | 4                                 | 6            | (3 IN.) = SAA  | SM          | NA                          | α = 0<br>γ <sub>D</sub> = 80 cpm |
|            | (3 IN.) = LOOSE (104R, 5/4) YELLOWISH BROWN CLAYEY SILT. SLIGHTLY MOIST. |                                   |              | ML   | NA          |                             |                                  |
| 6.0        | SS465<br>5-22<br>0823  | 5                                 | 3            | SAA  | ML          | NA                          |                                  |
| 6.5        | SS466<br>5-22<br>0823  | 3                                 | 6            | MEDIUM DENSE (104R, 5/3) BROWN CLAYEY SILT. MOIST.                     | ML          | NA                          | H <sub>max</sub> = 0<br>α = 0    |
| 7.0        | SS467<br>5-22<br>0823  | 5                                 | 6            | STIFF (104R, 5/3) BROWN SILTY CLAY. MEDIUM PLASTICITY. MOIST.          | CL          | 1.15                        | γ <sub>D</sub> = 90 cpm          |
| 7.5        | SS468<br>5-22<br>0823  | 7                                 | 5            | MEDIUM DENSE (104R, 5/3) BROWN CLAYEY SILT. MOIST.                     | ML          | NA                          |                                  |

50

NOTES: Contractor: Pennsylvania Drilling  
 Driller: CRAIG COULTER  
 Driller's Assistant: CHRIS COULTER  
 All samples collected according to ASTM Standards Soil Cells Debated  
 & Manual Soil Comp. Charts.

Brenneman Retinas/Line  
 H<sub>max</sub> = 0 mm.  
 Alpha (α) = 0 %  
 Liquid Limit = 40-100 %

VISUAL CLASSIFICATION OF SOILS

|  |   |               |                         |
|--|---|---------------|-------------------------|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMPC: RI/FS Facility Testing) |               |                         |
| BORING NUMBER: 1518  | COORDINATES:                                | DATE: 5-22-90 |                         |
| ELEVATION:   | GWL: Depth                                  | Date/Time     | DATE STARTED: 5-22-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                                | Depth                                       | Date/Time     | DATE COMPLETED: 5-22-90 |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) |   |               | PAGE 2 OF 5             |

| DEPTH (ft) | SAMPLE TYPE & NO                        | BLOWSON SAMPLER PER 16 (in.) | RECOVERY (in.) | DESCRIPTION   | USCS SYMBOL | MEASURED CONSISTENCY (115F) | REMARKS                     |
|------------|---|------------------------------|----------------|---|-------------|-----------------------------|-----------------------------|
|            | SAA = SAME AS ABOVE<br>NR = NO RECOVERY |                              |                |   |             |                             |                             |
| 8.0        | 55469<br>5-22<br>0932                   | 10                           | 6              | DENSE (104R, 5/4) YELLOWISH BROWN SILT. TRACE SAND. MOIST.                              | ML          | NA                          | H <sub>w</sub> = 0<br>α = 0 |
| 8.5        | 55470<br>5-22<br>0932                   | 16                           | 6              | DENSE (104R, 5/3) BROWN SILTY FINE SAND. LOW MOISTURE.                                  | SM          | NA                          | β = 90 cpm                  |
| 9.0        | 55471<br>5-22<br>0932                   | 21                           | 3              | SAA   | SM          | NA                          |                             |
| 9.5        | 55472<br>5-22<br>0935                   | 16                           | 6              | SAA   | SM          | NA                          | H <sub>w</sub> = 0<br>α = 0 |
| 10.0       | 55473<br>5-22<br>0935                   | 17                           | 6              | SAA   | SM          | NA                          | β = 90 cpm                  |
| 10.5       | 55474<br>5-22<br>0935                   | 22                           | 4              | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME SILT. LOW MOISTURE.              | SW          | NA                          |                             |
| 11.0       | 55475<br>5-22<br>0944                   | 12                           | 6              | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL TRACE SILT. LOW MOISTURE. | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0 |
| 11.5       | 55476<br>5-22<br>0944                   | 19                           | 6              | SAA   | SW          | NA                          | β = 100 cpm                 |
| 12.0       | 55477<br>5-22<br>0944                   | 21                           | 0              | NR  | NA          | NA                          |                             |
| 12.5       | 55478<br>5-22<br>1015                   | 16                           | 6              | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND (GRAVELLY). SOME SILT. WET.            | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0 |
| 13.0       | 55479<br>5-22<br>1015                   | 18                           | 6              | SAA   | SW          | NA                          | β = 100 cpm                 |
| 13.5       | 55480<br>5-22<br>1015                   | 21                           | 0              | NR  | NA          | NA                          |                             |
| 14.0       | 55481<br>5-22<br>1020                   | 19                           | 6              | DENSE (104R, 5/2) GRAYISH BROWN GRAVELLY WELL GRADED SAND. SOME SILT. WET.              | SW          | NA                          | H <sub>w</sub> = 0<br>α = 0 |
| 14.5       | 55482<br>5-22<br>1020                   | 24                           | 6              | SAA   | SW          | NA                          | β = 90 cpm                  |
| 15.0       | 55483<br>5-22<br>1020                   | 21                           | 1              | SAA   | SW          | NA                          |                             |

Begin  
+20 zone

NOTES:

See Page 1

**FERNALD  
RI/FS**

**VISUAL CLASSIFICATION OF SOILS**

|  |   |
|--|---|
| PROJECT NUMBER: 602.03.07                                    | PROJECT NAME: FMBE RI/FS - (Facility Testing Program) |
| BORING NUMBER: 1518  | COORDINATES:  |
| ELEVATION: <del>11.5</del> MG 5-22-90                        | DATE: 5-22-90   |
| ENGINEER/GEOLOGIST: M. GARMAN                                | DATE STARTED: 5-22-90                                 |
|  | DATE COMPLETED: 5-22-90                               |
| DRILLING METHODS: HOLLOW STEM AUGER - (Split Spoon Sampling) | PAGE 3 OF 5   |

| DEPTH (ft) | SAMPLE TYPE & NO      | BLOWSON SAMPLER PER (blows) | RECOVERY (%) | DESCRIPTION   | USCS SYMBOL | MEASURED CONSISTENCY (TSF) | REMARKS                                       |
|------------|-----------------------|-----------------------------|--------------|---|-------------|----------------------------|---|
|            |                       |                             |              | SAA = SAME AS ABOVE<br>NR = NO RECOVERY   |             |                            |   |
| 15.5       | 55484<br>5-22<br>1030 | 6                           | 6            | MEDIA DENSE (104R, 5/2) GRAYISH BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. WET. | SW          | NA                         | H <sub>max</sub> = 0<br>α = 0<br>βB = 100 cpm |
| 16.0       | 55485<br>5-22<br>1035 | 11                          | 5            | SAA   | SW          | NA                         |   |
| 16.5       | 55486<br>5-22<br>1030 | 15                          | 0            | NR  | NA          | NA                         |   |
| 17.0       | 55487<br>5-22<br>1035 | 16                          | 6            | DENSE (104R, 5/2) BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET.          | SW          | NA                         | H <sub>max</sub> = 0<br>α = 0<br>βB = 90 cpm  |
| 17.5       | 55488<br>5-22<br>1035 | 18                          | 6            | DENSE (104R, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. WET.              | SW          | NA                         |   |
| 18.0       | 55489<br>5-22<br>1035 | 23                          | 5            | SAA   | SW          | NA                         |   |
| 18.5       | 55490<br>5-22<br>1045 | 12                          | 6            | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME GRAVEL. TRACE SILT. WET.   | SW          | NA                         | H <sub>max</sub> = 0<br>α = 0<br>βB = 90 cpm  |
| 19.0       | 55491<br>5-22<br>1045 | 16                          | 6            | SAA   | SW          | NA                         |   |
| 19.5       | 55492<br>5-22<br>1045 | 18                          | 6            | DENSE (104R, 5/2) GRAYISH BROWN WELL GRADED SAND. SOME SILT. WET.                 | SW          | NA                         | H <sub>max</sub> = 0<br>α = 0<br>βB = 90 cpm  |
| 20         | 55493<br>5-22<br>1045 | 24                          | 5            | SAA   | SW          | NA                         |   |
|            |                       |                             |              | 200# BOTTOM OF BORING<br>PIEZOMETER INSTALLED                                     |             |                            |   |

NOTES:

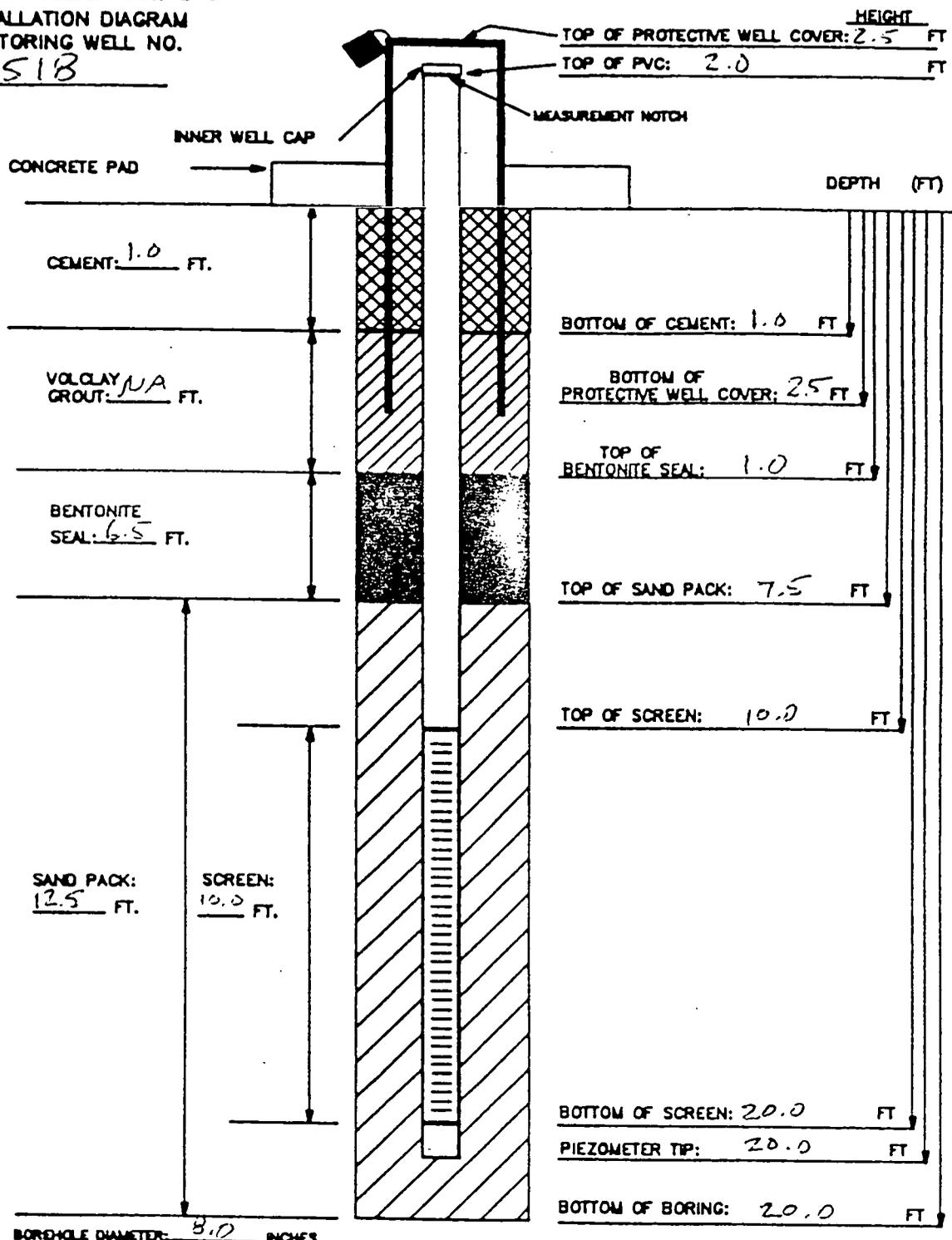
SEE Page 1

# FERNALD RI/FS

INSTALLATION DIAGRAM  
MONITORING WELL NO.

1518

INSTALLATION DATE: 5-22-90



**MATERIALS USED:**  
 SAND TYPE AND QUANTITY: 4 BAGS 1020 (80 lbs. each)  
 BENTONITE PELLETS (3-GALLON BUCKETS): 4  
 BAGS OF VOLCLAY GROUT: none used  
 AMOUNT OF CEMENT: 0.5 BAG (90 lbs. each)  
 AMOUNT OF WATER USED: 5 gallons  
 OTHER:

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

TASK: 602.37

GEOLOGIST/ENGINEER: *[Signature]*

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FMPC RIVES FIELD ENG./GEO. M. GARMAN DATE 5-22-90  
 PROJECT NO. 602.3.7 CHECKED BY P. Collins DATE 5/30/90  
 BORING NO. 1518  
 PIEZOMETER NO. 1518 DATE OF INSTALLATION 5-22-90

**BOREHOLE DRILLING**

|  |                                    |
|--|------------------------------------|
| DRILLING METHOD <u>HOLLOW STEM AUGER</u> | TYPE OF BIT <u>AUGER</u>           |
| DRILLING FLUID (S) USED:                 | CASING SIZE (S) USED:              |
| FLUID <u>NA</u> FROM _____ TO _____      | SIZE <u>NA</u> FROM _____ TO _____ |
| FLUID <u>NA</u> FROM _____ TO _____      | SIZE <u>NA</u> FROM _____ TO _____ |

**PIEZOMETER DESCRIPTION**

|  |  |
|--|--|
| TYPE <u>SCHEDULE 40 PVC</u>  | RISER PIPE MATERIAL <u>SCHEDULE 40 PVC</u>     |
| DIAMETER OF PERFORATED SECTION <u>2.0 IN I.D.</u>  | RISER PIPE DIAMETERS:                          |
| PERFORATION TYPE:  | O.D. <u>2 5/16 IN.</u> I.D. <u>2.0 IN.</u>     |
| SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT, 2.0 FT</u> |
| AVERAGE SIZE OF PERFORATIONS <u>0.02 IN</u>  | JOINING METHOD <u>FLUSH JOINT</u>              |
| TOTAL PERFORATED AREA <u>10.0 FT</u>   | <u>THREADED</u>                                |

**PROTECTION SYSTEM**

|  |  |
|--|--|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HINGED LOCKING</u> |
| PROTECTIVE PIPE O.D. <u>4 3/8 IN.</u>      | <u>COVER W/ PAD LOCK</u>               |

| ITEM  | DISTANCE ABOVE/BELOW GROUND SURFACE (FT) |      | ELEVATION ( ) |      |     |        |
|---|--|------|---------------|------|-----|--------|
| TOP OF RISER PIPE   | 2.0                                      |      |               |      |     |        |
| GROUND SURFACE  | 0.0                                      |      |               |      |     |        |
| BOTTOM OF PROTECTIVE PIPE   | 2.5                                      |      |               |      |     |        |
| BOREHOLE FILL MATERIALS:<br>GROUT/SLURRY CEMENT<br>BENTONITE<br>SAND<br>GRAVEL <u>NONE USED</u> | TOP                                      | 0.0  | BOTTOM        | 1.0  | TCP | BOTTOM |
|   | TOP                                      | 1.0  | BOTTOM        | 7.5  | TOP | BOTTOM |
|   | TOP                                      | 7.5  | BOTTOM        | 20.0 | TOP | BOTTOM |
|   | TOP                                      | NA   | BOTTOM        | NA   | TOP | BOTTOM |
| PERFORATED SECTION  | TOP                                      | 10.0 | BOTTOM        | 20.0 | TOP | BOTTOM |
| PIEZOMETER TIP  | 20.0                                     |      |               |      |     |        |
| BOTTOM OF BOREHOLE  | 20.0                                     |      |               |      |     |        |
| GWL AFTER INSTALLATION  |  |      |               |      |     |        |

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES  NO   
 REMARKS 12.0 FT - BEGIN H<sub>2</sub>O ZONE

|       |       |  |  |  |
|-------|-------|--|--|--|
| DATE  | TIME  |  |  |  |
| 10/21 | 11:00 |  |  |  |
| DATE  | TIME  |  |  |  |
| 10/21 | 11:00 |  |  |  |

VISUAL CLASSIFICATION OF SOILS

|                                  |   |
|----------------------------------|---|
| PROJECT NUMBER: 602.32.1         | PROJECT NAME: FMPC TRINFS                             |
| BOREHOLE NUMBER: 2386            | COCORDINATES: N.477,635.9 E.1380,783.98 DATE: 4-21-90 |
| ELEVATION: 575.2 BOUND           | GWL: 200m DATE/TIME: DATE STARTED: 4-21-90            |
| ENGINEER/GEOLOGIST: M. GARMAN    | DATE COMPLETED: 4-24-90                               |
| DRILLING METHOD: CCS. CABLE TOOL | PAGE 1 OF 7   |

| DEPTH (FT) | SAMPLE INTERVAL (FT)  | BLOWSON SAMPLES (1/2 IN) | RECOUITY (IN) | DESCRIPTION   | USCS SYMBOL | MEASURED COMPRESSIBILITY (1/2 IN) | NA WELL IDENTIFICATION | REMARKS                         |
|------------|-----------------------|--------------------------|---------------|---|-------------|-----------------------------------|------------------------|---------------------------------|
| 1          | 32572<br>4-21<br>1410 | 1<br>2<br>3              | 15            | LOOSE (10YR, 4/2) DARK GRAY BROWN CLAYEY SILT. SLIGHTLY MOIST TO MOIST.                     | ML          | NA                                |                        | HNU = 0<br>α = 0<br>γB = 50 cpm |
| 2          | 32573<br>4-21<br>1414 | 1<br>2                   | 8             | VERY LOOSE (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY, SANDY SILT. SLIGHTLY MOIST TO MOIST.    | ML          | NA                                |                        | HNU = 0<br>α = 0<br>γB = 50 cpm |
| 3          | 32574<br>4-21<br>1416 | 4<br>5                   | 8             | LOOSE (10YR, 4/6) DARK YELLOWISH BROWN CLAYEY SILT. SOME SAND. SLIGHTLY MOIST TO MOIST.     | ML          | NA                                |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |
| 4          | 32575<br>4-21<br>1419 | 6<br>4                   | 14            | HARD (10YR, 5/4) YELLOWISH BROWN SILTY CLAY. LOW TO MED. PLASTICITY. LOW MOISTURE.          | CL          | 2.5                               |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |
| 5          | 32576<br>4-21<br>1423 | 10<br>10                 | 9             | FIRM (10YR, 5/4) YELLOWISH BROWN SILTY CLAY LOW TO MED. PLASTICITY. LOW MOISTURE.           | CL          | 1.5                               |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |
| 6          | 32577<br>4-21<br>1426 | 8<br>6                   | 10            | MEDIUM DENSE (10YR, 4/4) DARK BROWN SILT. SOME CLAY. MOIST TO VERY MOIST.                   | ML          | NA                                |                        | HNU = 0<br>α = 0<br>γB = 50 cpm |
| 7          | 32578<br>4-21<br>1545 | 10<br>8                  | 10            | MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN SANDY, CLAYEY, SILT. SLIGHTLY MOIST TO MOIST. | ML          | NA                                |                        | HNU = 0<br>α = 0<br>γB = 40 cpm |
| 8          | 32579<br>4-21<br>1554 | 12<br>12<br>13           | 12            | HARD (10YR, 5/4) YELLOWISH BROWN SILTY CLAY TRACE FINE SAND. LOW PLASTICITY. LOW MOISTURE.  | CL          | 3.5                               |                        | HNU = 0<br>α = 0<br>γB = 70 cpm |
| 9          | 32580<br>4-21<br>1614 | 1<br>3<br>6              | 8             | SOFT (10YR, 5/1) GRAY SILTY CLAY. TRACE SAND AND GRAVEL. MEDIUM TO HIGH PLASTICITY. MOIST.  | CL          | 0.5                               |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |
| 10         | 32581<br>4-21<br>1621 | 7<br>10<br>16            | 14            | SOFT (10YR, 5/1) GRAY SILTY CLAY. TRACE SAND AND GRAVEL. MEDIUM TO HIGH PLASTICITY. MOIST.  | CL          | 0.5                               |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING  
 Drilling Equipment: CYCLONE 43  
 Driller: JOE BARILE  
 ASST: GARY KREPPS, BOB YOST

BACKGROUND:  
 HNU = 0 ppm  
 α = 0 cpm  
 γB = 20-80 cpm

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

**VISUAL CLASSIFICATION OF SOILS**

5-2-90  
ET

|                                 |                          |
|---------------------------------|--------------------------|
| PROJECT NUMBER: 602.3.2.1       | PROJECT NAME: FMPC RI/FS |
| BORING NUMBER: 2386             | COCORDINATES: 482 0.1    |
| ELEVATION: 575.2                | GWL Depth: Date/Time     |
| ENGINEER/GEOLOGIST: M. GARMAN   | Date/Time                |
| DRILLING METHOD-COS: CABLE TOOL | PAGE 2 OF 7              |

| DEPTH (FT) | SAMPLE TYPE & ID | HOW MANY SAMPLES (GINS) | RECOVERY (%) | DESCRIPTION  | TOOL USED | MEASURED CURVELENGTH (FT) | NA WELL CONSTRUCTION | REMARKS                         |
|------------|------------------|-------------------------|--------------|--|-----------|---------------------------|----------------------|---------------------------------|
| 15         | 32582            | 9                       | 12           | HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE GRAVEL. LOW TO MEDIUM PLASTICITY. LOW MOISTURE.  | CL        | 2.75                      |                      | HNU = 0<br>u = 0<br>yB = 60 cpm |
| 16         | 4-21<br>1635     | 12<br>15                | 12           |  |           |                           |                      |                                 |
| 17         | 32583            | 6                       | 13           | HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE GRAVEL. LOW TO MEDIUM PLASTICITY. LOW MOISTURE.  | CL        | 3.0                       |                      | HNU = 0<br>u = 0<br>yB = 70 cpm |
| 18         | 4-22<br>0840     | 9<br>13                 | 13           |  |           |                           |                      |                                 |
| 19         | 32584            | 3                       | 12           | HARD (10YR, 5/1) GRAY SILTY CLAY. TRACE GRAVEL. LOW TO MEDIUM PLASTICITY. LOW MOISTURE.  | CL        | 3.5                       |                      | HNU = 0<br>u = 0<br>yB = 60 cpm |
| 20         | 4-22<br>0855     | 8<br>13                 | 12           |  |           |                           |                      |                                 |
| 20         | 32585            | 3                       | 14           | HARD (10YR, 5/1) GRAY (FIRST BIN); (10YR, 4/2) BROWN (BOTTOM BIN.) SILTY CLAY. TRACE SAND AND GRAVEL. MEDIUM PLASTICITY. LOW MOISTURE. | CL        | 2.5                       |                      | HNU = 0<br>u = 0<br>yB = 80 cpm |
| 21         | 4-22<br>0906     | 9<br>14                 | 14           |  |           |                           |                      |                                 |
| 21         | 32586            | 25                      | 16           | VERY DENSE (10YR, 5/3) BROWN WELL GRADED SAND. SOME SILT AND GRAVEL. LOW MOISTURE.   | SW        | NA                        |                      | HNU = 0<br>u = 0<br>yB = 60 cpm |
| 22         | 4-22<br>1005     | 35<br>45                | 16           |  |           |                           |                      |                                 |
| 23         |                  |                         |              |  |           |                           |                      |                                 |
| 24         |                  |                         |              |  |           |                           |                      |                                 |
| 25         | 32587            | 40                      | 15           | VERY DENSE (10YR, 5/3) BROWN WELL GRADED SAND. SOME SILT AND GRAVEL. LOW MOISTURE.   | SW        | NA                        |                      | HNU = 0<br>u = 0<br>yB = 40 cpm |
| 26         | 4-22<br>1033     | 45<br>45                | 15           |  |           |                           |                      |                                 |
| 27         |                  |                         |              |  |           |                           |                      |                                 |
| 28         |                  |                         |              |  |           |                           |                      |                                 |
| 29         |                  |                         |              |  |           |                           |                      |                                 |
| 30         |                  |                         |              |  |           |                           |                      |                                 |

END OF TILL

NOTES. SEE P. 1

Drilling Contractor: PENN DRILL  
 Drilling Equipment: CYCLONE 43  
 Driller: JOE BARILE  
 ASSTS: GARY KREPPS, BUD YOST

BACKGROUND:

HNU = 0  
 u = 0  
 yB = 20-80 cpm

X-2(0 FT - END OF TILL

**VISUAL CLASSIFICATION OF SOILS**

5-2-90  
E1

|                               |                          |
|-------------------------------|--------------------------|
| PROJECT NUMBER: 602.3.2.1     | PROJECT NAME: FMPC RI/FS |
| BOHNG NUMBER: 2386            | COCROINATES: See p.1     |
| ELEVATION: 275.2              | GWL Depth: Date/Time     |
| ENGINEER/GEOLOGIST: M. GARMAN | Date/Time                |
| DRILLING METHOD: CABLE TOOL   | PAGE 3 OF 7              |

| DEPTH (FT) | SAMPLE TYPE & ID | DIAMETER (IN) | SAMPLING METHOD (GIN) | RECOVERY (IN) | DESCRIPTION   | TERRAZO | MEASURED EFFICIENCY (%) | NA WELL CONSTRUCTION | REMARKS                 |
|------------|------------------|---------------|-----------------------|---------------|---|---------|-------------------------|----------------------|-------------------------|
| 30         | 32588            | 20            |                       |               | VERY DENSE (10YR, 5/4) YELLOWISH BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. LOW MOISTURE. | SW      | NA                      |                      | H <sub>2</sub> O = 0    |
| 31         | 4-22<br>1112     | 27<br>25      | 13                    |               |   |         |                         |                      | a = 0                   |
| 32         |                  |               |                       |               |   |         |                         |                      | γ <sub>B</sub> = 40 cpm |
| 33         |                  |               |                       |               |   |         |                         |                      |                         |
| 34         |                  |               |                       |               |   |         |                         |                      |                         |
| 35         | 32589            | 50/4in        |                       |               | VERY DENSE (10YR, 4/3) BROWN WELL GRADED SAND. SOME SILT. LOW MOISTURE.                     | SW      | NA                      |                      | H <sub>2</sub> O = 0    |
| 36         | 4-22<br>1405     | 4             |                       |               |   |         |                         |                      | a = 0                   |
| 37         |                  |               |                       |               |   |         |                         |                      | γ <sub>B</sub> = 80 cpm |
| 38         |                  |               |                       |               |   |         |                         |                      |                         |
| 39         |                  |               |                       |               |   |         |                         |                      |                         |
| 40         | 32590            | 16            |                       |               | DENSE (10YR, 5/4) YELLOWISH BROWN WELL GRADED SAND. TRACE SILT. LOW MOISTURE.               |         |                         |                      | H <sub>2</sub> O = 0    |
| 41         | 4-22<br>1419     | 23<br>26      | 14                    |               |   |         |                         |                      | a = 0                   |
| 42         |                  |               |                       |               |   |         |                         |                      | γ <sub>B</sub> = 30 cpm |
| 43         |                  |               |                       |               |   |         |                         |                      |                         |
| 44         |                  |               |                       |               |   |         |                         |                      |                         |
| 45         |                  |               |                       |               |   |         |                         |                      |                         |

NOTES. See p.1

Drilling Contractor: PENN-DRILL

Drilling Equipment: CYCLONE 43

Driller: JOE BARILE

ASSIST: GARY KREPPES, BOB YOST

BACKGROUND: H<sub>2</sub>O = 0  
a = 0  
γ<sub>B</sub> = 20-80 cpm

**VISUAL CLASSIFICATION OF SOILS**

5-2-90  
E1

|                                      |                                   |
|--------------------------------------|-----------------------------------|
| PROJECT NUMBER: <u>602.3.2.1</u>     | PROJECT NAME: <u>FMPC RI/FS</u>   |
| BORING NUMBER: <u>2586</u>           | COCORDINATES: <u>SEE P.1</u>      |
| ELEVATION: <u>53.2</u>               | GWL: <u>DEEM</u> Date/Time: _____ |
| ENGINEER/GEOLOGIST: <u>M. GARMAN</u> | Date/Time: _____                  |
| DRILLING METHOD: <u>CABLE TOOL</u>   | DATE COMPLETED: <u>4-21-50</u>    |
|                                      | PAGE <u>4</u> OF <u>7</u>         |

| DEPTH (FT) | SAMITE (IN & IN) | BLOWSON SAMIT (G/M) | RECOVERY (IN) | DESCRIPTION   | USGS SYSTEM | MEASURED COMPRESSIBILITY (PSI) | WELL CONSTRUCTION                                      | REMARKS |
|------------|------------------|---------------------|---------------|---|-------------|--------------------------------|--|---------|
| 45         | 32591            | 32                  |               | VERY DENSE (10YR, 5/2) GRAYISH BROWN SANDY WELL GRADED GRAVEL. LOW MOISTURE.              | GW          | NA                             | H <sub>NV</sub> = 0<br>α = 0<br>γ <sub>B</sub> = 60cpm |         |
| 46         | 7-22<br>1445     | 30<br>45            | 10            |   |             |                                |  |         |
| 47         |                  |                     |               |   |             |                                |  |         |
| 48         |                  |                     |               |   |             |                                |  |         |
| 49         |                  |                     |               |   |             |                                |  |         |
| 50         | 32592            | 35                  |               | VERY DENSE (10YR, 4/3) BROWN SANDY WELL GRADED GRAVEL. MOIST.                             | GW          | NA                             | H <sub>NV</sub> = 0<br>α = 0<br>γ <sub>B</sub> = 80cpm |         |
| 51         | 4-23<br>1406     | 50/6"               | 7             |   |             |                                |  |         |
| 52         |                  |                     |               |   |             |                                |  |         |
| 53         |                  |                     |               |   |             |                                |  |         |
| 54         |                  |                     |               |   |             |                                |  |         |
| 55         | 32593            | 15                  |               | VERY DENSE (10YR, 4/2) DARK GRAYISH BROWN GRAVELLY WELL GRADED SAND. MOIST TO VERY MOIST. | SW          | NA                             | H <sub>NV</sub> = 0<br>α = 0<br>γ <sub>B</sub> = 80cpm |         |
| 56         | 4-23<br>1516     | 45<br>50/6"         | 12            |   |             |                                |  |         |
| 57         |                  |                     |               |   |             |                                |  |         |
| 58         |                  |                     |               |   |             |                                |  |         |
| 59         |                  |                     |               |   |             |                                |  |         |
| 60         |                  |                     |               |   |             |                                |  |         |

~53.2 FT.

NOTES. See p.1  
 Drilling Contractor: PENN-DRILL  
 Drilling Equipment: CYCLONE 43  
 Driller: JOE DARILE  
MSTB. GARY KREPPS, BOB YOST

BACKGROUND:  
 H<sub>NV</sub> = 0  
 α = 0  
 γ<sub>B</sub> = 40-100cp

\* 53.0 FT - WATER TABLE

**VISUAL CLASSIFICATION OF SOILS**

5-2-90

|   |                                     |
|---|-------------------------------------|
| PROJECT NUMBER: <u>602.3.2.1</u>        | PROJECT NAME: <u>FMPC RI/FS</u>     |
| BORING NUMBER: <u>2386</u>              | COORDINATES: <u>See p.1</u>         |
| ELEVATION: <u>575.2</u>                 | GWL: <u>Deem</u> Date/Time: <u></u> |
| ENGINEER/GEOLOGIST: <u>M. GARMAN</u>    | Deem Date/Time: <u></u>             |
| DRILLING METHOD: <u>COS. CABLE TOOL</u> | PAGE: <u>5</u> OF <u>7</u>          |

| DEPTH (FT) | SAMPLE TYPE & NO. | BLOWS ON SAMPLE (10 IN) | RECOVERY (IN) | DESCRIPTION  | TEST SYMBOL | MEASURED CAPACITY (CF) | NA WELL CONSTRUCTION | REMARKS     |
|------------|-------------------|-------------------------|---------------|--|-------------|------------------------|----------------------|-------------|
| 60         | 32594             |                         |               | VERT DENSE (10YR, 5/3) BROWN GRAVELLY WELL GRADED SAND. WET.                                 | SW          | NA                     |                      | HNU = 0     |
| 61         | 4-23<br>1540      | 35<br>37                | 18            |  |             |                        |                      | α = 0       |
| 62         |                   |                         |               |  |             |                        |                      | γB = 80 g/m |
| 63         |                   |                         |               |  |             |                        |                      |             |
| 64         |                   |                         |               |  |             |                        |                      |             |
| 65         | 32555             |                         |               | VERY DENSE (10YR, 4/2) DARK BROWN WELL GRADED SAND. SOME GRAVEL. WET.                        | SW          | NA                     |                      | HNU = 0     |
| 66         | 4-23<br>1655      | 20<br>25<br>27          | 18            |  |             |                        |                      | α = 0       |
| 67         |                   |                         |               |  |             |                        |                      | γB = 80 cpm |
| 68         |                   |                         |               |  |             |                        |                      |             |
| 69         |                   |                         |               |  |             |                        |                      |             |
| 70         | 32596             |                         |               | MEDIUM DENSE (10YR, 4/2) DARK GRAYISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET. | SW          | NA                     |                      | HNU = 0     |
| 71         | 4-24<br>1532      | 8<br>18<br>12           | 18            |  |             |                        |                      | α = 0       |
| 72         |                   |                         |               | BOTTOM OF BORING,<br>END OF SAMPLING - 71.5 FT.  |             |                        |                      | γB = 80 cpm |
| 73         |                   |                         |               |  |             |                        |                      |             |
| 74         |                   |                         |               |  |             |                        |                      |             |
| 75         |                   |                         |               |  |             |                        |                      |             |

NOTES: See p.1

Drilling Contractor: PENN DRILL  
 Drilling Equipment: CYCLONE 43  
 Driller: JOE BARILE  
 ASSTS: GARY KREPPS, ROB MOST

BACKGROUND:

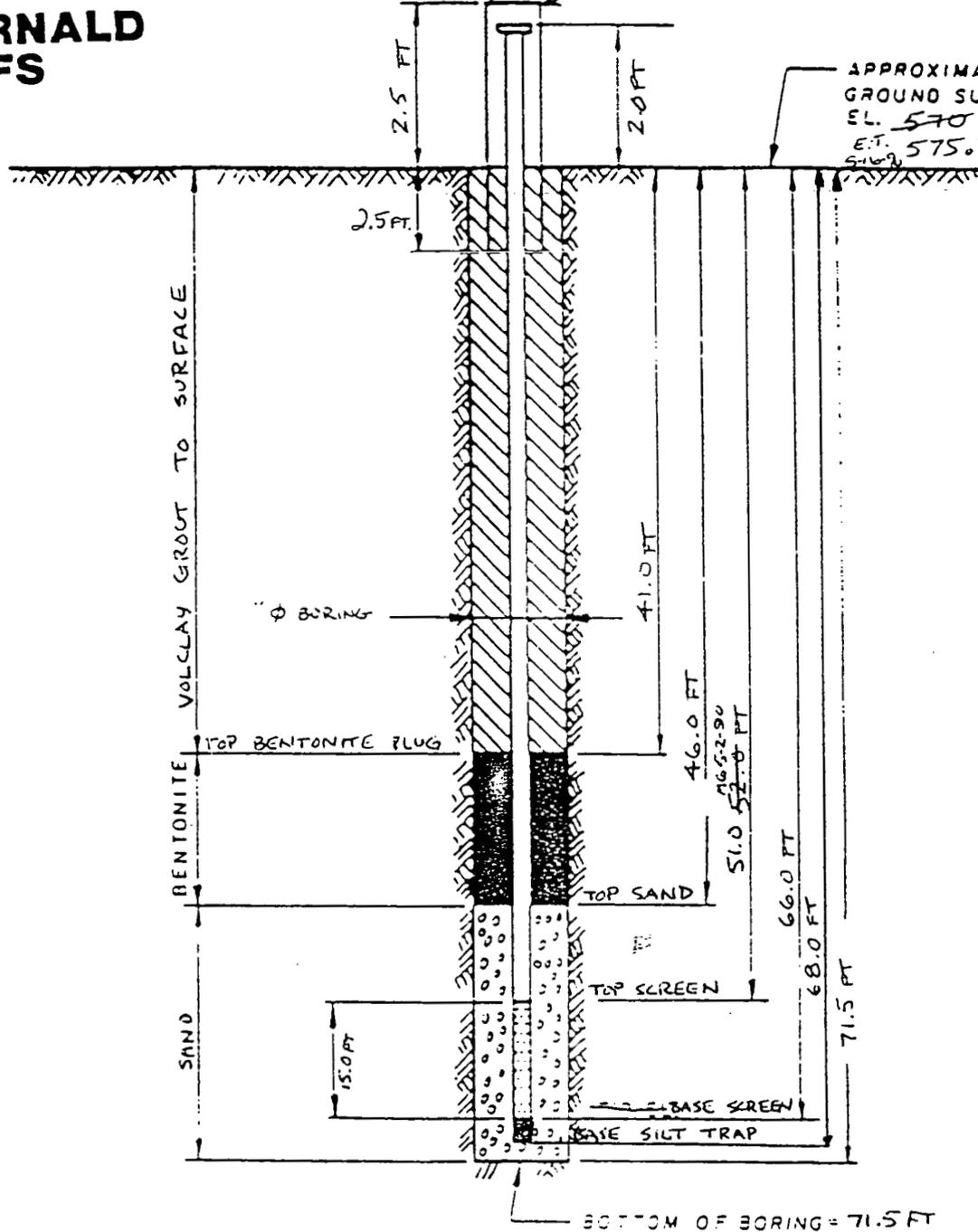
HNU = 0  
 α = 0  
 γB = 40-80 cpm

# FERNALD RI/FS

PROTECTIVE RISER CASING

CASING PROTECTIVE LID COVER WITH PADLOCK

APPROXIMATE EXISTING GROUND SURFACE  
EL. 570 FT.  
E.T. 575.2 FT.



|                |         |
|----------------|---------|
| DRAWING NUMBER |         |
| CHECKED BY     |         |
| APPROVED BY    |         |
| M/G            | 4-25-90 |
| DRAWN BY       |         |

**NOTES:**

1. RISER PIPE IS 4.0 IN I.D. SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN IS 4.0 IN I.D. SS. PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE).
3. LOWER END OF SCREEN IS CAPPED (W/ WELDED SILT TRAP)
4. ELEVATION OF WATER LEVEL 52.95 FT
5. WATER LEVEL READING ON 5-2-90

MATERIALS USED DURING WELL INSTALLATION:

- 18 BAGS 10/20 SAND (80 lb. each)
- 11 BAGS VOLCLAY GROUT (50 lb. each)
- 8 BUCKETS BENTONITE PELLETS (5 gal each)
- 1-15 FT. SCREEN WITH 2.0 FT WELDED SILT TRAP AND 0.4 FT. BLANK STICK-UP, 5-10 FT SECTION
- 1-2.0 FT SECTION AND 1-1.0 FT SECTION OF 4.0 IN I.D. STAINLESS STEEL RISER.

INSTALLATION DETAILS  
MONITORING WELL #2386

PREPARED FOR  
FERNALD RI/FS

TOTAL WATER ADDED DURING  
DRILLING AND GROUTING = 600 gal

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FMP RIFES FIELD ENG./GEO. M. GARMAN DATE 4-25-90  
 PROJECT NO. 602.32.1 CHECKED BY ET. DATE 5-10-90  
 BORING NO. 2386  
 PIEZOMETER NO. 2386 DATE OF INSTALLATION 5-2-90

**BOREHOLE DRILLING**

|   |   |
|---|---|
| DRILLING METHOD <u>CABLE TOOL</u>   | TYPE OF BIT <u>HAMMER</u>   |
| DRILLING FLUID (S) USED:<br>FLUID <u>WATER</u> FROM <u>0</u> TO <u>71.5 FT</u><br>FLUID <u>NA</u> FROM <u>          </u> TO <u>          </u> | CASING SIZE (S) USED:<br>SIZE <u>10.0 IN I.D.</u> FROM <u>0</u> TO <u>70.0 FT</u><br>SIZE <u>NA</u> FROM <u>          </u> TO <u>          </u> |

**PIEZOMETER DESCRIPTION**

|   |  |
|---|--|
| TYPE <u>MONITOR WELL</u>  | RISER PIPE MATERIAL <u>316 STAINLESS STEEL</u>                     |
| DIAMETER OF PERFORATED SECTION <u>4.0 IN I.D.</u>   | RISER PIPE DIAMETERS:<br>O.D. <u>4 3/8 IN.</u> I.D. <u>4.0 IN.</u> |
| PERFORATION TYPE:<br>SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT</u>                             |
| AVERAGE SIZE OF PERFORATIONS <u>0.01 IN</u>   | JOINING METHOD <u>THREADED, FLUSH JOINTED</u>                      |
| TOTAL PERFORATED AREA <u>15.0 FT</u>  |  |

**PROTECTION SYSTEM**

|  |  |
|--|--|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HINGED LOCKING</u> |
| PROTECTIVE PIPE O.D. <u>10 3/4 IN</u>      | <u>COVER W/ PADLOCK</u>                |

| ITEM                      | DISTANCE ABOVE / BELOW GROUND SURFACE (FT) |                   | ELEVATION (FT.) |               |               |
|---------------------------|--|-------------------|-----------------|---------------|---------------|
| TOP OF RISER PIPE         | 2.0 FT.                                    |                   | 577.92          |               |               |
| GROUND SURFACE            | 0.0  |                   | 575.20          |               |               |
| BOTTOM OF PROTECTIVE PIPE | 2.5 FT.                                    |                   | 572.7           |               |               |
| BOREHOLE FILL MATERIALS:  | GROUT/SLURRY                               | TOP 0.0           | BOTTOM 41.0     | TCP 575.20    | BOTTOM 534.20 |
|                           | BENTONITE                                  | TOP 41.0          | BOTTOM 46.0     | TOP 534.20    | BOTTOM 529.20 |
|                           | SAND                                       | TOP 46.0          | BOTTOM 71.5     | TOP 529.20    | BOTTOM 503.70 |
|                           | GRAVEL <u>NONE USED</u>                    | TOP NA            | BOTTOM NA       | TOP NA        | BOTTOM NA     |
| PERFORATED SECTION        | TOP <u>52.0</u> <u>51.0</u>                | BOTTOM <u>6.0</u> | TOP 524.20      | BOTTOM 519.20 |               |
| PIEZOMETER TIP            | 68.0                                       |                   | 517.20          |               |               |
| BOTTOM OF BOREHOLE        | 71.5                                       |                   | 503.70          |               |               |
| GWL AFTER INSTALLATION    | 52.95                                      |                   | - VARIABLE -    |               |               |

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES  NO   
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES  NO   
 REMARKS 3 BUCKETS BENTONITE ADDED OUTSIDE AND INSIDE WELL COVER

|             |         |     |     |     |
|-------------|---------|-----|-----|-----|
| DATE        | 5/18/90 |     |     |     |
| TIME        | 7:00    |     |     |     |
| FIELD CHECK |         | 1st | 2nd | 3rd |
|             |         | OK  | OK  | OK  |

VISUAL CLASSIFICATION OF SOILS

|                                |   |
|--------------------------------|---|
| PROJECT NUMBER: 602 3.2.1      | PROJECT NAME: FMPC RI/FS                |
| BORING NUMBER: 2394            | COORDINATES: N. 473,323.2 E. 1341,294.3 |
| ELEVATION: 534.5               | DATE: 5/18/90                           |
| ENGINEER/GEOLOGIST: M. SWANSON | GWL Depth Date Time                     |
| DRILLING METHOD: CABLE TOOL    | DATE COMPLETED: 5/21/90                 |
|                                | PAGE 1 OF 6                             |

| DEPTH (FT) | SAMITE TYPE & ID         | BLOWSON SAMPLES (6 IN) | RECOVERY (%) | DESCRIPTION   | USCS SYMBOL | MEASURED LIQUIDITY (PL) | WELL CONSTRUCTION | REMARKS  |
|------------|--------------------------|------------------------|--------------|---|-------------|-------------------------|-------------------|--|
| 1          | 32665<br>0905<br>5/18/90 | 3<br>5<br>6            | 10           | FIRM, VERY DARK GRAYISH BROWN (10YR 2/2) SANDY SILT, SOME QUARTZ PEBBLES, SUB-ROUND, DRY  | ML          | 1.0                     |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 60-80 CAM  |
| 2          | 32666<br>0912<br>5/18    | 3<br>7<br>7            | 16           | 2.0<br>HARD, DARK BROWN (10YR 2/3), SILTY CLAY, SOME SAND, LOW PLASTICITY, DRY  | CL          | 2.5                     |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 40-60 CAM  |
| 3          | 32667<br>0916<br>5/18    | 5<br>6<br>7            | 10           | 4.5   |             |                         |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 40-80 CAM  |
| 4          | 32668<br>0921<br>5/18    | 2<br>3<br>3            | 16           | FIRM, YELLOWISH BROWN (10YR 5/4) SILTY CLAY, SOME LIMESTONE FRAGMENTS, IRON OXIDE STAINING, LOW PLASTICITY, DRY TO SLIGHTLY MOIST | CL          | 2.0                     |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 80-100 CAM |
| 5          | 32669<br>0927<br>5/18    | 3<br>3<br>4            | 12           | 6.5<br>HARD, YELLOWISH BROWN (10YR 5/4), SANDY SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST   | CL          | 2.5                     |                   | H <sub>2</sub> O: 0.1 PPM<br>α: 0 CAM<br>β: 60-100 CAM |
| 6          | 32670<br>0934<br>5/18    | 1<br>1<br>1            | 18           | FIRM, YELLOWISH BROWN (10YR 5/6), SILTY SANDY CLAY, 0.5-1.0 SAND BEAN AT 8.5 FT, LOW TO MEDIUM PLASTICITY, WET                    | CL          | 1.0                     |                   | H <sub>2</sub> O: 0.1 PPM<br>α: 0 CAM<br>β: 80-100 CAM |
| 7          | 32671<br>0950<br>5/18    | 1<br>2<br>3            | 18           | FIRM, LIGHT OLIVE BROWN (2.5Y 5/4), CLAY, SOME SILT, PEBBLES (TO 0.20 IN), LIMESTONE COBBLE, MEDIUM TO HIGH PLASTICITY, WET       | CH          | 0.75                    |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 60-80 CAM  |
| 8          | 32672<br>1125<br>5/18    | 2<br>3<br>5            | 17           | 11.5<br>SOFT, GRAYISH BROWN (10YR 5/2) SANDY CLAY, HIGH PLASTICITY, WET   | CH          | 0.5                     |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 40-60 CAM  |
| 9          | 32673<br>1339<br>5/18    | 2<br>2<br>3            | 18           | 12.25<br>HARD, GRAY (2.5Y 5/2) SANDY CLAY, SOME ROUND PEBBLES, LOW PLASTICITY, MOIST  | CL          | 2.25                    |                   | H <sub>2</sub> O: 0.1 PPM<br>α: 0 CAM<br>β: 40-60 CAM  |
| 10         | 32674<br>1344<br>5/18    | 3<br>5<br>5            | 16           | 14.0<br>HARD, GRAY (2.5Y 5/2) MOTTLED, SANDY-SILTY CLAY, LOW PLASTICITY, MOIST  | CL          | 3.0                     |                   | H <sub>2</sub> O: 0.2 PPM<br>α: 0 CAM<br>β: 30-50 CAM  |

NOTES:

Drilling Contractor: PELU-DRILL CO.  
 Drilling Equipment: BULTRUS ERIE (CABLE TOOL)  
 Driller: D. NEWMAN  
ASST: B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL SAMPLE COLORS IDENTIFIED USING MUNSIELL SOIL COLOR CHARTS.

| INSTRUMENT       | SERIAL # | INST. # | BACKGROUND READINGS |
|------------------|----------|---------|---------------------|
| H <sub>2</sub> O | N/A      | 1015    | 0.2 PPM             |
| α                | 50767    | 13      | 0 CAM               |
| β                | 55339    | 8       | 40-100 CAM          |

**VISUAL CLASSIFICATION OF SOILS**

|                                |                          |           |                         |
|--------------------------------|--------------------------|-----------|-------------------------|
| PROJECT NUMBER: 6023.2.1       | PROJECT NAME: FmPC RI/FS |           |                         |
| BORING NUMBER: 2394            | COCORDINATES:            |           |                         |
| ELEVATION: 531.8               | GWL: Depth               | Date/Time | DATE STARTED: 5/18/90   |
| ENGINEER/GEOLOGIST: M. SWANSON | Depth                    | Date/Time | DATE COMPLETED: 5/21/90 |
| DRILLING MET-COS: CABLE TOOLS  |                          |           | PAGE 2 OF 6             |

| DEPTH (FT) | SAMITE<br>TYPE & NO.  | HOWSON<br>SAMPLE # | RECOVERY<br>% | DESCRIPTION  | USCS SYMBOL | MEASURED<br>LIQUIDITY<br>(%) | WELL<br>CONSTRUCTION                                      | REMARKS |
|------------|-----------------------|--------------------|---------------|--|-------------|------------------------------|---|---------|
| 15         | 32695<br>1350<br>5/18 | 2                  | 18            | SOFT, DARK GRAY (SY 4/1) PUSSILIFEROUS SILT, SOME SAND, CLAY, SLIGHT PLASTICITY, DRY   | ML          | .25                          | H <sub>2</sub> O = 0.1 ppm<br>α = 0 cpm<br>βγ = 60-80 cpm |         |
| 16         | 32696<br>1357<br>5/18 | 2                  | 16            |  |             |                              |   |         |
| 18         | 32677<br>1404<br>5/18 | 3                  | 18            | HARD, DARK GRAY (SY 4/1), SILTY CLAY, SOME SAND, PEBBLES (TO .25 IN.) TRACE OF LIMESTONE COBBLE, LOW PLASTICITY, DRY TO SLIGHTLY MOIST | CL          | 2.5                          | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>βγ = 60-80 cpm |         |
| 20         | 32678<br>1530<br>5/18 | 3                  | 14            | MEDIUM DENSE, DARK GRAY (SY 4/1), CLAYEY SAND, SOME SILT, WET  | SP          | N/A                          | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>βγ = 60-80 cpm |         |
| 21         | 32679<br>1542<br>5/18 | 10                 | 6             | HARD, DARK GRAY (SY 4/1), SANDY CLAY, TRACE OF SILT, LOW PLASTICITY, MOIST   | CL          | 2.0                          | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>βγ = 40-70 cpm |         |
| 23         | 32680<br>1600<br>5/18 | 1                  | 18            | SOFT, VERY DARK GRAY (SY 3/1), CLAY, SOME SILT, LOW PLASTICITY, WET  | CL          | 0.25                         | H <sub>2</sub> O = 0.0 ppm<br>α = 0 cpm<br>βγ = 40-60 cpm |         |
| 24         | 32681<br>1615<br>5/18 | 1                  | 18            |  |             |                              |   |         |
| 25         | 32682<br>1625<br>5/18 | 7                  | 16            | MEDIUM DENSE, YELLOWISH BROWN (10A-516) FINE SAND, DRY   | SP          | N/A                          | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>βγ = 20-40 cpm |         |
| 26         | 32683<br>1655<br>5/18 | 19                 | 18            | DENSE, YELLOWISH BROWN (10A-516) SILTY SAND-GRAVEL, WELL GRADED, COBBLE (10.2) SATURATED   | GM          | N/A                          | H <sub>2</sub> O = 0.1 ppm<br>α = 0 cpm<br>βγ = 20-60 cpm |         |
| 27         | 32684<br>1655<br>5/18 | 27                 | 18            | DENSE, YELLOWISH BROWN (10A-516) SANDY GRAVEL, WELL GRADED, SOME SILT PAVILLAR TO SUBROUNDED, SATURATED                                | GM          | N/A                          | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>βγ = 40-60 cpm |         |
| 29         |                       |                    |               | NO SAMPLE TAKEN  |             |                              |   |         |

25.3 FT  
START OF  
AQUIFER

|   |                                |
|---|--------------------------------|
| NOTES:                                      |                                |
| Drilling Contractor: <u>PENNY DRILL CO.</u> | <u>BACKGROUND</u>              |
| Drilling Equipment: <u>BUCHNERS ERIE</u>    | H <sub>2</sub> O = 0.0-0.2 ppm |
| Driller: <u>D. NEWMAN</u>                   | α = 0 cpm                      |
| Asst.: <u>S. JOHNSON</u>                    | βγ = 20-80 cpm                 |

VISUAL CLASSIFICATION OF SOILS

|                                |                          |
|--------------------------------|--------------------------|
| PROJECT NUMBER: 602 3.2.1      | PROJECT NAME: FMPL RI/FS |
| SPRING NUMBER: 2394            | COORDINATES:             |
| ELEVATION:                     | DATE: 5/19/90            |
| ENGINEER/GEOLOGIST: M. SWANSON | DATE STARTED: 5/18/90    |
| DRILLING METHOD: CABLE TOOL    | DATE COMPLETED: 5/21/90  |
|                                | PAGE 3 OF 6              |

| DEPTH (FT) | SAMITE (1/2 IN) | BLOWSON SAMPLES (1.6 IN) | RECOVERY (IN) | DESCRIPTION   | USCS SYMBOL | MEASURED LIQUIDITY (%) | WELL CONSTRUCTION | REMARKS   |
|------------|-----------------|--------------------------|---------------|---|-------------|------------------------|-------------------|---|
| 30         | 32684           | 7                        |               | DENSE, REDDISH YELLOW (7.57 4/2) WELL GRADED SANDY GRAVEL, TRACE OF SILT, TO 1.0 IN; SATURATED          | GW          | N/A                    |                   | H <sub>nu</sub> = 0.1 p.m.<br>α = 0 c.p.m.<br>βγ = 60-90 c.p.m. |
| 34         | 0935            | 21                       | 10            |   |             |                        |                   |   |
| 35         | 32685           | 8                        |               | MEDIUM DENSE, YELLOWISH BROWN (10.72 5/6) WELL GRADED SAND, TRACE OF SILT, TO 0.5 IN; SATURATED         | SW          | N/A                    |                   | H <sub>nu</sub> = 0.2 p.m.<br>α = 0 c.p.m.<br>βγ = 40-50 c.p.m. |
| 36         | 1045            | 11                       | 7             |   |             |                        |                   |   |
| 37         | 5/19            | 11                       |               | MEDIUM DENSE, DARK GRAY (10.72 4/1) WELL GRADED FINE SAND, TRACE OF SILT, PEBBLES TO 0.25 IN; SATURATED | SW          | UA                     |                   |   |
| 40         | 32686           | 25                       |               | DENSE, GRAYISH BROWN (10.72 5/2) GRAVEL-SAND MICTURE (TO 0.75 IN.) SOME SILT; SATURATED                 | GW          | N/A                    |                   | H <sub>nu</sub> = 0.1 p.m.<br>α = 0 c.p.m.<br>βγ = 20-40 c.p.m. |
| 41         | 1409            | 26                       | 12            |   |             |                        |                   |   |
| 41         | 5/19            | 20                       |               |   |             |                        |                   |   |

NOTES.

Drilling Contractor: PENNY-DREYER CO.  
 Drilling Equipment: BUCHER ERIC  
 Driller: D. NEWMAN  
 ASST.: B. JOHNSON

BACKGROUND  
 H<sub>nu</sub> = 0.2 p.m.  
 α = 0 c.p.m.  
 βγ = 40-100 c.p.m.

VISUAL CLASSIFICATION OF SOILS

|                                |  |
|--------------------------------|--|
| PROJECT NUMBER: 60L3.2.1       | PROJECT NAME: FMPC RI/FS                 |
| BORING NUMBER: 2394            | COORDINATES: DATE: 5/20/90               |
| ELEVATION:                     | GWL: 30cm 16.7 FT Date/Time 5/20/90 8:30 |
| ENGINEER/GEOLOGIST: M. SWANSON | DATE STARTED: 5/18/90                    |
| DRILLING METHOD: CABLE TOOLS   | DATE COMPLETED: 5/21/90                  |
|                                | PAGE 4 OF 6                              |

| DEPTH (FT) | SAMPLE TYPE & NO. | BLOWS ON SAMPLER (16/N) | RECOVERY (%) | DESCRIPTION  | TEST SYMBOL | MEASURED COMPRESSIBILITY (1000) | WELL CONSTRUCTION | REMARKS   |
|------------|-------------------|-------------------------|--------------|--|-------------|---------------------------------|-------------------|---|
| 45         | 32687             | 13                      |              |  |             |                                 |                   |   |
| 46         | 0972<br>5/20/90   | 14<br>15                | 10           | MEDIUM DENSE, GRAYISH BROWN (to 5/2), PARTLY GRAVEL SILTY GRAVEL, SOME SAND, (TO 1.0.2), SATURATED | GM          | N/A                             |                   | H <sub>20</sub> = 0.2 ppm<br>α = 0.0 cm<br>β = 40-50 cm |
| 47         |                   |                         |              | BOTTOM OF BORING DRILLED AND SAMPLED TO 46.5 FT.   |             |                                 |                   |   |
| 48         |                   |                         |              |  |             |                                 |                   |   |
| 49         |                   |                         |              |  |             |                                 |                   |   |
| 50         |                   |                         |              |  |             |                                 |                   |   |

NOTES.

Drilling Contractor: PEARSON DILL CO.  
 Drilling Equipment: BUYRUS ERIE  
 Driller: D. NEWMAN  
ASST. B. JOHNSON

BACKGROUND

H<sub>20</sub> = 0.2 ppm  
 α = 0.0 cm  
 β = 40-80 cm

# FERNALD RI/FS

1114

## PIEZOMETER INSTALLATION SHEET

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. SWANSON DATE 5/20/90  
 PROJECT NO. 602 3.2.1 CHECKED BY F. Trullinger DATE 5/30/90  
 BORING NO. 2394  
 PIEZOMETER NO. 2394 DATE OF INSTALLATION 5/21/90

### BOREHOLE DRILLING

|   |   |
|---|---|
| DRILLING METHOD <u>CABLE TOOLS</u>  | TYPE OF BIT <u>HAMMER</u>   |
| DRILLING FLUID(S) USED:<br>FLUID <u>H<sub>2</sub>O</u> FROM <u>OFF</u> TO _____<br>FLUID <u>-</u> FROM <u>-</u> TO <u>-</u> | CASING SIZE(S) USED:<br>SIZE <u>10.125 ID</u> FROM <u>OFF</u> TO _____<br>SIZE <u>-</u> FROM <u>-</u> TO <u>-</u> |

### PIEZOMETER DESCRIPTION

|   |  |
|---|--|
| TYPE <u>MONITORING WELL</u>   | RISER PIPE MATERIAL <u>316 STAINLESS STEEL</u>                   |
| DIAMETER OF PERFORATED SECTION <u>4.0 I.D.</u>  | RISER PIPE DIAMETERS:<br>O.D. <u>4 3/8 in.</u> I.D. <u>4 in.</u> |
| PERFORATION TYPE:<br>SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SLOTTED SCREEN <input checked="" type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10 FT</u>                             |
| AVERAGE SIZE OF PERFORATIONS <u>0.010 in.</u>   | JOINING METHOD <u>THREADED - FLUSH JOINTED</u>                   |
| TOTAL PERFORATED AREA <u>15 FT</u>  |  |

### PROTECTION SYSTEM

|  |   |
|--|---|
| RISER PROTECTIVE PIPE LENGTH <u>5 FT</u> | OTHER PROTECTION <u>HINGED LOCKING LID COVER WITH PADLOCK</u> |
| PROTECTIVE PIPE O.D. <u>10.75 in.</u>    |   |

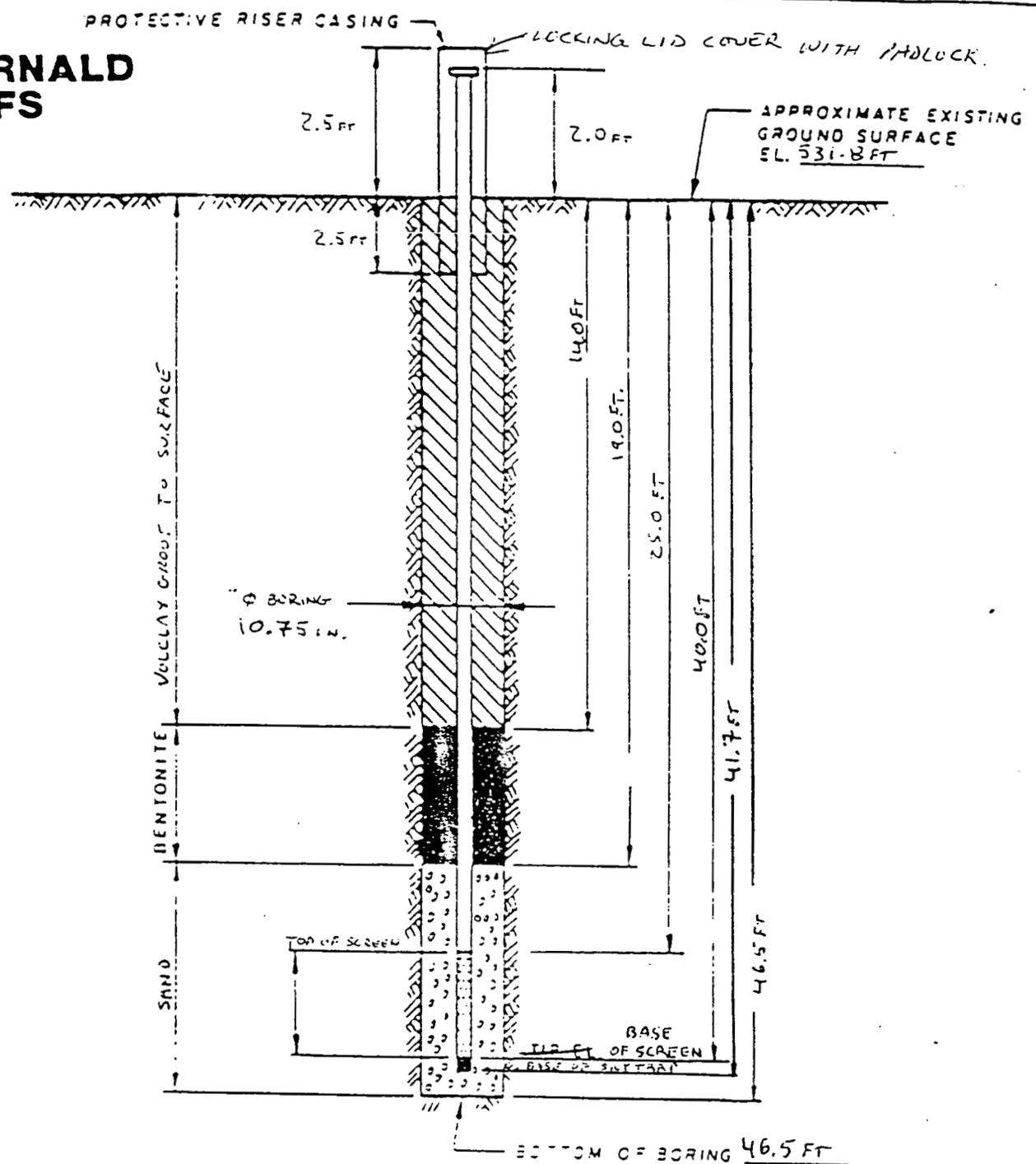
| ITEM                      | DISTANCE ABOVE/BELOW GROUND SURFACE (FT) |             | ELEVATION ( ) |        |
|---------------------------|--|-------------|---------------|--------|
| TOP OF RISER PIPE         | + 2.0                                    |             |               |        |
| GROUND SURFACE            | 0.0                                      |             |               |        |
| BOTTOM OF PROTECTIVE PIPE | - 2.5                                    |             |               |        |
| BOREHOLE FILL MATERIALS:  |  |             |               |        |
| GROUT/SLURRY              | TOP 0.0                                  | BOTTOM 14.0 | TOP           | BOTTOM |
| BENTONITE                 | TOP 14.0                                 | BOTTOM 14.0 | TOP           | BOTTOM |
| SAND                      | TOP 19.0                                 | BOTTOM 46.5 | TOP           | BOTTOM |
| GRAVEL <u>None used</u>   | TOP N/A                                  | BOTTOM N/A  | TOP           | BOTTOM |
| PERFORATED SECTION        | TOP 25.0                                 | BOTTOM 40.0 | TOP           | BOTTOM |
| PIEZOMETER TIP            | 41.7 FT                                  |             |               |        |
| BOTTOM OF BOREHOLE        | 46.5 FT                                  |             |               |        |
| GWL AFTER INSTALLATION    | 15.47 FT. BELOW GROUND SURFACE           |             |               |        |

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

66

REMARKS TWO (2) BUCKETS OF BENTONITE PELLETS ADDED AROUND PROTECTIVE CASING AND RISER PIPE.

# FERNALD RI/FS



|                |
|----------------|
| DRAWING NUMBER |
| CHECKED BY     |
| APPROVED BY    |
| DRAWN BY       |
| 5/20/90        |

### NOTES

1. RISER PIPE 154.0 IN ID SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN 154.0 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED. (WITH WELDED SILTRAP)
4. ELEVATION OF WATER LEVEL 9.0 FT, 16.2 FT, 15.47
5. WATER LEVEL READING ON 5/19/90, 5/20/90, 5/21/90

INSTALLATION DETAILS  
MONITORING WELL #2394

PREPARED FOR  
FERNALD RI/FS

### MATERIALS USED DURING WELL INSTALLATION

- 20 - 80 LB. BAGS OF 10/20 SAND
- 3 - 50 LB BAGS OF VOLCLAY GROUT
- 8 - 5 GAL. BUCKETS OF BENTONITE PELLETS
- 500 GALLONS OF WATER USED DURING GROUTING AND DRILLING PROCEDURES
- SS PIPE SECTIONS 21.5 FT. SCREEN WITH 12 FT WELDED SILTRAP, 2-10 FT., 1-5 FT., 1-2 FT.

|            |        |  |  |  |
|------------|--------|--|--|--|
| DATE       | 5/5/90 |  |  |  |
| TIME       | 12:15  |  |  |  |
| 1st Key In |        |  |  |  |
| 2nd Key In |        |  |  |  |
| 3rd Key In |        |  |  |  |

VISUAL CLASSIFICATION OF SOILS

|                                  |                          |                         |
|----------------------------------|--------------------------|-------------------------|
| PROJECT NUMBER: 602.3.2.1        | PROJECT NAME: FMPC RI/FS |                         |
| SPRING NUMBER: 3045              | COORDINATES:             | DATE: 5-5-90            |
| ELEVATION:                       | GWL Depth                | Date/Time               |
| ENGINEER/GEOLOGIST: M. GARMAN    | Depth                    | Date/Time               |
| DRILLING METHOD: COS. CABLE TOOL |                          | DATE COMPLETED: 5-17-90 |
|                                  |                          | PAGE 1 OF 8             |

| DEPTH (FT) | SAMITE TYPE & NO. | BLOWSON SAMPLER (G IN) | RECOVERY (IN) | DESCRIPTION  | USCS SYMBOL | MEASURED LAZURITICITY (%) | NA WELL CONSTRUCTION | REMARKS |
|------------|-------------------|------------------------|---------------|--|-------------|---------------------------|----------------------|---------|
| 0          |                   |                        |               | SEE VISUAL CLASSIFICATION LOG FOR MW 1045 (0.0 - 18.0 FT)  |             |                           |                      |         |
| 12.2       |                   |                        |               | 12.2 FT - BASE OF TILL                                     |             |                           |                      |         |
| 20.97      |                   |                        |               | 20.97 FT   |             |                           |                      |         |
| 20.97      |                   |                        |               | SEE VISUAL CLASSIFICATION LOG FOR MW 2045 (20.0 - 45.0 FT) |             |                           |                      |         |
| 45         |                   |                        |               |  |             |                           |                      |         |

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING  
 Drilling Equipment: CYCLONE 43  
 Driller: CRAIG COULTER  
 ASST.: CHRIS COULTER

BACKGROUND  
 HNU = 0 PPM  
 α = 0 CPM  
 γB = 40-100 CPM

**VISUAL CLASSIFICATION OF SOILS**

**1114**

|   |                                   |
|---|-----------------------------------|
| PROJECT NUMBER: <u>602.3.2.1</u>        | PROJECT NAME: <u>FMPL RI/FS</u>   |
| BORING NUMBER: <u>3045</u>              | COORDINATES:                      |
| ELEVATION:                              | GWL Depth: _____ Date/Time: _____ |
| ENGINEER/GEOLOGIST: <u>M. GARMAN</u>    | Date/Time: _____                  |
| DRILLING METHOD: <u>COS. CABLE TOOL</u> | PAGE <u>2</u> OF <u>8</u>         |

| DEPTH (FT) | SAMITE (VTL & IN) | BLOWSON SAMPLER (IN) | RECOVERY (IN) | DESCRIPTION   | USE SYMBOL | MEASURED COMPACTIVITY (%) | NA WITH CONSTRUCTION | REMARKS                         |
|------------|-------------------|----------------------|---------------|---|------------|---------------------------|----------------------|---------------------------------|
| 44         | 32597             | 4                    |               | DENSE (10 <sup>4</sup> R, 4/2) DARK GRAYISH BROWN WELL GRADED SAND. SOME SILT. WET.         | SW         | NA                        |                      | HNU = 0<br>α = 0<br>βB = 60 cpm |
| 45         | 5-7<br>1050       | 16<br>23             | 18            |   |            |                           |                      |                                 |
| 46         |                   |                      |               |   |            |                           |                      |                                 |
| 47         |                   |                      |               |   |            |                           |                      |                                 |
| 48         |                   |                      |               |   |            |                           |                      |                                 |
| 49         |                   |                      |               |   |            |                           |                      |                                 |
| 50         | 32598             | 6                    |               | MEDIUM DENSE (10 <sup>4</sup> R, 5/3) BROWN WELL GRADED SAND. TRACE SILT. WET.              | SW         | NA                        |                      | HNU = 0<br>α = 0<br>βB = 80 cpm |
| 51         | 5-7<br>1117       | 6<br>6               | 14            |   |            |                           |                      |                                 |
| 52         |                   |                      |               |   |            |                           |                      |                                 |
| 53         |                   |                      |               |   |            |                           |                      |                                 |
| 54         |                   |                      |               |   |            |                           |                      |                                 |
| 55         | 32599             | 11                   |               | MEDIUM DENSE (10 <sup>4</sup> R, 4/3) BROWN WELL GRADED SAND. SOME SILT. TRACE GRAVEL. WET. | SW         | NA                        |                      | HNU = 0<br>α = 0<br>βB = 80 cpm |
| 56         | 1340              | 14<br>15             | 17            |   |            |                           |                      |                                 |
| 57         |                   |                      |               |   |            |                           |                      |                                 |
| 58         |                   |                      |               |   |            |                           |                      |                                 |
| 59         |                   |                      |               |   |            |                           |                      |                                 |
| 60         |                   |                      |               |   |            |                           |                      |                                 |

**NOTES.**

Drilling Contractor PENNSYLVANIA DRILLING  
 Drilling Equipment CYCLONE 43  
 Driller: CRAIG COULTER  
 ASST. CHRIS COULTER

**BACKGROUND**

HNU = 0 ppm  
 α = 0 cpm  
 βB = 40-100 cpm

**VISUAL CLASSIFICATION OF SOILS**

|                                      |                                   |
|--------------------------------------|-----------------------------------|
| PROJECT NUMBER: <u>602.3.2.1</u>     | PROJECT NAME: <u>FMPC RI/FS</u>   |
| BORING NUMBER: <u>3045</u>           | COORDINATES: _____                |
| ELEVATION: _____                     | GWL: <u>Deon</u> Date/Time: _____ |
| ENGINEER/GEOLOGIST: <u>M. GARMAN</u> | Date/Time: _____                  |
| DRILLING MET-COS: <u>CABLE TOOL</u>  | DATE STARTED: <u>5-5-90</u>       |
|                                      | DATE COMPLETED: <u>5-17-90</u>    |
|                                      | PAGE <u>3</u> OF <u>8</u>         |

| DEPTH (FT) | SAMPLE TYPE & NO. | BLOWS ON SAMPLER (6 IN) | RECOVERY (IN) | DESCRIPTION   | USGS SYMBOL | MEASURED LIQUIDITY (PPM) | NA WELL CLASSIFICATION | REMARKS                         |
|------------|-------------------|-------------------------|---------------|---|-------------|--------------------------|------------------------|---------------------------------|
| 60         | 32600<br>5-7      | 6<br>15                 | 15            | MEDIUM DENSE (10YR, 5/3) BROWN WELL GRADED SAND, SOME FINE GRAVEL. TRACE SILT. WET.   | SW          | NA                       |                        | HNU = 0<br>α = 0<br>γB = 60 cpm |
| 61         | 1405              | 8                       |               |   |             |                          |                        |                                 |
| 62         |                   |                         |               |   |             |                          |                        |                                 |
| 63         |                   |                         |               |   |             |                          |                        |                                 |
| 64         |                   |                         |               |   |             |                          |                        |                                 |
| 65         | 32601<br>5-7      | 24<br>20                | 18            | DENSE (10YR, 5/3) BROWN WELL GRADED SAND SOME SILT (9 IN) WET. GRADING TO (10YR, 5/3) FINE SAND WITH SOME SILT. WET. (9 IN) | SW<br>SP    | NA<br>NA                 |                        | HNU = 3<br>α = 0<br>γB = 80 cpm |
| 66         | 1530              | 25                      |               |   |             |                          |                        |                                 |
| 67         |                   |                         |               |   |             |                          |                        |                                 |
| 68         |                   |                         |               |   |             |                          |                        |                                 |
| 69         |                   |                         |               |   |             |                          |                        |                                 |
| 70         | 32602<br>5-8      | 5<br>5                  | 12            | MEDIUM DENSE (10YR, 5/3) BROWN GRAVELLY WELL GRADED SAND. TRACE SILT. WET.  | SW          | NA                       |                        | HNU = 0<br>α = 0<br>γB = 70 cpm |
| 71         | 0855              | 7                       |               |   |             |                          |                        |                                 |
| 72         |                   |                         |               |   |             |                          |                        |                                 |
| 73         |                   |                         |               |   |             |                          |                        |                                 |
| 74         |                   |                         |               |   |             |                          |                        |                                 |
| 75         |                   |                         |               |   |             |                          |                        |                                 |

**NOTES.**

Drilling Contractor: PENNSYLVANIA DRILLING  
 Drilling Equipment: CYCLONE 43  
 Driller: CRAIG COULTER  
 ASST: CHRIS COULTER

**BACKGROUND:**  
 HNU = 0 ppm  
 α = 0 cpm  
 γB = 40-100 cpm

VISUAL CLASSIFICATION OF SOILS

|                                  |                          |           |                         |
|----------------------------------|--------------------------|-----------|-------------------------|
| PROJECT NUMBER: 602.2.2.1        | PROJECT NAME: FMPC RI/FS |           |                         |
| BOHRING NUMBER: 3045             | COORDINATES:             |           | DATE: 5-8-90            |
| ELEVATION:                       | GWL Depth                | Date/Time | DATE STARTED: 5-5-90    |
| ENGINEER/GEOLOGIST: M. GARMAN    | Depth                    | Date/Time | DATE COMPLETED: 5-17-90 |
| DRILLING METHOD: CCS. CABLE TOOL |                          |           | PAGE 4 OF 8             |

| DEPTH (FT) | SAMPLE TYPE & ID | U.S.G. ON SAMPLER (IN) | RECOVERY (%) | DESCRIPTION  | USCS SYMBOL | MEASURED COMPRESSIBILITY (psi) | NA WELL CONSTRUCTION | REMARKS                          |
|------------|------------------|------------------------|--------------|--|-------------|--------------------------------|----------------------|----------------------------------|
| 75         | 32603            | 26                     |              | VERY DENSE (1042, 4/2) DARK GRAYISH BROWN GRAVELLY WELL GRADED SAND. SOME SILT. WET.         | SW          | NA                             |                      | H <sub>NV</sub> = 0              |
| 76         | 5-8<br>1050      | 37<br>35               | 18           |  |             |                                |                      | α = 0<br>γ <sub>B</sub> = 50 cpm |
| 77         |                  |                        |              |  |             |                                |                      |                                  |
| 78         |                  |                        |              |  |             |                                |                      |                                  |
| 79         |                  |                        |              |  |             |                                |                      |                                  |
| 80         | 32604            | 16                     |              | DENSE (1042, 5/3) BROWN WELL GRADED SAND. TRACE SILT. WET.                                   | SW          | NA                             |                      | H <sub>NV</sub> = 0              |
| 81         | 5-8<br>1127      | 16<br>16               | 18           |  |             |                                |                      | α = 0<br>γ <sub>B</sub> = 80 cpm |
| 82         |                  |                        |              |  |             |                                |                      |                                  |
| 83         |                  |                        |              |  |             |                                |                      |                                  |
| 84         |                  |                        |              |  |             |                                |                      |                                  |
| 85         | 32605            | 12                     |              | MEDIUM DENSE (1042, 4/4) DARK GRAYISH BROWN WELL GRADED SAND. TRACE GRAVEL. TRACE SILT. WET. | SW          | NA                             |                      | H <sub>NV</sub> = 0              |
| 86         | 5-8<br>1447      | 13<br>13               | 16           |  |             |                                |                      | α = 0<br>γ <sub>B</sub> = 60 cpm |
| 87         |                  |                        |              |  |             |                                |                      |                                  |
| 88         |                  |                        |              |  |             |                                |                      |                                  |
| 89         |                  |                        |              |  |             |                                |                      |                                  |
| 90         |                  |                        |              |  |             |                                |                      |                                  |

NOTES.

Drilling Contractor: PENNSYLVANIA DRILLING  
 Drilling Equipment: CYCLONE 43  
 Driller: CRAIG COULTER  
 ASST: CHRIS COULTER

BACKGROUND:

H<sub>NV</sub> = 0  
 α = 0  
 γ<sub>B</sub> = 40-100 cpm

**VISUAL CLASSIFICATION OF SOILS**

**1114**

|   |                                 |                     |
|---|---------------------------------|---------------------|
| PROJECT NUMBER: <u>602.3.2.1</u>        | PROJECT NAME: <u>FMPC RI/FS</u> |                     |
| BOREHOLE NUMBER: <u>3045</u>            | COORDINATES:                    | DATE: <u>5-8-90</u> |
| ELEVATION:                              | GWL Depth                       | Date/Time           |
| ENGINEER/GEOLOGIST: <u>M. GARMAN</u>    | Depth                           | Date/Time           |
| DRILLING METHOD: <u>COS. CABLE TOOL</u> | PAGE <u>5</u> OF <u>8</u>       |                     |

| DEPTH (FT) | SAMITE (TYPE & PK) | BLOWS ON SAMPLER PER 16 IN | RECOVERY (IN) | DESCRIPTION   | USCS SYMBOL | MEASURED COMPRESSIBILITY (psi) | NAWELL LOGGING INDICATION | REMARKS                         |
|------------|--------------------|----------------------------|---------------|---|-------------|--------------------------------|---------------------------|---------------------------------|
| 90         | 32606              | 3                          |               |   |             |                                |                           |                                 |
| 91         | 5-8<br>1550        | 4<br>6                     | NA            | NO RECOVERY - IN BLOW SAND. 2ND ATTEMPT.  | NA          | NA                             |                           | HNU = NA<br>α = NA<br>γB = NA   |
| 92         |                    |                            |               |   |             |                                |                           |                                 |
| 93         |                    |                            |               |   |             |                                |                           |                                 |
| 94         |                    |                            |               |   |             |                                |                           |                                 |
| 95         | 32607              | 31                         |               |   |             |                                |                           |                                 |
| 96         | 5-8<br>1710        | 39.96<br>40                | 18            | VERY DENSE (104R, 41) DARK GRAY WELL GRADED SAND. SOME SILT. TRACE GRAVEL. WET.                                 | SW          | NA                             |                           | HNU = 0<br>α = 0<br>γB = 80 cpm |
| 97         |                    |                            |               |   |             |                                |                           |                                 |
| 98         |                    |                            |               |   |             |                                |                           |                                 |
| 99         |                    |                            |               |   |             |                                |                           |                                 |
| 100        | 32608              | 14                         |               |   |             |                                |                           |                                 |
| 101        | 5-9<br>0840        | 17<br>18                   | 12            | DENSE (54, 41) DARK GRAY SILT. GRADING FROM SANDY SILT TO A <sup>46</sup> SILT WITH SOME CLAY AT 101.5 FT. WET. | ML          | NA                             |                           | HNU = 0<br>α = 0<br>γB = 70 cpm |
| 102        |                    |                            |               |   |             |                                |                           |                                 |
| 103        |                    |                            |               |   |             |                                |                           |                                 |
| 104        |                    |                            |               |   |             |                                |                           |                                 |
| 105        |                    |                            |               |   |             |                                |                           |                                 |

**NOTES.**

Drilling Contractor: PENNSYLVANIA DRILLING  
 Drilling Equipment: CYCLONE 43  
 Driller: CRAIG COULTER  
 Asst.: CHRIS COULTER

**BACKGROUND**

HNU = 0 ppm  
 α = 0 cpm  
 γB = 40-100 cpm

**VISUAL CLASSIFICATION OF SOILS**

**1114**

|   |   |
|---|---|
| PROJECT NUMBER: <b>602.3.2.1</b>        | PROJECT NAME: <b>FMPG RI/FS</b>                 |
| BORING NUMBER: <b>3045</b>              | COORDINATES:                                    |
| ELEVATION:                              | GWL Depth: _____ Date/Time: _____               |
| ENGINEER/GEOLOGIST: <b>M. GARMAN</b>    | Date/Time: _____ DATE COMPLETED: <b>5-17-90</b> |
| DRILLING METHOD: <b>CCS. CABLE TOOL</b> | PAGE: <b>6</b> OF <b>8</b>                      |

| DEPTH (FT) | SAMPLE TYPE & NO. | BLOWSON SAMPLER (IN) | RECOVERY (IN) | DESCRIPTION  | USCS SYMBOL | MEASURED LIQUIDITY (%) | NAWELL CONSTRUCTION                                      | REMARKS |
|------------|-------------------|----------------------|---------------|--|-------------|------------------------|--|---------|
| 105        | 32605<br>5-9      | 14                   | 25            | VERY DENSE (54, 4%) DARK GRAY SILT. TRACE SAND. WET. TRACE GRAVEL. | ML          | NA                     | H <sub>N</sub> U = 0<br>L = 0<br>γ <sub>D</sub> = 90 cpm |         |
| 106        | 1046              | 50%                  | 16            |  |             |                        |  |         |
| 107        |                   |                      |               | Bottom of borehole 106.5<br>Sampling ended @ 106.5 FT              |             |                        |  |         |
| 108        |                   |                      |               |  |             |                        |  |         |
| 109        |                   |                      |               |  |             |                        |  |         |
| 110        |                   |                      |               |  |             |                        |  |         |

**NOTES.**

Drilling Contractor PENNSYLVANIA DRILLING  
 Drilling Equipment CYCLONE 43  
 Driller: CRAIG COULTER  
 Asst. CHRIS COULTER

BACKGROUND  
 H<sub>N</sub>U = 0 ppm  
 L = 0 cpm  
 γ<sub>D</sub> = 40-100 cpm

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FERNALD RI/FS FIELD ENG./GEO. M. GARMAN DATE 5-9-90  
 PROJECT NO. 602 3.2.1 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 BORING NO. 3045  
 PIEZOMETER NO. 3045 DATE OF INSTALLATION 5-17-90

**BOREHOLE DRILLING**

|  |  |
|--|--|
| DRILLING METHOD <u>CABLE TOOL</u>  | TYPE OF BIT <u>HAMMER</u>  |
| DRILLING FLUID(S) USED:<br>FLUID <u>WATER</u> FROM <u>0</u> TO <u>106.5</u><br>FLUID <u>NA</u> FROM _____ TO _____ | CASING SIZE (S) USED:<br>SIZE <u>10 IN I.D.</u> FROM <u>0</u> TO <u>103 FT</u><br>SIZE <u>NA</u> FROM _____ TO _____ |

**PIEZOMETER DESCRIPTION**

|   |  |
|---|--|
| TYPE <u>MONITOR WELL</u>  | RISER PIPE MATERIAL <u>316 STAINLESS STEEL</u>                   |
| DIAMETER OF PERFORATED SECTION _____  | RISER PIPE DIAMETERS:<br>O.D. <u>4 3/8 IN</u> I.D. <u>4.0 IN</u> |
| PERFORATION TYPE:<br>SLOTS <input checked="" type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT, 50 FT</u>                    |
| AVERAGE SIZE OF PERFORATIONS <u>0.01 IN</u>   | JOINING METHOD <u>THREADED, FLUSH JOINTED</u>                    |
| TOTAL PERFORATED AREA <u>10.0 FT</u>  |  |

**PROTECTION SYSTEM**

|  |   |
|--|---|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HINGED LOCKING COVER WITH PADLOCK</u> |
| PROTECTIVE PIPE O.D. <u>10 3/4 IN</u>      |   |

| ITEM  | DISTANCE ABOVE/BELOW GROUND SURFACE (FT) |      | ELEVATION ( ) |       |
|---|--|------|---------------|-------|
|   |  |      |               |       |
| TOP OF RISER PIPE   | 2.0                                      |      |               |       |
| GROUND SURFACE  | 0.0                                      |      |               |       |
| BOTTOM OF PROTECTIVE PIPE   | 2.5                                      |      |               |       |
| BOREHOLE FILL MATERIALS:<br>GROUT/SLURRY<br>BENTONITE <u>NONE USED</u><br>SAND<br>GRAVEL <u>NONE USED</u> | TOP                                      | 0.0  | BOTTOM        | 78.0  |
|   | TOP                                      | NA   | BOTTOM        | NA    |
|   | TOP                                      | 78.0 | BOTTOM        | 106.5 |
|   | TOP                                      | NA   | BOTTOM        | NA    |
| PERFORATED SECTION  | TOP                                      | 83.0 | BOTTOM        | 93.0  |
| PIEZOMETER TIP  | 94.7                                     |      |               |       |
| BOTTOM OF BOREHOLE  | 106.5                                    |      |               |       |
| GWL AFTER INSTALLATION  |  |      |               |       |

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

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REMARKS 2 BUCKETS BENTONITE ADDED INSIDE AND OUTSIDE PROTECTIVE WELL COVER

|          |         |  |  |  |
|----------|---------|--|--|--|
| Date     | 5/15/90 |  |  |  |
| Inc. #   |         |  |  |  |
| 1st Ref. |         |  |  |  |
| 2nd Ref. |         |  |  |  |
| 3rd Ref. |         |  |  |  |

VISUAL CLASSIFICATION OF SOILS

|                                 |                          |
|---------------------------------|--------------------------|
| PROJECT NUMBER: 602 3.2.1       | PROJECT NAME: FMPC RI/FS |
| BORING NUMBER: 3391             | COORDINATES:             |
| ELEVATION:                      | GWL: Depth Date/Time     |
| ENGINEER/GEOLOGIST: M. SWANSON  | DATE STARTED: 5/03/90    |
| DRILLING METHOD-COS: CABLE TOOL | DATE COMPLETED: 5/15/90  |
|                                 | PAGE 1 OF 7              |

| DEPTH (FT) | SAMPLE TYPE & NO. | BLOWSON SAMPLES (1) | RECOVERY (%) | DESCRIPTION  | USCS SYMBOL | MEASURED COMPACTNESS (%) | N/A WELL CONSTRUCTION | REMARKS |
|------------|-------------------|---------------------|--------------|--|-------------|--------------------------|-----------------------|---------|
| 0          |                   |                     |              | FOR A DESCRIPTION OF THE FIRST 30.0 FT OF B-3391, SEE VCS LOG OF B-2391. |             |                          |                       |         |
| 5          |                   |                     |              | SAMPLING OF B-3391 WILL BEGIN AT 35.0 FT,                                |             |                          |                       |         |
| 10         |                   |                     |              |  |             |                          |                       |         |
| 15         |                   |                     |              |  |             |                          |                       |         |
| 20         |                   |                     |              |  |             |                          |                       |         |
| 25         |                   |                     |              |  |             |                          |                       |         |
| 30         |                   |                     |              |  |             |                          |                       |         |

NOTES.

Drilling Contractor: DEAN DRILL CO.  
 Drilling Equipment: BUCYRUS ERIE  
 Driller: D. NEWMAN  
 ASST. B. JOHNSON

ALL SOIL SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST. SOIL COLORS CLASSIFIED USING MUNSSELL COLOR CHARTS.

VISUAL CLASSIFICATION OF SOILS

|                                  |                          |
|----------------------------------|--------------------------|
| PROJECT NUMBER: 602 3.2.1        | PROJECT NAME: EMPC RI/FS |
| BORING NUMBER: 3391              | COORDINATES:             |
| ELEVATION:                       | GWL: Depth Date/Time     |
| ENGINEER/GEOLOGIST: M. SWANSON   | Depth Date/Time          |
| DRILLING METHOD-COS: CABLE TOOLS | PAGE 2 OF 7              |

| DEPTH (FT) | SAMPLE TYPE & ID | HOW MANY SAMPLES (6 IN.) | RECOVERY (%) | DESCRIPTION  | USCS SYMBOL | MEASURED COMPACTNESS (SPT) | WELL CONSTRUCTION  | REMARKS |
|------------|------------------|--------------------------|--------------|--|-------------|----------------------------|--|---------|
| 35         | 32654            | 20                       |              | VERY DENSE BROWN (10YR 5/3), WELL GRADED SANDY GRAVEL, ROUNDED TO SUBANGULAR (TO .75 IN.), SATURATED             | GW          | N/A                        | H <sub>nu</sub> = 0.8 AM<br>α = 0 CAM<br>β <sub>y</sub> = 20-80 CAM  |         |
| 36         | 1020<br>5/03/90  | 32<br>35                 | 12           |  |             |                            |  |         |
| 37         |                  |                          |              |  |             |                            |  |         |
| 40         | 32655<br>0930    | 1<br>3                   | 16           | LOOSE, VERY DARK GRAY (2.5Y 3/0) WELL GRADED GRAVELLY SAND, SUB-ROUNDED GRAVEL AND PEBBLES (TO .5 IN.) SATURATED | SW          | N/A                        | H <sub>nu</sub> = 1.0 AM<br>α = 0 CAM<br>β <sub>y</sub> = 80-130 CAM |         |
| 41         | 5/06/90          | 5                        |              |  |             |                            |  |         |
| 42         |                  |                          |              |  |             |                            |  |         |
| 43         |                  |                          |              |  |             |                            |  |         |
| 44         |                  |                          |              |  |             |                            |  |         |
| 45         |                  |                          |              |  |             |                            |  |         |

NOTES.

Drilling Contractor: PERNA DRILL CO.  
 Drilling Equipment: BUYILOS ERIE  
 Driller: D. VEWMAA  
 ASST.: B. JOHNSON

| METER           | SERIAL # | BACKGROUND    |
|-----------------|----------|---------------|
| H <sub>nu</sub> | 401694   | 0.1 to 0.9 AM |
| α               | #4       | 0 CAM         |
| β <sub>y</sub>  | #10      | 20-80 CAM     |

**VISUAL CLASSIFICATION OF SOILS**

|                                 |                          |
|---------------------------------|--------------------------|
| PROJECT NUMBER: 602 3.2.1       | PROJECT NAME: FMPL RI/FS |
| BORING NUMBER: 3391             | COORDINATES:             |
| ELEVATION:                      | GWL Depth Date/Time      |
| ENGINEER/GEOLOGIST: M. SWANSON  | Date/Time                |
| DRILLING METHOD-COS: CABLE TOOL | DATE STARTED: 5/03/90    |
|                                 | DATE COMPLETED: 5/15/90  |
|                                 | PAGE 3 OF 7              |

| DEPTH (FT) | SAMPLE NO. (IN) & DATE | USING ON SAMPLES (IN) | RECOVERY (%) | DESCRIPTION   | TESTS PERFORMED | MEASURED (SPT) | WELL CONSTRUCTION | REMARKS   |
|------------|------------------------|-----------------------|--------------|---|-----------------|----------------|-------------------|---|
| 45         | 32656<br>1441<br>5/06  | 13<br>25<br>36        | 8            | VERY DENSE, DARK GRAY (10YR 4/1), WELL GRADED GRAVEL-SAND MIXTURE, SUBGRAINED, (TO .5 in.) SATURATED      | GW              | NA             |                   | H <sub>2</sub> O = 0.6 ppm<br>α = 0 cpm<br>PY = 60 cpm    |
| 46         |                        |                       |              |   |                 |                |                   |   |
| 47         |                        |                       |              |   |                 |                |                   |   |
| 48         |                        |                       |              |   |                 |                |                   |   |
| 49         |                        |                       |              |   |                 |                |                   |   |
| 50         | 32657<br>1550<br>5/06  | 5<br>8<br>9           | 7            | MEDIUM DENSE, GRAY (5Y 5/1), WELL GRADED SANDY GRAVEL, ROUNDED TO SUBGRAINED, (TO .75 in.), SATURATED     | GW              | N/A            |                   | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>PY = 40-60 cpm |
| 51         |                        |                       |              |   |                 |                |                   |   |
| 52         |                        |                       |              |   |                 |                |                   |   |
| 53         |                        |                       |              |   |                 |                |                   |   |
| 54         |                        |                       |              |   |                 |                |                   |   |
| 55         | 32658<br>1645<br>5/06  | 6<br>37<br>25         | 17           | VERY DENSE, GRAY (5Y, 5/1), WELL GRADED GRAVEL-SAND MIXTURE, SUBGRAINED (TO .5 in.), SOME SILT, SATURATED | GW              | N/A            |                   | H <sub>2</sub> O = 0.4 ppm<br>α = 0 cpm<br>PY = 30-50 cpm |
| 56         |                        |                       |              |   |                 |                |                   |   |
| 57         |                        |                       |              |   |                 |                |                   |   |
| 58         |                        |                       |              |   |                 |                |                   |   |
| 59         |                        |                       |              |   |                 |                |                   |   |

60

NOTES:

Drilling Contractor: PENNY-DRILL CO.

Drilling Equipment: BUYRUS ERIC

Driller: D. NEUMANN

ASST.: A. JOHANSON

BACKGROUND

H<sub>2</sub>O = 0.4 ppm

α = 0 cpm

PY = 20-30 cpm

**77**

VISUAL CLASSIFICATION OF SOILS

|                               |  |
|-------------------------------|--|
| PROJECT NUMBER: 602 3.2.1     | PROJECT NAME: FMPC RI/FS                                       |
| BORING NUMBER: 3391           | COCORDINATES: DATE: 5/07/90                                    |
| ELEVATION:                    | GWL Depth 13.8 FT Date/Time 5/07/90 0830 DATE STARTED: 5/03/90 |
| ENGINEER/GEOLOGIST M. SWANSON | Depth Date/Time DATE COMPLETED: 5/15/90                        |
| DRILLING METHODS: CABLE TOOL  | PAGE 4 OF 7  |

| DEPTH (FT.) | SAMITE TYPE & NO.        | BLOWSON SAMPLES (6 IN.) | RECOVERY (%) | DESCRIPTION   | USCS SYMBOL | MEASURED LARGEST SIZE (mm) | WELL CONSTRUCTION | REMARKS   |
|-------------|--------------------------|-------------------------|--------------|---|-------------|----------------------------|-------------------|---|
| 61          | 32654<br>1101<br>5/07/90 | 2<br>3<br>5             | 6            | LOOSE, GRAY (SY, S11), WELL GRADED CLEAN SANDY GRAVEL (TO 80%). ROUNDED TO SUBANGULAR, TRACE OF SILT, SATURATED | GW          | N/A                        |                   | H <sub>20</sub> = 0.4 ppm<br>α = 0.0 ppm<br>β <sub>γ</sub> = 60-100.0 ppm |
| 62          |                          |                         |              |   |             |                            |                   |   |
| 63          |                          |                         |              |   |             |                            |                   |   |
| 64          |                          |                         |              |   |             |                            |                   |   |
| 65          | 32660<br>1347<br>5/07    | 3<br>6<br>6             | 5            | MEDIUM DENSE, GRAY (Z.5Y 5/0), WELL GRADED COARSE SAND, SOME SUBROUNDED PEBBLES (TO 25%), SATURATED             | SW          | N/A                        |                   | H <sub>20</sub> = 0.2 ppm<br>α = 0.0 ppm<br>β <sub>γ</sub> = 40-60.0 ppm  |
| 66          |                          |                         |              |   |             |                            |                   |   |
| 67          |                          |                         |              |   |             |                            |                   |   |
| 68          |                          |                         |              |   |             |                            |                   |   |
| 69          |                          |                         |              |   |             |                            |                   |   |
| 70          | 32661<br>1505<br>5/07    | 1<br>5<br>11            | 10           | MEDIUM DENSE, GRAY (Z.5Y 5/0), WELL GRADED GRAVELLY SAND (TO 10.0%), SOME SILT, SATURATED                       | SW          | N/A                        |                   | H <sub>20</sub> = 0.2 ppm<br>α = 0.0 ppm<br>β <sub>γ</sub> = 40-100.0 ppm |
| 71          |                          |                         |              |   |             |                            |                   |   |
| 72          |                          |                         |              |   |             |                            |                   |   |
| 73          |                          |                         |              |   |             |                            |                   |   |
| 74          |                          |                         |              |   |             |                            |                   |   |
| 75          |                          |                         |              |   |             |                            |                   |   |

NOTES.

Drilling Contractor PERNO DRILL CO.  
 Drilling Equipment BUCAUS ERIE  
 Driller: D. NEWMAN  
ASST. B. JOHNSON

BACKGROUND

H<sub>20</sub> : 0.4 ppm  
 α : 0.0 ppm  
 β<sub>γ</sub> : 20-60.0 ppm

# FERNALD R/FS

1114

## VISUAL CLASSIFICATION OF SOILS

|                                |  |
|--------------------------------|--|
| PROJECT NUMBER: 602 3.2.       | PROJECT NAME: FMPC R/FS  |
| BORING NUMBER: 3391            | COORDINATES: DATE: 5/08/90                                       |
| ELEVATION:                     | GWL: Deem 1.7 FT Date/Time: 5/08/90 @ 0800 DATE STARTED: 5/03/90 |
| ENGINEER/GEOLOGIST: M. SWANSON | Deem Date/Time DATE COMPLETED: 5/15/90                           |
| DRILLING METHODS: CABLE TOOLS  | PAGE 5 OF 7  |

| DEPTH (FT) | SAMITE TYPE & NO         | BLOWSON SAMPLES (6 IN 1) | RECOVERY (%) | DESCRIPTION   | USCS SYMBOL | MEASURED LIQUIDITY (PL) | WELL CONSTRUCTION | REMARKS   |
|------------|--------------------------|--------------------------|--------------|---|-------------|-------------------------|-------------------|---|
| 75         | 32662<br>0905<br>5/08/90 | 11<br>11<br>12           | 9            | MEDIUM DENSE, GRAY (10YR 5/1), WELL GRADED GRAVELLY SAND, (TO .75 IN.) SOME SUBROUNDED PEBBLES, SATURATED                             | SW          | N/A                     |                   | H <sub>2</sub> O = 0.4 ppm<br>α = 0 cpm<br>β <sub>γ</sub> = 60-80 cpm |
| 76         |                          |                          |              |   |             |                         |                   |   |
| 77         |                          |                          |              |   |             |                         |                   |   |
| 78         |                          |                          |              |   |             |                         |                   |   |
| 79         |                          |                          |              |   |             |                         |                   |   |
| 80         |                          |                          |              |   |             |                         |                   |   |
| 81         | 32663<br>1055<br>5/08    | 3<br>5<br>9              | 8            | MEDIUM DENSE, GRAY (10YR 5/1) POORLY GRADED COARSE SAND, TRACE OF PEBBLES AND GRAVEL (TO .5 IN.), SUBROUNDED TO SUBANGULAR, SATURATED | SP          | N/A                     |                   | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>β <sub>γ</sub> = 40-60 cpm |
| 82         |                          |                          |              |   |             |                         |                   |   |
| 83         |                          |                          |              |   |             |                         |                   |   |
| 84         |                          |                          |              |   |             |                         |                   |   |
| 85         |                          |                          |              |   |             |                         |                   |   |
| 86         | 32664<br>1558<br>5/08    | 5<br>6<br>9              | 11           | MEDIUM DENSE, GRAY (10YR 5/1), POORLY GRADED FINE SAND, SOME ROUNDED PEBBLES (TO .25 IN.), SATURATED                                  | SP          | N/A                     |                   | H <sub>2</sub> O = 0.2 ppm<br>α = 0 cpm<br>β <sub>γ</sub> = 60-80 cpm |
| 87         |                          |                          |              | BOTTOM OF BORING,<br>DRILLED AND SAMPLED TO 86.5 FT.  |             |                         |                   |   |

NOTES.

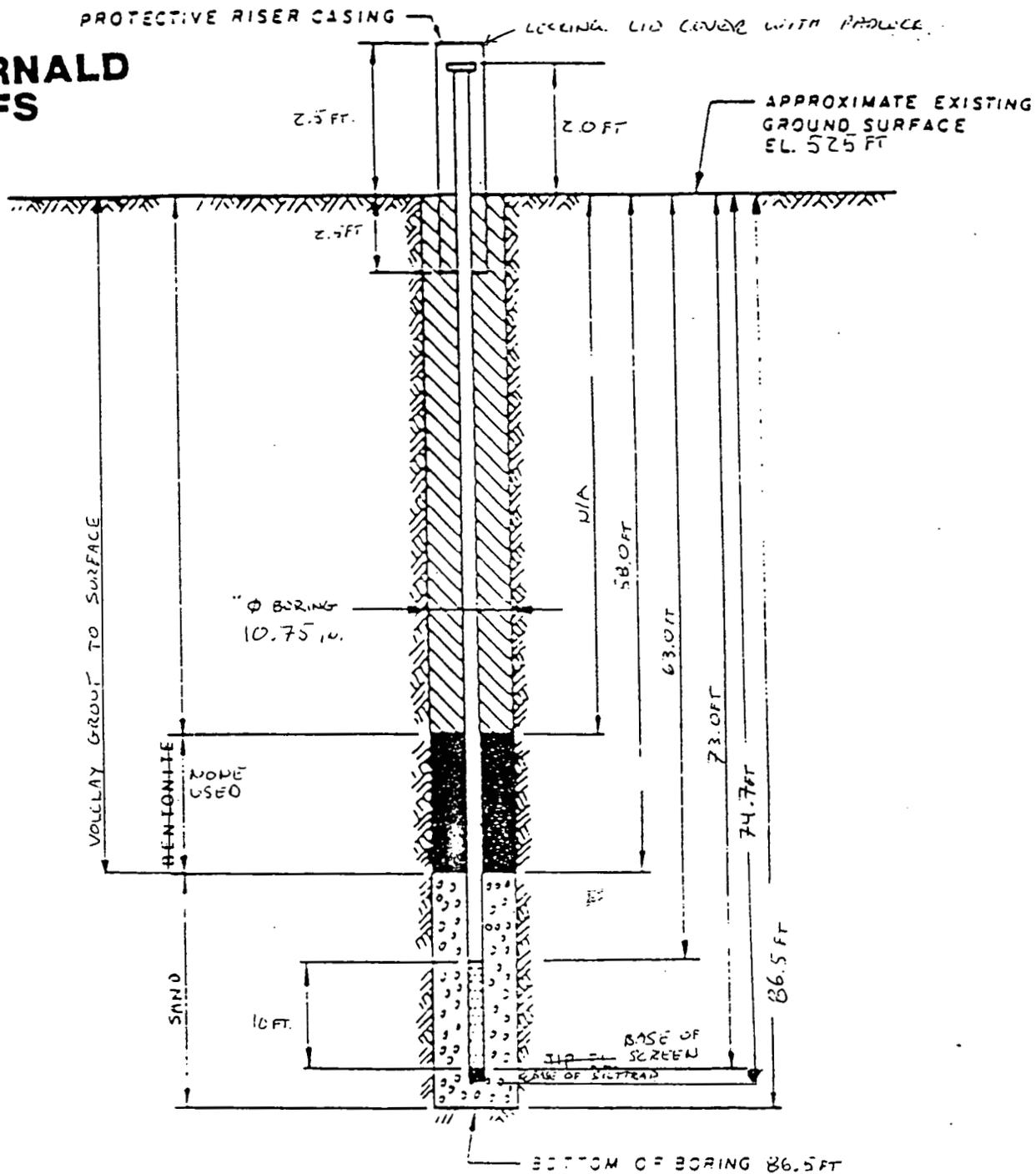
Drilling Contractor: PERU DRILL CO.  
 Drilling Equipment: RULYIUS ERIG  
 Driller: P. WEUMAN  
ASST. B. JOHNSON

BACKGROUND

H<sub>2</sub>O = 0.2 ppm  
 α = 0 cpm  
 β<sub>γ</sub> = 30-60 cpm

79

# FERNALD RI/FS



|                |              |
|----------------|--------------|
| DRAWING NUMBER |              |
| CHECKED BY     |              |
| APPROVED BY    |              |
| DRAWN BY       | W.A. 5/09/90 |

**NOTES:**

1. RISER PIPE 1.54 IN 10 SCHEDULE PIPE, THREADED, FLUSH-JOINTED.
2. SCREEN 1.54 IN 1.0 SS PIPE CONTINUOUS SLOT SCREEN (0.010 IN SLOT SIZE)
3. LOWER END OF SCREEN IS CAPPED, W/ WELDED SILTRAP
4. ELEVATION OF WATER LEVEL 13.8 FT @ 11.7 FT
5. WATER LEVEL READING ON 5/07/90 @ 230, 5/08/90 @ 2000

INSTALLATION DETAILS  
MONITORING WELL #3391

PREPARED FOR  
FERNALD RI/FS

**MATERIALS USED FOR WELL INSTALLATION:**

- 18 80 LB. BAGS OF 10/20 SAND
- 14 50 LB. BAGS OF VOLLAY GROUT
- 7 5 GAL. BUCKETS OF BENTONITE PELLETS

600 GALLONS OF WATER USED DURING DRILLING AND GROUTING  
1-10 FT SCREEN W/ 1-7 FT WELDED SILTRAP, 6-10 FT SECTIONS SS RISER, 5 FT. PROTECTIVE CASING

**PIEZOMETER INSTALLATION SHEET**

PROJECT NAME FMPC RI/FS FIELD ENG./GEO. M. SWANSON DATE 5/08/90  
 PROJECT NO. 602 3.2.1 CHECKED BY E.T. DATE 5-17-90  
 BORING NO. 3391  
 PIEZOMETER NO. 3391 DATE OF INSTALLATION 5/15/90

**BOREHOLE DRILLING**

|   |  |
|---|--|
| DRILLING METHOD <u>CABLE TOOLS</u>  | TYPE OF BIT <u>HAMMER</u>  |
| DRILLING FLUID(S) USED:<br>FLUID <u>H<sub>2</sub>O</u> FROM <u>0.0 FT</u> TO <u>86.5 FT</u><br>FLUID <u>-</u> FROM <u>-</u> TO <u>-</u> | CASING SIZE(S) USED:<br>SIZE <u>10 WID</u> FROM <u>0.0 FT</u> TO <u>86.5 FT</u><br>SIZE <u>-</u> FROM <u>-</u> TO <u>-</u> |

**PIEZOMETER DESCRIPTION**

|   |  |
|---|--|
| TYPE <u>MONITORING WELL</u>   | RISER PIPE MATERIAL <u>316 STAINLESS STEEL</u>                   |
| DIAMETER OF PERFORATED SECTION <u>4.0 WID</u>   | RISER PIPE DIAMETERS:<br>O.D. <u>4 3/8 IN</u> I.D. <u>4.0 IN</u> |
| PERFORATION TYPE:<br>SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SLOTTED SCREEN <input checked="" type="checkbox"/> | LENGTH OF PIPE SECTIONS <u>10.0 FT</u>                           |
| AVERAGE SIZE OF PERFORATIONS <u>0.010 IN</u>  | JOINING METHOD <u>THREADED - FLUSH JOINTED</u>                   |
| TOTAL PERFORATED AREA <u>10.0 FT</u>  |  |

**PROTECTION SYSTEM**

|  |   |
|--|---|
| RISER PROTECTIVE PIPE LENGTH <u>5.0 FT</u> | OTHER PROTECTION <u>HANGED LOCKING LIA COVER WITH PADLOCK</u> |
| PROTECTIVE PIPE O.D. <u>10.75 IN</u>       |   |

| ITEM   | DISTANCE ABOVE/BELOW GROUND SURFACE (FT) |      | ELEVATION ( ) |         |
|--|--|------|---------------|---------|
|  |  |      |               |         |
| TOP OF RISER PIPE  | + 2.0                                    |      |               |         |
| GROUND SURFACE   | 0.0                                      |      |               |         |
| BOTTOM OF PROTECTIVE PIPE  | - 2.5                                    |      |               |         |
| BOREHOLE FILL MATERIALS:<br>GROUT/SLURRY<br>BENTONITE <u>NONE USED</u><br>SAND <u>10/20</u><br>GRAVEL <u>NONE USED</u> | TOP                                      | 0.0  | BOTTOM        | 58.0    |
|  | TOP                                      | N/A  | BOTTOM        | N/A     |
|  | TOP                                      | 58.0 | BOTTOM        | 86.5    |
|  | TOP                                      | N/A  | BOTTOM        | N/A     |
| PERFORATED SECTION   | TOP                                      | 63.0 | BOTTOM        | 73.0 FT |
| PIEZOMETER TIP   | 74.7 FT                                  |      |               |         |
| BOTTOM OF BOREHOLE   | 86.5 FT                                  |      |               |         |
| GWL AFTER INSTALLATION   | 10.1 FT BELOW GROUND SURFACE             |      |               |         |

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

REMARKS 3 BUCKETS OF BENTONITE PELLETS  
POURED AROUND PROTECTIVE CASING & RISER PIPE.