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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT PERIOD ENDING AUGUST 31, 1993

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

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Period Ending August 31, 1993

Introduction

The Consent Agreement (CA) As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a), the Federal Facility Compliance Agreement (FFCA), and the Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA) signed September 20, 1991, July 18, 1986, and November 19, 1991, respectively, require that monthly reports be submitted to the U.S. EPA regarding progress made to meet the provisions of those agreements. This report fulfills those requirements by describing actions undertaken at the Fernald Environmental Management Project (FEMP) during the period August 1 through August 31, 1993, and planned actions for the period September 1 through September 30, 1993.

0301

Attachment to: DOE-3065-93

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

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WORK ASSIGNMENTS AND PROGRESS

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

- o CA Section IX - Removal Actions.
- o CA Section X - Remedial Investigation/Feasibility Study.
- o Enclosure A - Wastewater Flows and Radionuclide Concentrations under CA Section XXIII.B.
- o Enclosure B - FFCA: Initial Remedial Measures and Other Open Actions.
- o Enclosure C - FFA: Control and Abatement of Radon-222 Emissions.
- o Enclosure D - Drilling/Boring Logs

CA Section IX. Removal Actions

This section provides an update of activities associated with the implementation of Removal Actions (RAs) at the FEMP during August 1993. Information is presented for each of the Removal Actions identified in the Consent Agreement As Amended.

Phase I Removal Actions

- o RA No. 1, Contaminated Water Under FEMP Buildings.
- o RA No. 2, Waste Pit Area Run-off Control.
- o RA No. 3, South Groundwater Contamination Plume.
- o RA No. 4, Silos 1 and 2.
- o RA No. 5, Decant Sump Tank.
- o RA No. 6, Waste Pit 6 Residues.
- o RA No. 7, Plant 1 Pad Continuing Release.

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Phase II Removal Actions

- RA No. 8, Inactive Flyash Pile Control.
- RA No. 9, Removal of Waste Inventories.
- RA No. 10, Active Flyash Pile Controls.
- RA No. 11, Pit 5 Experimental Treatment Facility.
- RA No. 12, Safe Shutdown.
- RA No. 13, Plant 1 Ore Silos.
- RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator.
- RA No. 15, Scrap Metal Piles.
- RA No. 16, Collect Uncontrolled Production Area Runoff--Northeast.
- RA No. 17, Improved Storage of Soil and Debris.
- RA No. 18, Control Exposed Material in Pit 5.

Phase III Removal Actions

- RA No. 19, Plant 7 Dismantling.
- RA No. 20, Stabilization of UNH Inventories.
- RA No. 21, Expedited Silo 3.
- RA No. 22, Waste Pit Area Containment Improvement.
- RA No. 23, Inactive Flyash Pile.
- RA No. 24, Pilot Plant Sump.

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CA Section IX. Removal Actions (continued)

- RA No. 25, Nitric Acid Tank Car and Area.
- RA No. 26, Asbestos Removals (Asbestos Program).
- RA No. 27, Management of Contaminated Structures at the FEMP.
- RA No. 28, Contamination at the Fire Training Facility

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REMOVAL ACTIONS

RA No. 1, Contaminated Water Under FEMP Buildings

Pumping at all Plants and treatment of perched groundwater remained halted during August due to the spill of Uranyl Nitrate Hexahydrate on April 27 and the subsequent shutdown of all Plant 8 operations. It is anticipated that the Plant 8 Sump will be operational the week of September 13. The VOC System is anticipated to be operational the week of September 20. Pumping operations can the be resumed.

RA No. 2, Waste Pit Area Runoff Control

This removal action was completed on August 30, 1992.

RA No. 3, South Groundwater Contamination Plume

Part 1

On January 31, 1991, the U.S. EPA approved the Work Plan for Part 1, Alternate Water Supply for two industrial users, Albright & Wilson Americas and Delta Steel. Subsequently, The U.S. EPA and Ohio EPA approved deleting Delta Steel from the current scope of the project. The Delta Steel hookup will be delayed until the planned public water supply can service the facility. The FEMP prepared a revised Work Plan (Revision 1) and issued it to the EPAs to reflect this and other changes that have occurred. A summary of the most recent and ongoing activities for Part 1 are listed below:

The FEMP completed a 60-day continuous testing period on May 24, 1993. The continuous test was delayed until plan approval was received from the Ohio EPA. The system continues to operate satisfactorily. Provisions are being made to turn possession of the system over to AWA. Legal representatives from the Justice Department and Albright & Wilson Americas are handling final acceptance of the alternate water supply. Negotiations for easement payments to several affected property owners continues. A court hearing was held June 7, 1993, regarding the Linesch property with the final judgement ruled in favor of DOE.

Part 2

This project was divided into five construction bid packages. These include: 2A - groundwater discharge pipeline (pressure flow) and outfall pipeline (gravity flow) from south of Willey Road to and including Manhole 183B; 2B1 - Manhole 183B to Great Miami River; 2B2 - Aeration Facility; 2C - recovery well field; and 2D - test well installation and pump test. The following is the status of the Part 2 activities:

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume (continued)

The Outfall Pipeline section of Part 2A and 2B1 portions of the projects were operational on May 1, 1993. Accordingly, the existing outfall pipeline was removed from service. This removes an EPA concern that the existing pipeline was subject to leaking.

The FEMP completed the last phase of the Part 2D pump test on June 5. The FEMP analyzed the data obtained from each phase of the pump test (step drawdown, constant rate, and recovery period) to evaluate the various hydrogeologic parameters of the aquifer in the immediate vicinity of the South Plume Well Field. Based on the results, The FEMP prepared a letter which assessed preliminary pump test results, stated that the planned pumping rate for the South Plume Recovery System should be adequate, and confirmed the previously recommended lengths and depths of the screened interval for the remaining four South Plume recovery wells. A meeting was held on June 30 to present the data to the Ohio EPA and the U.S. EPA before proceeding with the remaining well installation.

Subsequently, The FEMP drilled the remaining four recovery wells, and set the pumps and screens. Final analysis of the data and a pump test report were received on August 25, 1993. Delta Steel attempted to stop the pumping action through court action. However, the judge ruled in favor of DOE at the August 26 hearing allowing pumping to proceed. The pumping test report was delivered to the EPAs on August 26. Concurrence was received that same day. The well field began pumping at 3:00 p.m. on Friday, August 27, 1993.

The FEMP completed installation of new larger 700 gpm pumps at the Stormwater Retention Basin and operations began in late June. This will increase the probability that no overflow of the Stormwater Retention Basin will occur in the future.

Part 3

The FEMP prepared the Work Plan for Parts 2 and 3 as one document. The plan entails installing and operating an Interim Advanced Wastewater Treatment (IAWWT) System to reduce uranium contaminant loading discharged to the Great Miami River to a level less than 1,700 pounds per year. Due to the relocation of the Part 2 well field to an area having a higher concentration of uranium, the IAWWT system capacity was expanded to maintain the 1,700 pound per year maximum level. The IAWWT system includes two treatment units. The IAWWT unit located at the Storm Water Retention Basin consists of two trailer-mounted assemblies, each with a nominal 150 gpm capacity or a total nominal 300 gpm capacity. The unit located at the Biodenitrification Effluent Treatment System has a nominal capacity of 100 gpm. Current activities are described below.

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume (continued)

IAWWT Stormwater Retention Basin Unit

During July the IAWWT Stormwater Retention Basin Unit operated when stormwater and Cartridge Filter elements were available. However, the units continue to use cartridge filter elements excessively during operation, and the FEMP has had problems keeping the filter elements in stock. Accordingly, plans are being made to install multimedia filtration upstream of the Ion Exchange units. The filter units will be installed in the Uranium Reduction in FEMP Discharge system installed pursuant to the agreed Operable Unit 2 Dispute Resolution Supplemental Project.

IAWWT Biodenitrification Effluent Treatment System Unit

The FEMP received a new Dual Media Filtration system on July 14. The FEMP has not yet received two new ion exchange vessels; however, the system will be able to run at up to 50 gallons per minute using the one existing ion exchange vessel that will be retained. Operation of the system, using the one ion exchange vessel began the week of August 16.

Part 4

Part 4 involves groundwater monitoring and institutional controls.

Sampling of private homeowner and existing RI/FS wells in the South Plume area continues. The two homeowner treatment systems installed south of the FEMP continue to operate successfully.

Part 5

Part 5 was added to this removal action in order to address the relocation of the Part 2 well field. It includes the groundwater modeling and geochemical investigation of an area south of the well field to determine the location of the leading edge of the 20 ppb uranium-contaminated groundwater. Part 5 includes evaluating the location of plumes associated with the Paddy's Run Road and the impact on these plumes by pumping the FEMP Part 2 Recovery Well Field. Part 5 also includes performing the required field sampling, data analysis and computer modeling flow and particle tracking to enable setting the location and design of the Part 2 Recovery Well Field.

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume (continued)

The geochemical investigation is divided into four phases:

Phase I - two traverse lines of hydropunch borings within the alluvium area and concurrent sampling of existing nearby wells. The FEMP completed Phase I on August 25, 1992. Only one hydropunch sample exceeded 20 ppb uranium.

Phase II - two traverse lines of monitoring wells with corresponding hydropunch sampling north and south of the proposed recovery well field. Phase II began in late March 1993. Under this phase, two traverse lines of monitoring wells (12 well program), one north and one south of the proposed recovery well field at the South Plume have been installed and developed, and the first round of sampling completed. This program consists of six monitoring 2000-series and 3000-series well pairs. The first round of sampling for each monitoring well was for full radiological parameters, volatile organic compounds and general groundwater parameters. In addition, at each location hydropunch samples were collected at various depths below the water table to determine the vertical distribution of the uranium within the aquifer.

Phase III - seven piezometers clustered near proposed extraction well R-4. The seven piezometer cluster located near proposed Recovery Well No. 4 was installed in early May as part of the Part 2D pump test construction package. Six of these piezometers (3911, 3912, 3916, 3917, 3918, and 4920) were centered approximately 25 feet from the test well. To avoid bedrock, the seventh piezometer (4919) was replaced with a boring hole, B-1, 50 feet away from the test well. Samples from these piezometers were taken to evaluate the vertical extent of the uranium contamination within the aquifer. Sample investigations associated with Phase III have identified two piezometers (3916 and 3917) where uranium samples exceeded 20 ppb.

Phase IV - soil vapor sampling.

A need and location for a soil vapor survey will be determined after 20 ppb isopleth is located and Phase I, II, III, data and proposed pumping under the Design, Monitoring, and Evaluation Program Plan are evaluated. After all analytical data is collected from Phases I, II, and III, a summary report will be prepared which will include a plot of uranium.

Operable Unit 2 Dispute Resolution Supplemental Project (Uranium Reduction in FEMP Discharge)

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume (continued)

The supplemental project will provide for partial treatment of the South Plume discharge with the objective of reducing uranium discharges from the FEMP to the Great Miami River. The project consists of the following parts:

1. Procure and install one additional IAWWT trailer unit to treat 200 gpm South Plume flow. This new unit, referred to as the South Plume Interim Treatment (SPIT) project, will be installed by March 30, 1994. The SPIT project will also include the addition of multi-media filtration units to supplement filtration at the IAWWT (SWRB).

2. Use off-peak capacity in Phase I AWWT for South Plume Treatment when no stormwater is available for treatment. This provision will be available in January 1995 when Phase I of the AWWT becomes operational.

3. Eliminate low uranium streams, that is, less than 20 ppb (Sewage Treatment Plant and clean side General Sump) from Phase II AWWT and utilize this capacity to treat a portion of the South Plume; estimated to be approximately 200 gpm. This provision will be available in January 1995 when Phase II of the AWWT becomes operational.

4. Extend the planned operational life of the existing IAWWT SWRB unit and convert from treating stormwater to treating South Plume flow. Also, the capacity would be increased from 300 gpm to approximately 400 gpm. This would be accomplished by March 30, 1995.

   The status of this project is as follows:

   Part 1

   The Certified for Construction Design Basis Documents, drawings, sketches, and specifications were issued on August 27, 1993. The procurement package is expected to be issued by September 3, 1993.

   Part 2

   Operable Unit 5 has completed changes to the AWWT project scope to eliminate the treatment of the Sewage Treatment Plant and clean side General Sump flows. The AWWT package now under construction contains piping and valving to transfer South Plume flow to the existing SWRB pumping station for subsequent transfer to Phase II.

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REMOVAL ACTIONS

RA No. 3, South Groundwater Contamination Plume (continued)

Part 3

FERMCO plans to expedite installation of the 20" line that will serve a future AWWT Phase III. This will allow South Plume Groundwater to be transferred to AWWT Phase II until AWWT Phase III is operational. The pipe required has been procured and a request for proposal will be issued by September 3, 1993, for the additional work under AWWT Phase II.

RA No. 4, Silos 1 and 2

Installation of the bentonite in Silos 1 and 2 was completed on November 28, 1991.

The DOE submitted an evaluation detailing a revised method for determining the effectiveness of the bentonite in the silos to the U.S. EPA on December 17, 1992. As discussed with U.S. EPA on April 13, 1993, information contained in the revised Bentonite Effectiveness Evaluation document will be incorporated into the Removal Action Final Report.

As defined in the Removal Action Work Plan and the FFA-CARE, data associated with monitoring the effectiveness of the bentonite installation are included in Enclosure C.

RA No. 5, K-65 Decant Sump Tank

The FEMP completed removal of the liquid from the K-65 Decant Sump Tank on April 16, 1991, when the liquid was transferred to the holding tanks in Plant 2/3. Treatment of the decant liquid based on the Material Evaluation Form and available analytical results was completed on May 12, 1992.

Current activities include monitoring the liquid level of the K-65 Decant Sump Tank and performing maintenance as required. DOE will advise the EPA when pumping operations will take place.

RA No. 6, Waste Pit 6 Residues

This removal action was completed on December 19, 1990.

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REMOVAL ACTIONS

RA No. 7, Plant 1 Pad Continuing Release

This removal action consists of three stages. Stage I, which implements the run-on/off control measures, is complete. Stage II, addressing the installation of 80,000 square feet of a newly covered and controlled concrete storage pad, is complete. Stage III involves activities to upgrade the remaining 375,000 square feet of the existing Plant 1 storage pad. Stage III upgrading activities include installation of a polymeric vapor barrier over the existing concrete and the installation of concrete above the barrier with an epoxy sealant. In addition, 22,500 square feet of the Stage III work area will be enclosed beneath a tension support structure.

The bids for Stage III (Phases C, D, and E) were received June 18, 1993, as scheduled. A subcontractor was given a notice to proceed on August 13, 1993. They have mobilized on site and began construction on Stage III, Phases C and D. Major concrete placements will begin in September.

KEY MILESTONES	STATUS	DUE DATE
Complete Stage III	Open	February 19, 1995

RA No. 8, Inactive Flyash Pile Control

The Inactive Flyash Pile Isolation Activity was completed, ahead of schedule, on December 23, 1991.

RA No. 9, Removal of Waste Inventories

During August 1993, 23,270 drum equivalents of low-level waste (LLW) were dispositioned. Repackaging material has reduced the year-to-date disposal volume shipped to the Nevada Test Site (NTS) by 2,931 drum equivalents. The FY1993 goal is to dispose of 67,000 drum equivalents of low-level waste at the Nevada Test Site and 50,000 drum equivalents of low-level waste through subcontractors.

The activities completed in August included the FEMP demonstrating significant progress on closure of the audit findings and maintained its waste shipping/certification program approval to continue shipping to the NTS. The FEMP will provide sampling and analysis results to DOE-NV for final approval of the Sampling and Analysis Plan. The DOE-NV audit team

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REMOVAL ACTIONS

RA No. 9, Removal of Waste Inventories (continued)

discovered several significant findings. However, DOE-NV agreed to give the FEMP 30 days to complete significant corrective action in lieu of an immediate suspension of all waste shipments to the NTS.

Waste shipping activities for September will include continued closure of the audit findings, revision of application and completion of sample and analysis approvals.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Open, on schedule	June 30, 1994

RA No. 10, Active Flyash Pile Controls

This removal action was completed on June 29, 1992. Any required maintenance will be conducted on an ongoing basis.

RA No. 11, Pit 5 Experimental Treatment Facility

RA No. 11 was completed on March 20, 1992.

RA No. 12, Safe Shutdown

The Safe Shutdown Removal Action documents the activities that will remove uranium and other material from equipment and pipelines in former processing equipment and properly disposition the removed materials and equipment off-site.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Open, on schedule	June 30, 1994

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

The Operational Readiness Review, which will allow Safe Shutdown to proceed with removal of hold-up materials from equipment and lines, was submitted to DOE-FN on August 3, 1993. DOE-FN has determined that a Readiness Assessment, rather than an Operational Readiness Evaluation, will be done to assess the adequacy of the Safe Shutdown Program Planning and Implementation so that field work can proceed.

Safe Shutdown completed the transfer of approximately 50-75 gallons of nitric acid and four water rinses totalling 400 gallons, from the nitric acid tank rail car to two portable stainless steel tanks. The solution will be transferred to a stationary tank and eventually will be utilized to flush the lines after the stabilization of the UNH is complete. Accomplishing this transfer will allow us to have the rail car disassembled for future disposition.

Equipment and Material Assessments (formerly Preliminary Assessments) are continuing. Field evaluations of Plants 1, 4, 7, and 8 have been completed. The field evaluation of Plants 5 and 9 are in process. Red-line, as-built floor plan drawings are being prepared for Plants 4 and 9 to reflect present equipment location.

The following is the status of expense items: 2,962 expense items are currently in the data base; 1,495 have been field verified; 578 are on a "shopping list" to ascertain on-site use; 1,042 have been transferred to Maintenance; and 125 have been placed on AC-563 Forms to be excessed. These numbers are expected to fluctuate from month to month as field verification is conducted.

The following is the status of capital equipment: of an estimated 1,695 total number of items, 1,192 have been put on AC-563 Forms to be excessed, and 503 have been identified as "In Use/Future Use" items. The number of items on AC-563 Forms and the "In Use/Future Use" listing may vary due to change of status of equipment items.

Six hundred sixty-four maintenance work orders to isolate and disconnect all utilities/energy sources from equipment not in use have been prepared. Of these, 289 have been completed. Field verification of the completed orders is ongoing. Completion of these work orders is a preliminary step for removal of hold-up material from the equipment in preparation for equipment removal and decontamination and decommissioning. These numbers may vary from month-to-month due to change in status of the equipment.

Phase II of the 4A Metal Removal Project covers the shipment of approximately 1,028 metric tons of uranium of Material Description Code 228 to the Nevada Test Site.. As of August 31, FERMCO has packaged 307 white metal boxes of the 345 estimated for the project.

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

Shipment of the material depends on the resolution of the NTS audit findings and approval. Material Disposition Order D-690, Final, Revision I, was issued August 16, 1993, to incorporate the changes required for this phase of the project.

August activity on the sale of uranium focused on preparation for issuing the contracts. Recommendations were made to DOE-FN for their approval of the sale of depleted uranium, and Westinghouse Hanford is completing the same preparatory work with DOE-RL. Both FERMCO and Westinghouse Hanford will be drafting shipping plans for removal of the material. The materials will be removed from the site over a two-to-three-year period beginning after the contracts are signed or after the Environmental Assessment, whichever is later. The Environmental Assessment is expected to be approved January 1994.

During September, the FEMP will finish packaging the Army material for shipment to NTS and continue following the progress on contracts for the sale of uranium. The FEMP will also continue to issue work orders for utility isolation work and will follow completion of the Readiness Assessment. Other key efforts include continuing to develop implementation plans for removing materials from process equipment, complete field activities associated with the removal of the Pilot Plant Sump, and continuing to verify equipment and material evaluations for Plants 5 and 9.

RA No. 13, Plant 1 Ore Silos

The Plant 1 Ore Silos Removal Action will include the dismantling of the 14 Plant 1 Ore silos and their support structure. This dismantling will eliminate the potential threat of additional material releases and the safety hazard due to structural deterioration of the silos and their support structure. The activities in this removal action will include characterization, removal, containerization, and disposal of the materials making up the above-ground portion of the facility.

August activities included installation of scaffolding and containment around the concrete silos. A preliminary acceptance test was performed on September 1. A new schedule has been submitted by the subcontractor indicating how they plan to recover from the 35 days they are presently behind schedule. September activities include finishing the Size Reduction Building, performing the final acceptance test, and beginning size-reducing the steel and concrete removed from the six concrete silos.

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REMOVAL ACTIONS

RA No. 13, Plant 1 Ore Silos (continued)

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open	December 19, 1994

RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator

This removal action will include the isolation or removal and disposition of contaminated soils in the vicinity of the Sewage Treatment Plant (STP). This action will eliminate the potential threat of additional material releases to the environmental media through migration. The activities in this removal action will include characterization, removal, and storage/disposal of the materials.

Excavation resumed in the off-property area immediately east of the sewage treatment plant and in the on-property area west of the STP. The soil is being stockpiled in a controlled area within the production area as per Removal Action No. 17. Grass and weeds were cut down around the wooded area so that the sampling crews can gain access to the area.

Scheduled September activities include the completion of excavation in the areas east and west of the STP and taking verification samples to confirm that the action level has been achieved. Intrusive soil sampling off-property is scheduled for September but completion depends on finding lab capacity to analyze the samples.

The revised Work Plan Addendum was submitted to the EPA on July 12, 1993. Conditional approval was received from the Ohio EPA on August 19, 1993. U.S. EPA approval was received August 24.

KEY MILESTONES	**STATUS**	**DUE DATE**
Phase III - Tentative completion of off-property and on-property excavations	Additional sampling to determine boundary of contamination	February 25, 1994
Phase IV - Tentative Submittal of Final Report	Open	September 26, 1994

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REMOVAL ACTIONS

RA No. 15, Scrap Metal Piles

The Scrap Metal Piles Removal Action will detail the stabilization and disposition of LLW scrap metal currently stockpiled on site. This removal action will minimize material releases to the environment. Approximately 1,400 tons of scrap copper along with approximately 2,200 tons of recoverable scrap metals are the focus of this removal action.

Containerization of the Phase I scrap metal pile at the B69 pad began in February. A total of 31 tons of non-ferrous metal has been shipped to Quadrex and 2,025 tons of ferrous metal have been shipped to SEG. All scrap metal at B69 pad was packaged and size-reduced by August 3, 1993. SEG remobilized on August 6 to size reduce and package the additional 300 tons of scrap vehicles. SEG completed size reduction and packaging of this metal on August 26, and began demobilization on August 31. Off-site shipment of the containers continue through the month of September. Through August 31, 1,466 tons of ferrous metal has been melted and made into shield blocks for DOE's high-energy physics applications.

The subcontractor for the Phase IIB subcontract was selected and contract award is scheduled for completion before September 30. The subcontractor's Removal Action Project Plan will be submitted to the FEMP 30 days after the contract award.

KEY MILESTONES	STATUS	DUE DATE
Complete Phase I	Open, on schedule	March 30, 1994
Phase I - Submit Final Report	Open, on schedule	September 30, 1994
Phase IIB: Submittal of Subcontractor's Removal Action Plan	Open, behind Schedule	September 30, 1993
Phase IIB: Submittal of Final Report	Open, on schedule	March 30, 1995

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REMOVAL ACTIONS

RA No. 16, Collect Uncontrolled Production Area Runoff -- Northeast

This Removal Action was completed, ahead of schedule, on August 20, 1993.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Completed August 20, 1993	August 30, 1993

RA No. 17, Improved Storage of Soil and Debris

This removal action will establish a site-wide management concept and implementation strategy for the improved storage of existing and future generated soils and debris at the FEMP. This removal also includes the design and construction of four (4) containment structures for the appropriate improved storage of contaminated soil and debris on site. This will eliminate the potential threat of additional material releases to the environment due to wind, rain, or vehicular traffic. Other activities in this Removal Action will include the revision of site procedures to enhance the characterization, interim storage management of the contaminated soil and debris materials until final remediation under Operable Unit 3.

The revised Request for Exemption from installing automatic sprinklers in tension support structures was submitted to DOE-HQ on June 7. The Request for Exemption was conditionally approved by DOE EM-331 on July 29, 1993. All design issues for the first design package have been agreed upon by DOE-FN and FERMCO as of June 11. DOE-FN granted approval on July 27 to complete the design for the Central Storage Facility pending NEPA review as part of the RA No. 17 Phase I Design Package. The direction to complete with Phase I design package and begin Part II design package (Decontamination Facility Pad only) was given on August 20, 1993.

Direction to proceed with the Soil and Rubble Pile cover design will be given in September. September activities will include preparation of both Phase I and II design packages.

RA No. 18, Control Exposed Material in Pit 5

This removal action was completed on June 4, 1993, and a final report is undergoing internal review.

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RA No. 19, Plant 7 Dismantling

The Plant 7 Dismantling Removal Action will include dismantling and disposition of the Plant 7 structure. This dismantling will eliminate the threat of additional contaminant releases and the safety hazard due to histoplasmosis. The activities in this removal action will include characterization, gross decontamination, removal, dismantling, packaging, and disposal and potential recycling of the materials making up the above-ground portion of the facility.

The FEMP submitted the draft final RAWP on June 30. Ohio EPA granted conditional approval on July 12 with one comment, and U.S. EPA granted approval with no comments on July 30, 1993. The Ohio EPA's comment has been addressed and submitted via letter attachment, dated August 24. The RAWP will not be revised and resubmitted.

Phase I activities began in May 1993 and are being accomplished under the Safe Shutdown Program. Phase II activities began on July 21, 1993. Phase I and II activities will continue through September.

The bid package went out to pre-qualified bidders on July 30, 1993. There was a pre-bid meeting at the FEMP on August 9, with a walk-through of Plant 7. Bids were received and opened on August 25, 1993. There were nine bidders on the contract. The contract will be awarded in October 1993.

KEY MILESTONES	STATUS	DUE DATE
Receive U.S. EPA comments	Completed on June 1, 1993	May 20, 1993
Submit Final Work Plan to the U.S. EPA	Completed on June 30, 1993	July 1, 1993

RA No. 20, Stabilization of UNH Inventories

The Stabilization of UNH Inventories Removal Action will remove and prepare for safe storage approximately 230,000 gallons of acidic UNH that is currently stored in 21 tanks in and around Plant 2/3. Existing processing equipment will be used to neutralize the solutions, filter the precipitate, and package the resulting filter cake in double containment for safe storage. This activity was previously part of RA No. 12, Safe Shutdown, but is being accelerated as a separate expedited response.

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REMOVAL ACTIONS

RA No. 20, Stabilization of UNH Inventories (continued)

Processing remains on hold pending implementation of the recommendations resulting from the Class B investigation of an incident that occurred on April 27.

RA No. 21, Expedited Silo 3

The Expedited Silo 3 Removal Action Final Report was submitted to the U.S. EPA on February 24, 1993.

RA No. 22, Waste Pit Area Containment Improvement

This project involves the stabilization of the south berm of Waste Pit 4, the regrading of the drainage ditches along Waste Pits 3, 4, 5, and 6, and the resurfacing of the road between Waste Pits 3, 4, 5, and 6.

RA No. 22 was completed on June 30, 1993, and a final report is undergoing internal review.

RA No. 23, Inactive Flyash Pile

A field investigation was conducted to determine if select locations within the Inactive Flyash Pile and South Field Disposal area boundary (RA No. 8) would require material to be removed. On June 24, 1992, contaminated debris from three of the regulated areas identified in the survey report were collected and placed in interim controlled storage. The contaminated items collected were a plastic bag (approximately 1 gallon) containing soil, a 1 foot x 2 feet section of transite and two small pieces of yellow material. Results of the survey were submitted on June 29, 1992. As a result of removal of the debris, DOE-FN determined that no additional action is required until remediation.

RA No. 24, Pilot Plant Sump

This sump is located on the southwest side of the Pilot Plant. The sump consists of a stainless steel cylinder approximately two feet in diameter and ten feet deep. This sump was built to remove liquids from the floor drains of the Pilot Plant and was used only during the renovation of the Pilot Plant in 1969. The sump is filled with a thick liquid and sludge. Analytical results of the sump contents show high concentrations of metals: lead, copper, chromium, nickel, as well as thorium and volatile organic compounds.

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REMOVAL ACTIONS

RA No. 24, Pilot Plant Sump (continued)

Field activities completed to date include the concrete apron and pump removal, excavation at the drain line, and all sampling except at the bottom of the sump.

This removal action is scheduled for completion by October 20, 1993.

KEY MILESTONES	STATUS	DUE DATE
Perform Removal Preparations and Design	Completed	May 24, 1993
Remove Sump, Evaluate Pipe Interior, Cap Inlet Pipe, Perform Soil Sampling	Open, ahead of schedule	September 22, 1993
Backfill Area and Return Area to Normal	Open, ahead of schedule	October 22, 1993

RA No. 25, Nitric Acid Tank Car and Area

The Nitric Acid Rail Car was formerly located on the northern perimeter of the production area and east of Building 63. The FEMP RCRA Part A and Part B application identify this tank car and area surrounding it as a Hazardous Waste Management Unit.

This high-grade, stainless steel tank car has a capacity of approximately 100,000 gallons and measures approximately 10 feet wide by 40 feet long by 15 feet high. This unit operated from 1952 until about 1989. The tank car stored nitric acid used at the FEMP. Based on recent analysis, the tank car now contains 50-100 gallons of nitric acid. This removal action includes removing residual contents from the tank car followed by decontamination and disposal of the tank car.

The FEMP collected samples of the soil underneath and around the tank car in late July. Small areas of soil are being excavated to remove above-background levels of chromium detected in soil samples. The railroad tracks west of the boiler plant were repaired in August. Field preparatory work began on August 23, 1993. Transport of the car and the sampling and transfer of the car contents took place in late August. The tank car was rinsed and the rinseate sampled August 28, 1993. Analytical results are pending.

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RA No. 25, Nitric Acid Tank Car and Area (continued)

The Closure Plan Information Data is awaiting approval by the Ohio EPA. Closure activities must be completed by September 8, 1993.

KEY MILESTONES	STATUS	DUE DATE
Perform Removal Preparations and Design	Completed	May 7, 1993
Sample, Transfer to (UNH) Tank, Decontaminate Tank Car, Perform Soil Sampling	Open, on schedule	September 8, 1993
Submit Final Report to DOE	Open, behind schedule	October 18, 1993

RA No. 26, Asbestos Removals (Asbestos Program)

This removal action documents asbestos abatement activity at the FEMP to mitigate the potential for contaminant release and migration. Abatements within the Asbestos Program to date include small-scale in-situ repairs, encasement, encapsulation, and removals, and the initiation of large-scale asbestos abatement within Plant 7.

The June 1993 Work Procedures submittal included Large-Scale Asbestos Work Practices, which applies to all asbestos abatement on-site (both small- and large-scale). This submittal also provided generalizations of all abatement activities to date as well as planned abatement activities for the next year, including several large-scale abatement projects. The U.S. EPA stated on July 28 that it had no comments on the draft annual work procedures update, therefore no additional submittal is required.

The FEMP is using the large-scale Asbestos Work Practices to perform the asbestos abatement activities associated with Removal Action 19, Plant 7 Dismantling. Asbestos work within Plant 7 is scheduled to continue through October 1993.

KEY MILESTONES	**STATUS**	**DUE DATE**
Submit draft Work Procedures for 1993 to the U.S. EPA	Completed June 30, 1993	June 30, 1993

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REMOVAL ACTIONS

RA No. 27, Management of Contaminated Structures at the FEMP

The final EE/CA was approved June 16, 1993.

RA No. 28, Contamination at the Fire Training Facility

This removal action will address removal, decontamination and disposal, treatment or storage of all structures, tanks, equipment, the underground sump and oil/water separator, in addition to addressing "hot spots" soil staining, and any other surface soils from which a threat of migration of contamination exists.

U.S. EPA conditional approval was received August 6 and Ohio EPA disapproval was dated August 4. Responses to comments are being prepared and revisions to the work plan are being made to incorporate the comment responses. The responses and revised work plan pages will be submitted to the U.S. and Ohio EPA by September 30, 1993.

KEY MILESTONES	STATUS	DUE DATE
Submit draft Work Plan to EPA	Completed on June 29, 1993	June 30, 1993

Emergency Removal Action, Erosion Control at Inactive Flyash Pile

This "time critical" removal action is being initiated in two phases. Phase I was an interim action completed on May 4, 1993, which involved the placement of a 220-foot long rock berm along the bank of Paddy's Run Creek immediately adjacent to the Inactive Flyash Pile. This initial action was implemented to mitigate the immediate threat of erosion induced slope failure and discharge of flyash to Paddy's Run Creek. Phase II involved design activitieis to determine the final remedy and implementation of the same. Construction of the final remedy, which is an enhancement of the initional rock berm, began on August 23, 1993 and is approximately 40 percent complete.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

1.0 Operable Unit 1

Operable Unit 1, as defined in the Amended Consent Agreement, includes Waste Pits 1 - 6, Clearwell, Burn Pit, berms, liners, and soil within the operable unit boundary.

1.1 Treatability Studies

Scope:

The Operable Unit 1 treatability studies will evaluate several treatment process options identified in the Operable Unit 1 Initial Screening of Alternatives document: drying, agglomeration, polymer encapsulation, cement stabilization, and vitrification. The FEMP will evaluate the technical feasibility of these technologies through a series of experiments on both composite waste samples and individual strata samples. Where it is appropriate, the FEMP will investigate performance criteria, including formulation ranges, compressive strength, leachability, bulking factor, and permeability. Cement stabilization binding agents, including portland cement, flyash, Blast Furnace Slag, and sodium silicate, are being evaluated. Clay (attapulgite and clinoptilolite) will be added to reduce the leachability of metals in the waste. Glass formers and modifiers considered for vitrification are flyash, soil, and sodium hydroxide.

The stabilization testing was planned to be conducted in two phases. The preliminary phase, now complete, consisted of reagent range-finding experiments on a pit-by-pit basis using composite samples from individual waste pits. The advanced phase consisted of testing on strata samples where available. Each phase contained two stages permitting additional reagent testing as necessary. The advanced phase was discontinued after evaluation of preliminary phase data indicated further test work was unnecessary.

The FEMP will investigate a variety of drying methods including flash drying, rotary drying, and microwave drying. The FEMP will also test agglomeration of dried particles to reduce dusting, depending on the drying method and final particle size of the dried waste material. Polymer encapsulation will be studied using several types of low density polyethylene.

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1.1 Treatability Studies (continued)

Status:

The wet/dry and freeze/thaw durability testing for cement stabilized samples has been completed. The report on cement stabilization and vitrification studies is being prepared.

A test of polyethylene encapsulation using surrogate waste was made at a vendor test facility. The tests were very successful. Additional tests at vendor test facilities using spiked (NaCl) surrogate waste and other types of equipment are planned. Work is continuing in the on-site labs for drying and agglomeration studies.

Issues/Corrective Actions:

None to report.

1.2 Remedial Investigation

Scope:

The FEMP will prepare an RI Report in accordance with the U.S. EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA Directive 93553-01) and the approved Risk Assessment Work Plan Addendum.

Status:

The draft RI Report is presently undergoing internal peer review.

1.2 Remedial Investigation

Issues\Corrective Actions:

None to report.

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1.2 Remedial Investigation (continued)

OPERABLE UNIT 1 REMEDIAL INVESTIGATION REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants within the Operable Unit 1 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	10/12/93 C	12/11/93 C	01/10/94 C

C = Consent Agreement Date

1.3 Feasibility Study

Scope:

The Feasibility Study evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The study analyzes remedial alternatives individually against each criterion and then compares them against one another to determine their respective strengths and weaknesses and to identify the key tradeoffs that must be balanced for the site.

Status:

Work continued in preparation of the draft Feasibility Study.

1.3 Feasibility Study (continued)

The schedule remains on target to issue the draft FS Report to DOE-HQ by November 9, 1993.

The final draft of the Operable Unit 1 ARAR Report was completed and is being used in the evaluation of remedial alternatives for the FS.

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1.3 Feasibility Study (continued)

OPERABLE UNIT 1 FEASIBILITY STUDY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	03/07/94 C	05/06/94 C	06/04/94 C

C = Consent Agreement Date A = Actual

1.4 Planned Activities for September 1993

- The 90% Draft of the Treatability Study Report for Operable Unit 1 will be completed.
- Work will continue on treatability studies for drying, agglomeration, and polymer encapsulation.
- Complete revisions to the draft Operable Unit 1 RI/Baseline Risk Assessment for submittal to DOE-HQ September 24, 1993.
- A meeting with the U.S. EPA and the Ohio EPA has been scheduled for September 16, 1993, to preview the RI/Baseline Risk Assessment and FS.
- Work on the Operable Unit 1 CRARE will continue.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

2.0 Operable Unit 2

Operable Unit 2, as defined in the Amended Consent Agreement, includes the flyash piles, other South Field disposal areas, lime sludge ponds, solid waste landfill, berms, liners, and soil within the operable unit boundary.

2.1 Field Investigation

2.1.1 RI/FS Work Plan Addendum for Operable Unit 2

Scope:

DOE-FN submitted the Remedial Investigation Report for Operable Unit 2 to the U.S. EPA and Ohio EPA in October 1992. Based on December 17, 1992 review comments from the U.S. EPA and Ohio EPA on the RI Report and subsequent disapproval of the document, Operable Unit 2 will require a second phase of Remedial Investigation sampling and analysis in order to meet the objectives of the March 1988 Sitewide Remedial Investigation/Feasibility Study (RI/FS) Work Plan.

Status:

Collection and analysis of environmental samples is an integral part of the second phase of the Operable Unit 2 RI/FS. The FEMP prepared this additional Sampling and Analysis Plan in accordance with CERCLA Guidance for Conducting Remedial Investigations and Feasibility Studies.

FERMCO submitted the draft RI/FS Work Plan Addendum for Operable Unit 2 to DOE-FN on March 3, 1993. DOE-FN transmitted the Addendum to the Ohio EPA and U.S. EPA on March 8, 1993. Pursuant to the informal dispute resolution process with the U.S. EPA, the FEMP began field investigations on March 16, 1993. Field work was completed June 28, 1993.

Issues/Corrective Actions:

None to report.

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2.1 Field Investigation (continued)

OPERABLE UNIT 2 REMEDIAL INVESTIGATION REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Submit RI Report/Baseline Risk Assessment	02/18/94 C	04/15/94 C	05/13/94 C

C = Consent Agreement Date

2.2 Feasibility Study

Status:

The revised schedule for the Operable Unit 2 RI/FS program has been evaluated through the informal dispute resolution and is now finalized.

Issues/Corrective Actions:

In an effort to correct the schedule for evaluating the revised Remedial Investigation results, the RI schedule is being accelerated.

Corrective Action: Accelerate the RI schedule.

OPERABLE UNIT 2 FEASIBILITY STUDY REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	04/29/94 C	06/27/94 C	07/25/94 C

C = Consent Agreement Date

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2.3 Planned Activities for September 1993

- Complete the 100 and 500 year flood plain determinations.
- Complete a Scope of Work for the Lime Sludge Ponds/Flyash Pile Treatability Study.
- Continue work on the Feasibility Study.
- Start the development of the Geotechnical Sampling and Analysis Plan for the Solid Waste Landfill and the Operable Unit 2 disposal cell.

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3.0 Operable Unit 3

Operable Unit 3, as defined in the Amended Consent Agreement, includes the Production Area and production-associated facilities and equipment (including all above and below-grade improvements) including all structures, equipment, utilities, drums, tanks, solid waste, waste, product, thorium, effluent lines, K-65 transfer lines, wastewater treatment facilities, fire training facilities, scrap metal piles, feed stocks, and coal pile.

3.1 RI/FS Work Plan

Scope:

The RI/FS Work Plan will detail the approaches and assumptions to be applied to gathering information and the presenting results. Specifically, the Operable Unit 3 RI/FS Work Plan identifies the approach to be employed for baseline risk assessment and the specific sampling and sampling strategy to be performed during the field investigation program.

Status:

The Ohio EPA provided comments and granted conditional approval of the RI/FS Work Plan Addendum on February 16, 1993. In an April 14, 1993, letter, the U.S. EPA conditionally approved the revised Addendum, based on the comment-response package provided to the EPAs on March 19, 1993. After incorporation of the changes proposed in the comment-response package, and addressing some minor U.S. EPA concerns, the U.S. EPA provided final approval of the RI/FS Work Plan Addendum by letter of August 4, 1993.

Fourteen Field Work Packages were completed, approved, and distributed in August, with the sampling identified therein, encompassing a large extent of the samples anticipated to be taken in the first couple months of Operable Unit 3 RI/FS sampling.

Issues/Corrective Actions:

None to report.

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3.2 Field Investigation

Scope:

The Operable Unit 3 field investigation program will gather information necessary to perform a baseline risk assessment, further identify the nature of contaminants in the operable unit, refine estimates of volume of contaminated materials, and support initial screening of applicable alternatives.

Status:

The Intrusive Sampling procedure training began on August 23 and was completed on August 27 for Operable Unit 3 RI/FS Field Investigations personnel. This completes the training on screening and intrusive sampling procedures.

Field screening for chemical and metals contamination continued throughout August, using a portable X-Ray Fluorescence Analyzer and a Photo Ionization Detector. Components 20B (Water Treatment Plant), 28B (Human Resources Building), 28D (2nd Street Guard Post, 4A (Green Salt Plant), and 8D (Railroad Filter Shack) were screened.

Radiological screening to support the development of Field Work Packages continues. Components 5A (Metals Production Plant), 3G Refrigerator Building), and 39A (Incinerator Building) were screened.

The equipment storage room is stocked, secured and functioning. An inventory of the equipment has been completed.

Issues/Corrective Actions:

None to report.

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3.3 Treatability Studies

Scope:

The treatability studies gather information necessary to support remedy selection, engineering, and implementation. Specific studies will be structured to gather the information necessary for specific technologies identified through screening as part of leading alternatives.

Status:

The FEMP will conduct remedy screening treatability studies in parallel with the Field Investigation and Alternatives development. Operable Unit 3 is developing a Treatability Study Work Plan to include initially-identified studies to be performed. Current actions involve the description of planned testing for the initial studies. The plan is scheduled to be complete to meet a January 15, 1994, due date to the EPA; however, additional tests will be planned and submitted as Addendums to the Treatability Study Work Plan.

Issues/Corrective Actions:

None to report.

3.4 Remedial Investigation Report

Scope:

The Remedial Investigation Report provides a summary of the field investigations and supports the Feasibility Study by defining the nature and extent of the contaminants in Operable Unit 3, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

Status:

With the exception of planning the report content and layout, formal development of the RI has not begun.

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3.5 Feasibility Study

Scope:

The Feasibility Study evaluates alternatives in detail with respect to the nine U.S. EPA evaluation criteria. The FEMP analyzes the alternatives individually and then compares to one another to determine respective strengths and weaknesses and to identify key tradeoffs. The Feasibility Study also includes an overall assessment of site residual risks through a Comprehensive Response Action Risk Evaluation.

Status:

Operable Unit 3 has not begun formal activities on the Feasibility Study, although alternatives research and document layout planning are underway. As a result of the development of a Proposed Plan for Interim Action, the Feasibility Study will not address initial decontamination or dismantling, but will focus on treatment and disposal issues, which remain the scope of the final action.

Issues/Corrective Actions:

None to report.

3.6 Interim Action - Proposed Plan/Interim Action - Record of Decision

Scope:

The Interim Action Record of Decision (IROD) will document the preferred alternative from the Interim Action Proposed Plan/Environmental Assessment (PP/EA), as amended through public comment. The IROD draft will be submitted for U.S. EPA review and approval and, once approved, will form the basis for completing the decontamination and dismantlement action for Operable Unit 3.

Status:

The draft Interim Action PP/EA was submitted to the U.S. EPA on August 16, 1993. A draft IROD will follow U.S. EPA approval of the draft PP/EA and subsequent public comment.

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3.7 RD/RA Work Plan

Scope:

The Interim RD/RA Work Plan will detail how design activities will be performed to meet the scope of the IROD for facility decontamination and dismantlement, and how this design will then be implemented through the Remedial Action.

Status:

Annotated outline of RD/RA Work Plan is currently undergoing internal peer review.

3.8 Planned Activities for September 1993

- Continue preparation of test-specific work plans for initially identified Treatability Studies.
- Continue development of the RD/RA Work Plan for Interim Action.
- Continue writing of Field Work Packages; continue radiological and chemical screening to support the Field Work Packages.
- Continue field screening using the X-Ray Fluorescence Analyzer and a Photo Ionization Detector. Locations for intrusive media samples will be based on screening results. Continue rad screening to determine rad intrusive media locations. Intrusive media sampling is scheduled to begin for the Operable Unit 3 RI/FS Sampling on September 13, 1993. Contract laboratory availability is still the critical path to initiating sampling. Site failure to obtain the pending contract laboratory capacity for chemical and radiological sample analysis will delay intrusive sampling beyond the September 13, 1993 initiation date.

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3.8 Planned Activities for September 1993

- Group coordinators/task leaders for the development of the Remedial Design/Remedial Action Work Plan for the Proposed Plan for Interim Action will continue to finalize and expand upon the work plan outline. In particular, activities are planned for the development/refinements of an implementation strategy for the RD/RA.

- A self-assessment on the Daily Operations Unit of the Operable Unit 3 Field Investigations will be conducted.

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4.0 Operable Unit 4

Operable Unit 4, as defined in the Amended Consent Agreement, consists of Silos 1, 2, 3, and 4, the silo berms, the Decant Sump Tank System, and soil within the operable unit boundary.

4.1 Field Investigation (Sampling West of K-65 Silos 1 and 2)

Scope:

The information obtained through this additional investigation will augment the current understanding and conclusions drawn from previous sampling and analytical results which have been used to characterize the extent of contamination in the vadose zone and groundwater in the glacial overburden immediately west of the K-65 Silos 1 and 2. Two 1000-series piezometers were installed in the uppermost perched water interval in the K-65 Silos area. One lysimeter targeted the perched water zone downgradient of the Decant Sump Tank. Three lysimeters were installed in the east bank of Paddy's Run to verify that contamination from the vadose zone or perched water is not entering the stream.

Status:

Data from samples collected as a result of this program have been incorporated into the Operable Unit 4 Feasibility Study. CRU 5 will continue to monitor water levels of wells 11204, 11205, 11206, and 11207. Monitor well 11207 will be sampled if and when the well yields a sufficient volume of water.

Issues/Concerns

Data from this sampling program will be incorporated into the Operable Unit 5 RI report and into the U.S. EPA submittal of the Operable Unit 4 FS.

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4.2 Treatability Studies

Scope:

A Treatability Study Work Plan addresses the additional information that is required to support the FS and subsequent remedy selection for Operable Unit 4. There are two separate treatability studies to support the Operable Unit 4 FS. One study considers cement stabilization of Silos 1, 2, and 3 material and chemical extraction, leachate precipitation, and leachate stabilization of Silos 1 and 2 material. The second treatability study considers the vitrification of Silos 1, 2, and 3 material.

Status:

The results from the vitrification studies, the Cement Stabilization Preliminary and Advanced Phase Tests, and the Chemical Extraction test have been summarized and incorporated in Appendix C of the Operable Unit 4 Feasibility Study.

The Cement Stabilization Optional Phase Treatability testing report has been completed and is included in the Operable Unit 4 Feasibility Study as appendix H.

Issues/Corrective Actions:

None

4.3 Remedial Investigation Report

Scope:

The RI provides a summary of the field investigations and supports the FS by defining the nature and extent of the contaminants in the Operable Unit 4 study area, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

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4.3 Remedial Investigation Report (continued)

Status:

Due to extensive revisions on the baseline risk assessment and technical problems with the software used in preparation of the Operable Unit 4 RI/Baseline Risk Assessment, an additional ten day extension was requested for the submittal of the RI. The request was approved by the U.S. EPA and the RI was submitted to the USEPA on August 20, 1993.

OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants in the Operable Unit 4 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	04/19/93 A	06/18/93 C 06/24/93 A	08/20/93

C = Consent Agreement Date
A = Actual Date

4.4 Feasibility Study

Scope:

The FS evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The remedial alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses, and to identify the key tradeoffs that must be balanced for the site.

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4.4 Feasibility Study

Status:

The Feasibility Study is on schedule for submission to the U.S. EPA on September 10, 1993. A meeting was held with representatives of the U.S. EPA, the Ohio EPA, and DOE in August on proposed ARARs for Operable Unit 4. On the basis of this meeting, a followup discussion on additional data from the proposed disposal area was held. It was agreed that DOE would drill additional boring across the proposed siting area. These boring were intiated in August. All borings are anticipated to be completed by September 10, 1993.

Issues/Corrective Actions:

The Operable Unit 4 Feasibility Study will contain the first site-wide integrated FS/EIS and also the first sitewide CRARE. Presentation of the required technical information and integration with the RI/FS guidance for both documents are priority issues.

OPERABLE UNIT 4 FEASIBILITY STUDY **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

4.5 Proposed Plan

Scope:

The Proposed Plan identifies the remedial alternatives being considered for the remediation of Operable Unit 4 in the Feasibility Study for Operable Unit 4. The preferred alternative and the reasons for its selection will also be presented. The DOE and the U.S. EPA will solicit public comments on the alternatives presented including the preferred alternative.

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4.5 Proposed Plan (continued)

Status:

The draft Proposed Plan is on schedule for submission to the U.S. EPA on September 10, 1993.

Issues/Corrective Actions:

None

OPERABLE UNIT 4 PROPOSED PLAN **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Identifies potential remedial alternatives as listed in the FS and presents the preferred alternative to the U.S EPA and the public.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

4.6 Planned Activities for September 1993

- Complete incorporation of DOE comments to the draft FS/EIS/PP and submit to the U.S. EPA.
- Continue work on the Operable Unit 4 Administrative Record for the RI and FS reports.
- Commence preparing Record of Decision based on the results of the FS and Proposed Plan.
- Continue to monitor water levels for MW 11207

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4.6 Planned Activities for September 1993 (continued)

- Respond to any EPA concerns or comments on the Operable Unit 4 Draft Final Remedial Investigation Report. Communicated to DOE during September 1993. Initiate revision of Draft Final RI Report approval is received from U.S. EPA.

- Complete geometrical borings on the area of the proposed on-property disposal facility.

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5.0 Operable Unit 5

Operable Unit 5, as defined in the Amended Consent Agreement, includes: groundwater, surface water, soil not included in the definitions of Operable Units 1 - 4, sediments, flora, and fauna.

5.1 RI Field Investigation

5.1.1 Operable Unit 5 Work Plan Addenda

Scope:

Soil and perched groundwater sampling was conducted in the following areas under this program: the Plant 1 Pad, the Southeast Quadrant of the Production Area, the Fire Training Area, the KC-2 Warehouse Area, Scrap Metal Area and Electrical Substation, and the K-65 Slurry Line and Clearwell Line.

Status:

On November 30, 1992, conditional approval was received from the Ohio EPA to proceed with the field investigations. On December 2, 1992, the U.S. EPA also provided conditional approval of the Work Plan. Conditional approval from both agencies was based on the necessity to respond to specific comments which appear minor. It was determined in January 1993 to initiate field investigations for the KC-2 Warehouse Area even though comments from the regulators indicated concerns and issues that require further resolution.

The responses to the additional comments from the Ohio EPA and U.S. EPA were transmitted to the EPAs in July. The FEMP received concurrence from the EPAs on the majority of the responses in August. The Work Plan Addenda will be revised and transmitted in September.

Nearly all the field work for this task has been completed. The remaining work is scheduled to be completed by October 1, 1993.

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5.1 RI Field Investigation (continued)

5.1.2 Additional Operable Unit 5 Field Investigation Tasks

The scope and rationale for the following site characterization programs were presented to DOE-FN, DOE-HQ, U.S. EPA, and Ohio EPA at Technical Information Exchange meetings on April 1 and April 20, 1993:

- FEMP Trap Shooting Range Investigation
- Great Miami Riverbank Investigation
- Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation
- Surface and Subsurface Soil Sampling
- Additional Monitoring Well Installation and Well Abandonment
- Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling
- FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation

The draft Project Specific Plans (PSPs) for these programs have been completed and submitted to DOE and EPA. U.S. EPA and Ohio EPA comments have been received on all seven PSPs. Response to comments (RTC) documents have been prepared to address comments for all seven PSPs. Five of the seven RTC documents have been transmitted to the EPAs. The RTC documents for the FEMP Trap Shooting Range Investigation and the Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation will be transmitted to the EPAs in September.

A status and comment resolution meeting with the Agencies was held on August 26. Responses to Agency comments on five of the seven PSPs and the Operable Unit 5 Addenda were discussed. Responses were satisfactory to the EPAs with relatively few minor exceptions. The PSPs will be revised based on the RTC once formal EPA concurrence is received.

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5.1 RI Field Investigation (continued)

Status:

FEMP Trap Shooting Range Investigation

The initial field work for this task was completed in July. Soil samples are currently undergoing sieve analysis at the on-site laboratory. Based on the results of the sieve analysis, samples will be submitted to a RI/FS contract laboratory for more detailed analysis as specified in the Work Plan.

Great Miami River Bank Investigation

Field work for this project was complete on August 7.

Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation

Sampling specified in the PSP was completed in June. Daily flow measurements at two weirs and a drainage pipe in this area were completed in mid-July. The flow data is currently being evaluated to further quantify the variability of the components to the flow in the ditch. Collection of additional surface water samples is planned for the headwaters of this ditch to further quantify the source of contamination in the ditch.

Surface and Subsurface Soil Sampling

All field work outlined in the PSP for this project was complete on August 11.

Additional Monitoring Well Installation and Well Abandonment

The installation of 20 new wells originally planned for this program was complete in July. Installation of the five additional wells in the Waste Storage Area and one of the three Type 1 replacement piezometers in the northeast part of the former production area has been completed.

Seven wells (1350, 1174, 1004, 1072, 1030, 1037, and 3084) are scheduled to be plugged and abandoned for this task. This work is expected to begin in September 1993.

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5.1 RI Field Investigation (continued)

Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling

The FEMP has sampled all original snapshot monitoring wells capable of yielding sufficient water for sampling. All surface water and sediment sampling has been completed.

FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation

As of August 27, 73 of 78 slug tests have been performed. The remaining five wells have been deleted from the program because they did not contain enough water to run the slug test. The slug test portion of the project is complete. A yield test in Well 11214 will be performed to replace the yield test for Well 1785. If Well 11214 yields a sufficient amount of water, it will be used as a pump test well. The packer assembly has been tested and found to be working properly. Drilling for the lysimeters and the packer testing program is expected to be completed during September.

5.1.3 Abandonment and Plugging of KC-2 Warehouse Well No. 67

The project has been halted until analytical results are available. When the results are available, the FEMP will confer with the EPAs to determine the most appropriate path forward for this removal action. DOE-FN has prepared a draft letter to DOE-HQ on this project status.

Issues/Corrective Actions:

None to report.

5.2 Treatability Study

Scope:

The Treatability Study provides information to support the Feasibility Study and subsequent remedy selection for Operable Unit 5. Specifically, the study will demonstrate the feasibility of soil washing as a remedial technology for cleaning soil in Operable Unit 5. The study incorporates a physical separation/chemical extraction

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5.2 Treatability Study (continued)

process that initially involves separating a soil into different particle-size fractions. The process uses reagent formulas in the washing solutions to extract radionuclides and organic and inorganic compounds from these different-size fractions. The contaminants may be separated from the wash stream into a concentrated residue for further treatment. The study consists of two phases: (1) remedy screening Stages 1 and 2, involving laboratory and bench-scale tests; and (2) remedy selection using pilot-scale equipment. Soils from three different areas will be used in these investigations. These soils are from the following areas: incinerator area (ID-A), Plant 1 Pad Area (ID-B), and maintenance building area (OU5-A).

Status:

The FEMP installed the skids containing the major portion of the soil washing pilot plant equipment in April 1993. During May, The FEMP made modifications/ additions to address safety issues were addressed, and then installed the centrifuge, which is the last major piece of equipment. The FEMP trained supervisors and technicians for the operation of the pilot plant. Documents completed in support of startup of the soil washing pilot plant included the health and safety plan, environmental compliance plan and the risk management plan.

IT Corporation submitted the data from the remedy screening tests for the ID-A and ID-B soils on April 12, 1993. The data from the OU5-A soil was received in the middle of May. The FEMP is preparing a summary report of the data. Results from these bench-scale studies were used to provide the initial operating conditions for startup of the remedy selection soil washing pilot plant. Initial operating conditions include physical separation processes followed by chemical extraction with dilute inorganic acid at elevated temperatures. The test system is designed to include spent extractant treatment.

The soil washing pilot plant began processing radiologically contaminated ID-B soil on June 8. A second run of soils from the incinerator area was subsequently completed. Results from the initial sample analysis performed in the FERMCO onsite laboratory were summarized and the mass balance calculated. FERMCO is preparing an evaluation of the data. This satisfies the requirement in the Operable Unit 5 Soil Washing Treatability Work Plan for completion of Stage I and Stage II work.

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5.2 Treatability Study (continued)

A soil treatability laboratory is currently being established at Fernald to support pilot plant testing and further bench testing of other reagents. Government-owned laboratory and testing equipment from IT's ETDC facility in Oak Ridge has been shipped to Fernald and is currently being installed in the on-site laboratory.

The FEMP began design and programming of a database to accommodate Operable Unit 5 remedy screening and remedy selection data. The database is being designed to also accommodate soil washing treatability test data from Lockheed Environmental and Oak Ridge National Laboratory. These soil washing test programs have been conducted in parallel to the Operable Unit 5 study under the umbrella of the DOE Treatability Integrated Demonstration program.

A Technical Information Exchange meeting is planned for September 22, 1993, to discuss the above program and the overall FEMP treatment of soils.

5.3 Remedial Investigation (RI)

Scope:

The Remedial Investigation (RI) is the mechanism for collecting data to characterize site conditions, determining the nature of the Site's wastes, determining the nature and extent of contamination, and assessing baseline risk to human health and the environment.

Status:

Remedial Investigation data compilation and evaluation continues. All data sources to be included are being identified and evaluated. Chemical and radiological data collected as part of both the RI/FS and other site sampling programs are being posted on maps and evaluated. The FEMP is compiling, evaluating, and updating the geologic and hydrogeologic information contained in RI/FS site files and documents. Existing maps and cross sections are being updated where additional information has become available. New maps and cross sections of the glacial overburden have been and continue to be generated. The FEMP is now reviewing the preliminary versions of Sections 1, 2, and 3 of the RI report.

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5.3 Remedial Investigation (RI) (continued)

The FEMP began a significant data validation effort in January, and it became fully operational in February. The effort identified a backlog of nearly 8,000 RI/FS samples requiring validation. Validation of the majority of the backlog samples was completed in June. Remaining validation, quality control, and formatting of the validated data base are continuing. Additional validated data will be added to the data base throughout this Summer and Fall as validation is completed on supplemental data from non-RI/FS programs, new programs, and laboratory data that has been received since the beginning of 1993.

Downloading of data from the Sitewide Environmental Database to Operable Unit 5 staff began for the high priority previous RI/FS tasks. The high priority tasks are: Surface Soils, Subsurface Soils, Surface Water/Sediment, Groundwater, and Facilities Testing. Work began on splitting up the high priority data download into a format suitable to support Sections 4, 5, and 6 of the RI report.

Responses to U.S. EPA and Ohio EPA comments on the Groundwater and Surface Water Background report were finalized. DOE-FN transmitted the responses to the EPAs. Preparation of an ecological risk screening study based on U.S. EPA, Region V guidelines was completed. The screening study was transmitted to both the U.S. EPA and Ohio EPA.

Issues/Corrective Actions:

Attenuation/release characteristics of uranium contamination at the FEMP are an issue that has not been resolved in RI/FS studies to date. DOE is developing a site-wide strategy for addressing the attenuation/release characteristics of uranium. In addition to summarizing all the existing information from previous studies (i.e., EWMF and soil washing treatability studies), this strategy will determine the overall approach and necessary laboratory experiments to define the following data:

- Extractable portions of uranium in the waste materials;
- K_d values for the waste materials based on the total contaminant mass or the extractable mass only; and
- Aerial and vertical distributions of K_d values for contaminants in the media outside the contaminant source areas.

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5.3 Remedial Investigation (continued)

Preliminary experimental procedures have been developed and waste materials have been collected from the Operable Unit 2 waste units. The first batch of experiments began in late June. Before this information is available, conservative assumptions and literature values will be used for RI/FS activities (i.e., Operable Unit 4 and Operable Unit 1 RI/FS and CRARE).

Operable Unit 2 has completed the laboratory tests for uranium K_d values based on the total uranium mass. Samples were taken from waste materials as well as from the media outside the contaminant source areas of each Operable Unit 2 sub-unit. Analytical data from these laboratory tests are currently under data validation processes. Additional tests to measure the extractable portions of uranium are currently underway. The expected completion date for the Operable Unit 2 K_d and extractable portion study is the end of September. Tests for Operable Unit 4 waste materials are also being conducted. Procedures and preliminary results of these studies will be presented and discussed with U.S. EPA and Ohio EPA in the September or October Technical Information Exchange meeting.

Operable Unit 4 and Operable Unit 1 have used available perched water and soil data as well as results of previous geochemical studies done by IT and ORNL to define attenuation/release characteristics in the RI/FS and CRARE activities.

As part of the site-wide strategy, Operable Unit 5 will collect additional soil samples for further defining attenuation/release characteristics of uranium during the soil washing treatability studies. The results of Operable Unit 5 studies will be available in November.

5.4 Planned Activities for September 1993

- Complete field work for all of the RI characterization programs.
- Resolve all U.S. EPA, Ohio EPA, and internal comments related to the present field programs.
- Complete the site strategy on determining attenuation/release characteristics for uranium. Present this strategy to the EPAs.
- Continue work on RI report, Sections 1, 2, and 3. Continue compiling and evaluating historic data in support of the RI report.

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5.4 Planned Activities for September 1993 (continued)

- Continue validation of the laboratory data from the present field programs and from supplemental non-RI/FS programs.
- Continue to divide the validated data base by media to support work on Sections 4, 5, and 6 of the RI report.
- Continue work on Sections 4, 5, and 6 of the RI report.
- Resolve EPA comments on the following reports that were submitted to the Agencies in May: "Characterization of Background Water Quality for Streams and Groundwater"; "Groundwater Modeling Evaluation Report and Improvement Plan"; and "Groundwater Modeling Report - Summary of Modeling Development."
- Complete sampling specified in the Operable Unit 5 Work Plan Addenda.
- Revise the Operable Unit 5 Work Plan Addenda to reflect final comment resolutions.
- Complete comment responses to the Ohio EPA and U.S. EPA comments on the Work Plan Addendum for the Outfall Line. Revise the Work Plan to reflect final comment resolutions.
- Confer with the EPAs to determine the path forward for the KC-2 Warehouse Well No. 67 Removal Action.

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6.0 On-Site Disposal Cell

The Engineered Waste Management Facility (EWMF) scope has been modified to evaluate the On-Site Disposal Cell (OSDC) alternatives along with the complete evaluation of off-site alternatives. All further reference to the EWMF will be entitled OSDC.

The technical approach for the evaluation will be based on a information previously developed for the EWMF. This information is being expanded to include the development of engineering assessment to evaluate the On-Site Disposal/Storage, Off-Site Disposal, and Transportation Risk Assessment for Off-Site Disposal. The information generated by these technical reports and the reports that will be generated from the information gathered for the EWMF Siting Report will serve as a basis for evaluating the disposal options and alternatives.

6.1 EWMF General Siting Report

Scope:

The EWMF Siting Report was scoped to evaluate the feasibility of locating an EWMF facility at the FEMP. The intent was to deliver all of the information necessary to meet the requirements in a singular document. In order to expedite the delivery of the technical information, the report has been subdivided into six stand-alone technical reports. The technical reports will be identified as follows with the appropriate scope:

- Geotechnical Engineering Analysis for an On-Site Disposal Cell - This report will contain the engineering analysis prepared for the EWMF structure. This will include an analysis of the barrier and cap design, drainage system, erosion analysis, slope stability analysis and an estimated cost of construction for an on-site tumulus. The report will be entitled, "Technical Report 5.1A, Engineering Evaluation Report for On-Site Disposal".

- Site Characterization Report - This report will include the investigation and evaluation of the site geology, radiation measurements, well installation diagrams, boring logs, and analytical data. This report will be entitled "Technical Report 5.1B, Site Characterization/Geological Report for On-Site Disposal".

- Material Source Survey - This report will discuss the availability and cost of materials in the local area required to construct the OSDC. This report will be entitled "Technical Report 5.1C, Material Source Survey for On-Site Disposal".

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6.1 EWMF General Siting Report (continued)

- ARARs Report - This report will identify and discuss the ARARs that will be applicable to the construction of an OSDC. This report will be entitled "Technical Report 5.4, ARARs for On-Site Disposal Cell Concept".

- Survey of Local Geology in the Alternate Siting Areas - This report will cover the investigation of two alternative sites for the OSDC adjacent or near the FEMP situated on bedrock highs. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3A, Geological Report for Off-Site Disposal".

- Ecological Characterization - This report will discuss the ecological characterization of the two off-site locations. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3B, Ecological Characterization of the Off-Property Disposal Cell Study Area".

Status:

All six technical reports have been completed. These reports will be incorporated into the appropriate FS reports as needed. The risk-based evaluation of an on-site disposal cell containing treated wastes has been delayed pending further review.

Issues/Corrective Actions:

None to report.

6.2 Planned Activities for September 1993

None to report.

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7.0 Community Relations

Status

The Fernald Advisory Committee has changed its name to the "Fernald Citizens Task Force". Convener Dr. Eula Bingham has completed her work, except for participating in the orientation activities and facilitating the first meeting. Dr. Bingham submitted a list of nominees and a draft charter to DOE, U.S. EPA, and Ohio EPA on August 4. DOE issued invitation letters to the nominees on August 23. An orientation and a retreat for the Task Force are scheduled for September.

On August 9, 127 salaried and 70 represented employees received a 60-day notice of layoff. In addition, 62 salaried employees elected to voluntarily retire or resign.

DOE-HQ Office of Technology Development held a workshop August 16-17 in Augusta, Georgia, for leaders from communities near DOE sites with integrated demonstration projects. The purpose of the workshop was to bring community leaders from across the country together to talk one-on-one with DOE Headquarters. Four participants from the Fernald community attend the 2-day workshop.

On August 16, the Operable Unit 3 Proposed Plan/Environmental Assessment for Interim Remedial Action and the corresponding fact sheet was submitted to U.S. EPA for first draft review and placed in the Public Environmental Information Center.

DOE-FN is preparing to hold a public planning workshop which will allow community residents to address issues associated with the Fernald Roadmap. The draft Roadmap issues and assumptions were mailed to interested stakeholders on August 18. Also, briefings were given at local township meetings and at the FRESH meeting in August. A news release was issued along with announcements placed in three local newspapers.

On August 12, DOE-FN met with FRESH members, the Crosby Township Trustees, and representatives of the Hamilton County Public Works and the Cincinnati Water Works to discuss the public water system The meeting was held to inform local residents who will receive free hookups to the system.

The Community Environmental Education Course initiated last year at DOE-FN has a new title -- Science, Technology, the Environment, and the Public (STEP). It is designed to be a "gateway to participation" for local residents, Fernald employees, and other stakeholders in the issues at Fernald. The goal of the STEP program is to encourage and facilitate public participation in the decision-making process at Fernald. Several meetings for opinion leaders, Fernald workers, and the public have been scheduled in September, October and November.

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7.0 Community Relations (continued)

DOE-FN representatives attended the monthly FRESH meeting, held August 26, 1993. Twenty members of the community attended the meeting. Topics included:

- Status of the Fernald Citizens Task Force
- Public Water Supply Update
- 1992 Site Environmental Report available
- Information on the upcoming DOE Roadmap Workshop on September 8 and the STEP sessions beginning September 14

Issues/Corrective Action

None.

Planned Activities for September 1993

- Effective September 6, J. Phillip Hamric will become the manager of the DOE Fernald Field Office. Mr. Hamric comes to Fernald from the DOE's Richland Field Office where he was deputy manager with oversight of conduct of operations at Hanford.

- The DOE Roadmap Workshop on September 8 will allow the public to help DOE frame issues relating to environmental restoration that need resolution at DOE-HQ.

- Many activities are scheduled in September for the newly-formed Fernald Citizens Task Force: a tour of the Fernald site on the 9th; a retreat and orientation at Miami University on the 18th; and, the first meeting is scheduled for September 28.

- DOE submits its initial draft of the Operable Unit 4 Feasibility Study to U.S. EPA on September 10.

- The STEP Program will conduct its first and second sessions on September 14 and September 21.

- The monthly FRESH meeting is scheduled for September 23.

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ENCLOSURE A

WASTEWATER FLOWS AND RADIONUCLIDE CONCENTRATIONS UNDER CA SECTION XXIII.B

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Introduction

The accompanying Effluent Radiation Reports provide, in accordance with the requirements of Section XXIII.B of the Consent Agreement As Amended under CERCLA Sections 120 and 106 (a), data on the daily wastewater flows, radionuclide concentrations, and loadings released to the Great Miami River and an estimate of runoff and radionuclide concentrations to Paddy's Run during August 31 1993.

Summary - August 1993

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 1I000004001) was 12.03 kilograms. The average uranium concentration for the previous 12 months was 0.59 mg/L. This is 66.3% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

There was no discharge from the Stormwater Retention Basin (Outfall 1I000004002) to Paddy's Run via the Storm Sewer Outfall Ditch in August 1993. Based on 2.82 inches of rainfall in August 1993, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.01 kilograms.

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

Location: 1I000004001 Month: August 1993
001 Total Discharge
Manhole 175 (Effluent to the Great Miami River)

Day	Flow (MGD)	Total Alpha (pCi/L)	Total Beta (pCi/L)	Total U (mg/L)	Total U (kgs)	Calculated Total U-238 (pCi/L) (1)
1	0.148	50	104	0.01	0.01	3
2	0.342	81	149	0.03	0.04	10
3	0.461	77	221	0.15	0.26	51
4	0.465	81	126	0.06	0.11	20
5	0.232	54	95	0.01	0.01	3
6	0.345	54	113	0.06	0.08	20
7	0.233	41	41	0.01	0.01	3
8	0.212	203	194	0.11	0.09	37
9	0.202	63	36	0.01	0.01	3
10	0.247	59	54	0.01	0.01	3
11	0.315	77	63	0.04	0.05	14
12	0.840	207	63	0.21	0.67	71
13	1.462	171	36	0.18	1.00	61
14	1.362	158	95	0.24	1.24	81
15	1.056	189	32	0.22	0.88	74
16	0.266	86	131	0.10	0.10	34
17	0.421	18	113	0.05	0.08	17
18	0.441	279	95	0.12	0.20	41
19	0.425	189	95	0.12	0.19	41
20	0.328	95	72	0.03	0.04	10
21	0.298	81	81	0.04	0.05	14
22	0.210	63	81	0.01	0.01	3
23	0.322	171	99	0.04	0.05	14
24	0.913	198	144	0.25	0.86	84
25	1.361	410	158	0.26	1.34	88
26	1.375	369	135	0.27	1.40	91
27	1.251	252	68	0.22	1.04	74
28	1.340	207	63	0.21	1.06	71
29	0.597	153	54	0.19	0.43	64
30	0.273	234	198	0.06	0.06	20
31	0.777	293	126	0.23	0.68	78
TOTAL	18.520				12.03	

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON -222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month August 1993

	Flow (MGD)	Total Alpha (pCi/L)(2)	Total Beta (pCi/L)(2)	Total U (mg/L)(2)	Total U (kgs)	Calculated Total U-238 (pCi/L)(1)(2)
Avg.	0.597	198	97	0.17	0.39	58
Max.	1.462	410	221	0.27	1.40	91
Min.	0.148	18	32	0.01	0.01	3

The average uranium concentration for the previous twelve months was 0.59 mg/L. This is 66.3% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

Comments:

(1) The activity of this discharge has been and will continue to be reported as Uranium-238 (pCi/L) in accordance with the Ohio EPA format for reporting uranium. Since this does not account for the activity of the other uranium isotopes in the effluent, the total uranium data is also presented. The calculated total U-238 is based on a conversion factor of 337.84 pCi U-238/mg Total U applied to measure value of total uranium.

(2) Average values presented are flow-weighted.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

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

Month: August 1993

There was no discharge to Paddy's Run from the Stormwater Retention Basin.

Based on 2.82 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.01 kgs.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING AUGUST 31, 1993

ENCLOSURE B

FFCA: INITIAL REMEDIAL MEASURES

AND OTHER OPEN ACTIONS

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period August 1 through August 31, 1993, that are not covered by the reporting requirements of the Consent Agreement As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 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 ongoing work in support of the Federal Facility Compliance Agreement (FFCA) is summarized in Table 1 of Enclosure B. Completed work previously reported upon has been eliminated for the sake of brevity. 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 - Status information on the K-65 Silo project normally reported in this section is being provided under Operable Unit 4: Silos 1-4.

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

   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 As Amended under CERCLA Sections 120 and 106(a).

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

3. Reports and Record Keeping

Section B

The RI/FS Monthly Technical Progress Report for July 1993 was transmitted to the U.S. EPA on August 20, 1993, as an integral part of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report in accordance with the requirements of Section X of the Consent Agreement As Amended.

CLEAN AIR ACT (CAA)

Section E

The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.

RADIATION DISCHARGE INFORMATION

Section A

This information will now be submitted on an annual basis as part of the FEMP Annual Site Environmental Report.

REPORTING REQUIREMENTS

Section B

The Federal Facility Compliance Agreement Monthly Progress Report for July 1993, was transmitted to the U.S. EPA on August 20, 1993, as Enclosure B of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report.

TABLE 1

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

AUGUST 31, 1993

ACTION	DESCRIPTION	COMPLETION TIME AFTER FFCA SIGNED	FY1992 STATUS
CERCLA			
1.	INITIAL REMEDIAL MEASURES		
1.C	Implement radon control plan approved by the U.S. 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.
2.	REMEDIAL INVESTIGATION/FEASIBILITY STUDY		No action required.
2.A	RI/FS work is to be conducted in accordance with the U.S. EPA guidelines.	N/A	
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 As Amended under CERCLA Sections 120 and 106(a).
2.E	Amend and submit revised RI/FS Work Plan to U.S. 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 As Amended under CERCLA Sections 120 and 106(a).
2.F	Implement tasks described 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 As Amended under CERCLA sections 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 July 1993 was transmitted to the U.S. EPA on August 20, 1993.
CLEAN AIR ACT			
B.4	Prepare annual progress report installation and replacement of emission control devices.	yearly	The Fifth Annual Progress Report on the installation and replacement of emission control devices was transmitted to the U.S. EPA on March 9, 1993 (DOE-1305-93).

TABLE 1

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

AUGUST 31, 1993

C.	Provide annual reports to the U.S. EPA per 40 CFR 61.94(c).	yearly	The Annual NESHAP Compliance Report for CY1992 was transmitted to the U.S. EPA on June 28, 1993 (DOE-2281-93).
D.1	Provide U.S. EPA with yearly stack-testing schedule.	yearly	The 1989 stack testing schedule was transmitted to the U.S. EPA on June 16, 1989. A letter (DOE-1615-89) was transmitted to the U.S. EPA on September 15, 1989, indicating that, due to the uncertainty concerning resumption of production at the FEMP, the 1989 FFCA Stack Testing Program was being deferred. In August 1991, the DOE confirmed that no further production would take place at the facility, and renamed the facility the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
D.2	Provide U.S. EPA with stack-test results for stacks tested that year.	45 days	Because the FEMP has been out of production since mid-1989, there was no opportunity to perform stack testing. The DOE, in August 1991, confirmed that no future production will take place at the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
E.1	Maintain records of monthly particulate matter emissions.	------	Ongoing.
E.2	Provide quarterly reports to U.S. EPA on these emissions.	------	The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.
RCRA			
A.1	Conduct a hazardous waste determination on all waste streams.	30 days	Complete. Pursuant to the Proposed Amended Consent Decree, a RCRA waste evaluation was conducted on all identified waste streams pertaining to the PACD.
A.2	Commence a hazardous waste analysis program for materials in the landfill and going to the incinerator.	30 days	Complete. Operation 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.

TABLE 1

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

AUGUST 31, 1993

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 I of the RCRA Part B Permit Application transmitted to the Ohio EPA and the U.S. EPA on March 26, 1993 (DOE-1471-93). Facility closure will be completed on a date the last TSD unit is closed.
RADIATION DISCHARGE INFORMATION			
A.3	Report to U.S. EPA, Ohio EPA and Ohio Department of Health the results of the continuous liquid discharge samples.	yearly	The twenty-first Quarterly Discharge Report for the period October through December 1991 was transmitted to the U.S. EPA on February 20, 1992 (DOE-941-92). This information will now be reported on an annual basis.
REPORTING REQUIREMENTS			
B.	Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.	monthly	July's FFCA Monthly Progress Report was transmitted to the U.S. EPA on August 20, 1993.

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING AUGUST 31, 1993

ENCLOSURE C

FEDERAL FACILITY AGREEMENT:
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

Introduction

The Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA), signed November 19, 1991, requires that a monthly report be submitted to the U.S. EPA regarding all steps undertaken in the preceding month to implement Part V of the agreement and that all data generated as a result of those actions be submitted.

Enclosure C fulfills those requirements by describing steps taken at the FEMP during the period August 1 through August 31, 1993, to implement Part V, Radon-222 Control and Abatement Plan, paragraphs 19-33 of the FFA-CARE.

After four months of data collection for the applicable parameters, preparation is now underway to evaluate the data for use in the Transport Release Models.

Work Assignments and Progress

In this section of Enclosure C, action descriptions and work progress are presented in a format consistent with that of the FFA-CARE. Immediately following this section are the K-65 Silos Report and the Selected Radon Data Report. Reporting this data is also a requirement included in the U.S. EPA approved Silos 1 and 2 Removal Action Work Plan (Removal Action No. 4).

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 19 & 21	Implement the K-65 Silos 1 and 2 Removal Action in accordance with the approved Silos 1 and 2 Removal Action Work Plan.	12/1/91	Completed. Installation of the bentonite completed 11/28/91.
Part V, 20	Reduce radon-222 to a level As-Low-As Reasonably-Achievable (ALARA) with the goal as specified in the Silos 1 and 2 Removal Action Work Plan.	5/22/92	Completed. Concentrations offsite remain well below performance goal of removal action.
Part V, 22	Submit proposed methodology for estimating radon-222 concentration reductions resulting from completion of the Silos 1 and 2 Removal Action.	Within 60 days of completing removal action; 1/27/92.	The Bentonite Effectiveness Environmental Monitoring Plan was resubmitted to the U.S. EPA for comment and approval on 3/13/92. EPA approval was received on 4/24/92. DOE has prepared a revision to the methodology. Comment responses to the U.S. EPA's disapproval of the revised methodology is under way.
Part V, 23	Evaluate performance of the removal action and determine whether or not additional actions are needed prior to final remediation.	None specified.	Methodology for estimating radon-222 concentration reduction submitted to U.S. EPA per paragraph 20 of Part V. The first Bentonite Effectiveness Environmental Monitoring Report was issued to the U.S. EPA on 5/22/92. DOE submitted a revision to the methodology to the U.S. EPA on 12/17/92. Comment responses to the U.S. EPA's disapproval of the revised methodology is under way.

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FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 24, 25, and 33	Demonstrate compliance with NESHAP Subpart Q at the completion of final remediation using a methodology approved by the U.S. EPA. Applicable to: Silos 1, 2, and 3; Waste Pits 1, 2, 3, 4, and 5 and the Clearwell; and any newly discovered radon-222 emission sources.	None specified.	No information to report for August 1993.
Part V, 26	Directly measure radon-222 flux from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	Radon sampling is complete for Pits 1, 2, and 3. All measurements were below the criteria set by the U.S. EPA. A final report was issued to the U.S. EPA on 6/25/92. A letter was received from the U.S. EPA on 10/16/92 giving approval of the proposed method for measuring the radon flux from Pit 4. The letter also stated that since the Clearwell is water covered, and Pit 5 is nearly 100% water covered, the flux from Pit 5 and the Clearwell may be assumed to be zero.
Part V, 26	Include direct measurement data from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	See above.
Part V, 27	Estimate radon-222 emissions from Silo 3 based upon characterization data; include the estimated radon-222 emission data from Silo 3 in the RI/FS that includes Silo 3 under the CERCLA Consent Agreement.	None specified.	Completed. An estimate of radon flux from the K-65 Silo 3 was submitted to the U.S. EPA on 12/17/91. Radon flux for the silo was estimated to be above 20 pCi/m^2-s.
Part V, 28	Submit documentation or estimates of current radon-222 emissions from existing but newly discovered sources that contain radium-226 in sufficient concentrations to emit radon-222 in excess of NESHAP Subpart Q prior to final remediation.	Within 30 days of discovery.	No new sources identified.

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FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 30	Submit methodology for direct measurement or other appropriate means of characterization of the relevant emissions pursuant to paragraph 29 of the FFA.	Within 45 days of the U.S. EPA response pursuant to paragraph 29.	None required.
Part V, 31	Submit results of measurements pursuant to paragraph 30.	Within 30 days of U.S. EPA approval of characteriz ation method.	None required.
Part VI, 31	Submit monthly report on steps undertaken to implement Part V of the FFA-CARE and the data obtained in the preceding month.	20th day of succeeding month.	The progress report being submitted herewith as an integral part of the CERCLA Consent Agreement Monthly Progress Report.

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending August 31, 1993

Data Reporting Requirements: RA No. 4: Silos 1 and 2

As defined in the Silos 1 and 2 Removal Action Work Plan and the Federal Facility Agreement, data associated with monitoring the effectiveness of the bentonite installation are included in the following tables: the K-65 Silos Report and the Selected Radon Data Report.

The K-65 Silos Report includes data on the following parameters:

- Ambient temperature and pressure near the silos.
- Silos 1 and 2 headspace temperature.
- Silos 1 and 2 differential pressure.
- Silos 1 and 2 radon headspace concentration.
- Silos 1 and 2 headspace humidity

The Selected Radon Data Report includes radon data from the following locations:

- Air monitoring station number 5 (AMS-5)
- Air monitoring station number 6 (AMS-6)
- Pilot Plant
- Background data
- K-65 Monitoring Data (K-65 NW, K-65 SW, K-65 NE, K-65 SE).

The radon data submitted in Enclosure C: Radon Data for the K-65 Removal Action and in all previous consent agreement status updates is considered to be draft. The radon data, although collected by qualified technicians using detailed procedures, was not obtained in a manner which would withstand a rigorous validation process. The various field and laboratory procedures are currently being reviewed and modified to be in accordance with the conditionally approved Site-Wide CERCLA Quality Assurance Project Plan (SCQ). Once the sampling and analysis procedures have been modified and approved, along with specific validation protocols, suspect radon data will either be qualified or rejected.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING AUGUST 31, 1993

ENCLOSURE D

DRILLING/BORING LOGS

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

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K-65 SILO REPORT

LOCATION: Silo # 1 DATE: August 1993

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
1	72.7	29.35	67.1	*	0.001	329510
2	75.5	29.31	67.5	*	0.001	161188
3	70.2	29.47	67.3	*	0.000	191730
4	69.1	29.54	67.2	*	-0.000	154587
5	64.4	29.57	66.7	*	-0.001	231212
6	67.5	29.40	66.5	*	-0.001	230651
7	67.9	29.51	66.4	*	-0.000	138241
8	69.4	29.65	66.2	*	0.000	195800
9	72.2	29.67	66.4	*	0.001	279940
10	69.5	29.56	66.5	*	-0.000	294999
11	77.1	29.53	66.5	*	0.002	350115
12	68.1	29.43	66.7	*	-0.029	415425
13	74.1	29.41	66.4	*	-0.010	185827
14	76.9	29.50	66.6	*	0.002	327156
15	76.5	29.50	67.0	*	0.002	385658
16	73.9	29.43	67.2	*	0.030	381904
17	75.2	29.42	67.3	*	0.028	363978
18	75.9	29.47	67.5	*	0.002	282636
19	76.5	29.46	67.7	*	0.002	406196
20	75.1	29.40	67.9	*	-0.022	218923
21	71.2	29.48	67.7	*	0.000	120410
22	71.7	29.49	67.5	*	0.001	277055
23	77.6	29.44	67.7	*	0.002	408138
24	79.1	29.46	68.2	*	-0.001	312500
25	78.0	29.59	68.5	*	-0.004	306563
26	79.7	29.62	68.7	*	0.002	355060
27	79.7	29.53	68.9	*	0.002	398991
28	75.9	29.48	69.1	*	0.018	342552
29	76.7	29.47	68.9	*	0.043	375405
30	79.2	29.43	69.0	*	0.002	366880
31	75.7	29.41	69.1	*	0.001	279804
ARITHMETIC MEAN	73.9	29.48	67.5	*	0.002	292549
MAXIMUM	79.7	29.67	69.1	*	0.043	415425
MINIMUM	64.4	29.31	66.2	*	-0.029	120410
MEDIAN	75.2	29.47	67.3	*	0.001	306563

Note: * – Silo #1 Relative Humidity was inoperable, default value = 0.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

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FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT

LOCATION: Silo # 2 DATE: August 1993

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
1	72.7	29.35	66.0	93.6	-0.010	2987160
2	75.5	29.31	66.5	93.9	-0.010	2790621
3	70.2	29.47	66.2	93.8	-0.010	2817807
4	69.1	29.54	66.2	94.1	-0.010	2907763
5	64.4	29.57	65.7	94.4	-0.009	2930709
6	67.5	29.40	65.4	94.1	-0.010	2990403
7	67.9	29.51	65.3	93.8	-0.010	2913998
8	69.4	29.65	65.2	93.7	-0.010	2881408
9	72.2	29.67	65.4	93.7	-0.010	2884650
10	69.5	29.56	65.4	94.1	-0.010	2851146
11	77.1	29.53	65.4	95.1	-0.010	2917241
12	68.1	29.43	65.6	95.9	-0.066	2985414
13	74.1	29.41	65.3	95.5	-0.025	2968538
14	76.9	29.50	65.6	95.3	-0.010	2892465
15	76.5	29.50	65.9	95.1	-0.011	2890054
16	73.9	29.43	66.2	94.7	0.007	2813318
17	75.2	29.42	66.3	93.9	0.006	2812403
18	75.9	29.47	66.4	93.6	-0.011	2859625
19	76.5	29.46	66.6	93.8	-0.011	2878248
20	75.1	29.40	66.9	93.7	-0.026	2886812
21	71.2	29.48	66.7	93.6	-0.011	2787296
22	71.7	29.49	66.5	94.2	-0.010	2892133
23	77.6	29.44	66.6	93.8	-0.011	2933287
24	79.1	29.46	67.1	93.3	-0.012	2823461
25	78.0	29.59	67.3	93.2	-0.010	2907585
26	79.7	29.62	67.6	93.3	-0.011	2981673
27	79.7	29.53	67.8	93.2	-0.011	2987553
28	75.9	29.48	67.9	93.0	0.023	2974024
29	76.7	29.47	67.8	93.2	0.037	3034383
30	79.2	29.43	67.9	93.3	-0.011	3029810
31	75.7	29.41	67.9	93.5	0.004	2980182
ARITHMETIC MEAN	73.9	29.48	66.4	94.0	-0.009	2909393
MAXIMUM	79.7	29.67	67.9	95.9	0.037	3034383
MINIMUM	64.4	29.31	65.2	93.0	-0.066	2787296
MEDIAN	75.2	29.47	66.3	93.8	-0.010	2907585

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

MONTH:AUGUST
YEAR: 93

FACILITY: Fernald Environmental Management Report
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

SELECTED RADON DATA REPORT
(Monthly Summary of Selected Sampling Locations)

Daily Averages:	AMS-5 (pCi/L)	AMS-6 (pCi/L)	PILOT PLANT (pCi/L)	BKGD (pCi/L)
08/01/93	1.5	1.3	1.0	(b)
08/02/93	0.6	0.7	0.5	(b)
08/03/93	1.3	1.2	0.9	(b)
08/04/93	0.8	0.8	0.6	(b)
08/05/93	1.1	1.0	0.6	(b)
08/06/93	1.1	1.1	0.9	(b)
08/07/93	1.2	1.0	0.8	(b)
08/08/93	1.9	1.5	1.2	(b)
08/09/93	1.8	1.5	1.1	0.5 (b)
08/10/93	1.4	1.4	1.1	1.0
08/11/93	1.2	1.1	0.7	0.8
08/12/93	1.4	1.2	0.9	0.7
08/13/93	0.7	0.7	0.4	0.6
08/14/93	1.4	1.2	0.9	0.9
08/15/93	1.7	1.4	1.1	1.0
08/16/93	1.1	1.0	0.8	0.7
08/17/93	0.6	0.6	0.4	0.5
08/18/93	1.6	1.3	0.9	0.8
08/19/93	1.3	1.4	1.1	1.0
08/20/93	0.7	0.7	0.6	0.6
08/21/93	0.8	0.9	0.6	0.6
08/22/93	1.0	1.0	0.7	0.8
08/23/93	1.6	1.3	1.3	1.0
08/24/93	1.1	1.0	0.8	0.6
08/25/93	1.1	1.0	0.7	0.9
08/26/93	1.9	1.6	1.2	1.1
08/27/93	1.7	1.6	1.1	1.1
08/28/93	1.4	1.4	1.0	1.0
08/29/93	1.3	1.3	1.0	1.0
08/30/93	1.8	1.7	1.2	1.1
08/31/93	1.4	1.3	0.9	0.8

Monthly Averages:	AMS-5 (pCi/L)	AMS-6 (pCi/L)	PILOT PLANT (pCi/L)	BKGD (pCi/L)
AVERAGE:	1.3	1.2	0.9	0.6
MAXIMUM:	1.9	1.7	1.3	1.1
MINIMUM:	0.6	0.6	0.4	0.5
MEDIAN:	1.3	1.2	0.9	0.8
STD. DEV.:	0.4	0.3	0.2	0.4

STANDARD LEGEND:

1. "(a)" indicates censored data due to erroneous readings.
2. "(b)" indicates data loss due to monitor malfunction.
3. "(c)" indicates operator error in programming monitor.
4. "(d)" indicates partial data loss due to relocation of monitor.

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

MONTH:AUGUST
YEAR: 93

FACILITY: Fernald Environmental Management Report
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

SELECTED RADON DATA REPORT
(Monthly Summary of Selected Sampling Locations)

Daily Averages:	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
08/01/93	2.1	2.0	7.8	2.8
08/02/93	1.1	0.9	2.3 (a)	1.3
08/03/93	1.6	1.7	2.9	1.7
08/04/93	1.2	1.2	2.4	1.8
08/05/93	1.5	1.6	3.3	2.0
08/06/93	1.5	1.6	4.3	2.6
08/07/93	1.6	1.6	2.7	1.7
08/08/93	2.0	2.2	3.5	2.3
08/09/93	2.4	2.3	3.9	2.3
08/10/93	2.1	2.4	3.6	2.2
08/11/93	1.8	2.0	2.1	1.5
08/12/93	2.2	2.4	4.6	2.3
08/13/93	1.4	1.9	1.2	0.9
08/14/93	1.8	2.0	2.5	1.8
08/15/93	2.7	2.5	5.3	2.9
08/16/93	1.7	1.6	2.6	1.7
08/17/93	1.2	1.1	2.1	1.4
08/18/93	2.1	2.5	3.4	2.3
08/19/93	2.0	2.1	3.8	2.3
08/20/93	1.3	1.2	2.1	2.0
08/21/93	1.3	1.5	1.4	1.4
08/22/93	1.8	1.7	2.1	1.6
08/23/93	2.1	2.3	6.0	2.8
08/24/93	1.6	1.6	3.1	1.7
08/25/93	1.5	1.5	2.9	1.8
08/26/93	2.2	2.4	4.1	2.4
08/27/93	2.3	2.4	4.1	2.3
08/28/93	2.1	2.0	2.8	2.3
08/29/93	2.1	2.0	3.0	2.4
08/30/93	2.6	2.6	4.1	2.7
08/31/93	2.3	2.3	2.9	2.2

Monthly Averages:	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
AVERAGE:	1.8	1.9	3.3	2.0
MAXIMUM:	2.7	2.6	7.8	2.9
MINIMUM:	1.1	0.9	1.2	0.9
MEDIAN:	2.0	2.0	3.1	2.2
STD. DEV.:	0.4	0.4	1.3	0.5

STANDARD LEGEND:

1. "(a)" indicates censored data due to erroneous readings.
2. "(b)" indicates data loss due to monitor malfunction.
3. "(c)" indicates operator error in programming monitor.
4. "(d)" indicates partial data loss due to relocation of monitor.

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT
RADON CONCENTRATIONS

MONTH: AUGUST 1993 REPORT GENERATED: 09/07/93

Daily Summary of Recorded Headspace Concentrations
(recorded at 5 minute intervals)

	SILO 1				SILO 2			
Date	Average	Maximum	Minimum	Std. Dev.	Average	Maximum	Minimum	Std. Dev.
08/01/93	329,510	600,782	61,061	139,081	2,987,160	3,268,330	2,406,360	161,787
08/02/93	161,188	620,813	17,047	148,927	2,790,621	3,172,560	1,879,590	247,352
08/03/93	191,730	658,070	31,204	132,496	2,817,807	3,100,730	2,190,860	185,914
08/04/93	154,587	500,567	33,163	117,853	2,907,763	3,076,780	2,406,360	101,173
08/05/93	231,212	525,219	20,898	154,091	2,930,709	3,076,780	2,190,860	101,606
08/06/93	230,651	601,509	48,070	155,202	2,990,403	3,292,280	2,597,910	107,569
08/07/93	138,241	455,947	16,361	102,320	2,913,998	3,052,840	2,669,740	69,898
08/08/93	195,800	470,280	15,096	159,256	2,881,408	3,052,840	2,645,790	65,157
08/09/93	279,940	617,104	26,074	173,498	2,884,650	3,028,900	2,573,960	85,203
08/10/93	294,999	538,343	32,528	158,908	2,851,146	3,076,780	1,831,700	215,413
08/11/93	350,115	749,593	62,982	154,619	2,917,241	3,052,840	2,502,130	80,685
08/12/93	415,425	620,813	79,343	159,119	2,985,414	3,100,730	2,502,130	96,369
08/13/93	185,827	616,314	15,729	177,095	2,968,538	3,124,670	2,741,570	73,636
08/14/93	327,156	554,442	41,591	160,112	2,892,465	3,028,900	2,645,790	61,479
08/15/93	385,658	588,987	35,070	175,026	2,890,054	3,052,840	2,573,960	83,665
08/16/93	381,904	729,004	8,040	165,987	2,813,318	3,028,900	1,783,820	207,153
08/17/93	363,978	625,256	95,073	160,788	2,812,403	3,004,950	1,664,100	166,806
08/18/93	282,636	620,813	43,502	165,958	2,859,625	3,004,950	2,334,520	118,471
08/19/93	406,196	634,948	23,485	197,874	2,878,248	3,052,840	2,502,130	89,850
08/20/93	218,923	718,370	20,265	161,703	2,886,812	3,172,560	2,214,810	115,485
08/21/93	120,410	477,523	17,680	110,960	2,787,296	3,028,900	2,166,920	152,284
08/22/93	277,055	608,906	22,799	218,333	2,892,133	3,028,900	2,430,300	85,183
08/23/93	408,138	720,669	53,230	183,551	2,933,287	3,076,780	2,693,680	79,613
08/24/93	312,500	611,880	56,478	156,543	2,823,461	3,076,780	1,640,150	207,697
08/25/93	307,798	549,289	35,758	180,745	2,907,929	3,052,840	2,717,630	63,667
08/26/93	355,060	531,776	53,230	149,565	2,981,673	7,410,620	2,669,740	405,575
08/27/93	398,991	707,760	56,478	148,033	2,987,553	3,100,730	2,765,510	56,434
08/28/93	342,552	731,308	64,956	161,764	2,974,024	3,148,610	1,807,760	169,740
08/29/93	375,405	611,880	57,810	179,121	3,034,383	3,148,610	2,885,230	50,258
08/30/93	366,880	622,274	48,070	172,956	3,029,810	3,172,560	2,669,740	95,989
08/31/93	279,804	618,563	56,478	148,690	2,980,182	3,172,560	2,382,410	142,680

Grab Samples of Headspace

Date	SILO 1 Concentration	SILO 2 Concentration
08/02/93	468,000	3,397,000
08/06/93	57,000	3,512,000
08/09/93	264,000	1,935,000
08/13/93	79,000	3,384,000
08/17/93	42,000	2,694,000
08/20/93	33,000	3,785,000
08/24/93	579,000	2,949,000
08/27/93	793,000	3,475,000

NOTES: 1. All values reported in pCi/L.

PROJECT NUMBER: 50-03-22	PROJECT NAME: CERCLA Additional		
BORING NUMBER: 302T	COORDINATES:		#49
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	0535	21	6	Hard 2.5Y(7/4) pale yellow clay w/trace gravel, dry, no plasticity	CL	>4.5	M= BL=
		8/4	0	No Recovery	NA	NA	M= BL=
			0	No Recovery	NA	NA	M= BL=
	0545	50	4	Hard 2.5Y(7/4) pale yellow clay w/trace gravel, dry, no plasticity	CL	>4.5	M= 0 BL= 0
	0545	50	0	No Recovery	NA	NA	M= NA BL= NA
		50	0	No Recovery	NA	NA	M= NA BL= NA

NOTES:

Drilling Contractor: Sullivan Drilling

Drilling Equipment: Bucyrus Erie

Driller: Chris Carter, Bill Shaw

Samples collected per ASTM standard practice

Colors identified using Munsell Color Chart

SA- Same as above
NA- Not applicable

Blows: M=Moist, BL=Below Grade

PROJECT NUMBER: 50.03.99	PROJECT NAME: [illegible]
BORING NUMBER: 302T	COORDINATES:
ELEVATION:	GWL: Depth Date/Time: 4916
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time:
DRILLING METHODS: Cable Tool	

DATE: [illegible]
DATE STA[illegible]
DATE CO[illegible]
PAGE [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	0850 1125	43	6	Hard 2.5Y(6/4) Lt yellowish brown clay w/ little sand & gravel, no plasticity	CL	>4.5	M= [illegible] B= [illegible]
	0850 1125	50	3	SAD	CL	>4.5	M= [illegible] B= [illegible]
		50	0	No Recovery	NA	NA	M= NA B= NA
	0855 1125	31	6	Hard 2.5Y(6/4) Lt yellowish brown silty clay w/ gravel no plasticity, dry	CL	>4.5	M= [illegible] B= [illegible]
	0855 1125	37	2	SAA	CL	>4.5	M= 0 ppm B= 40 ppm
		34	0	No Recovery	NA	NA	M= NA B= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Berkshire Fall
Driller: Chris Cantin, Bill Shaut

SAA - Same [illegible]
NA - Not [illegible]

Samples collected per ASTM [illegible]

Colors identified using Munsell [illegible] Chart

Blank: M= 0 ppm B= 40-60 ppm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-H Additional Wells		
BORING NUMBER: 302T	COORDINATES:		DATE: [illegible]
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: [illegible]
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: [illegible]
DRILLING METHODS: Cable Tool			PAGE 3 OF [illegible]

-4916

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
	CPC 110-[illegible]	37	6	V. Stiff. 2.5Y(4/3) Olive Brown silty clay w/gravel, no plasticity, dry	CL	[illegible]	PA = 0 ppm BK = 60 cpm
	CPC 110-[illegible]	42	3	SAA	CL	3.25	PA = 0 ppm BK = 60 cpm
		28	0	No Recovery	NA	NA	PA = NA BK = NA
	CPC 110-[illegible]	22	6	V. Stiff. 2.5Y(4/4) Lt. Olive Brown gravelly clay, low plasticity, dry.	CL	3.75	PA = 0 ppm BK = 50 cpm
	CPC 110-[illegible]	17	3	SAA	CL	[illegible]	PA = 0 ppm BK = 50 cpm
		12	0	No Recovery	NA	NA	PA = NA BK = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkbile ESU

Driller: Chris Carter, Bill Short

SAA - Same as above
NA - Not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Blank: PA = 0 ppm BK = 40-60 cpm

0081

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-5 Kalamazoo		
BORING NUMBER: 302T	COORDINATES: -4916		DATE
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED
DRILLING METHODS: Cable Tool			PAGE H

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	CCE 1 19-22	17	6	Hard. 10YR(5/6) Yellowish Brown Clay w/ trace silt no plasticity, dry - mottled w/ gray	Cl	>4.5	MA= BZ=
	CCE 2 19-24	24	6	SAA	Cl	>4.5	MA= BZ=
		33	0	No Recovery	NA	NA	MA= NA BZ= NA
	CCE 3 19-26	23	6	Hard. 2.5Y(5/4) Light Olive Brown Sandy Clay no plasticity dry	Cl	>4.5	MA= 0ppm BZ= 60ppm
	CCE 4 19-28	22	6	SAA	Cl	>4.5	MA= 0ppm BZ= 60ppm
	CCE 5 19-30	40	3	SAA. with black ? & iron oxide	Cl	>4.5	MA= 0ppm BZ= 60ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhart Erie

Driller: Chris Cantin, Bill Short

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell soil chart

Blank: MA=0 ppm BZ=40-60 ppm

PROJECT NUMBER: 50.08.22	PROJECT NAME: CRU-K Additional		
BORING NUMBER: 302T	COORDINATES: -4916		DATE:
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	1025 / 1963 / 1030	10	6	Hard, 2.5Y(5/4) Lt. Olive Brown gravelly clay, no plasticity CL4	CL	>4.5	PH= BZ=
	1035 / 1969 / 1040	19	6	SAA	CL	>4.5	PH= BZ=
15	1050 / 1970 / 1055	25	4	SAA	CL	>4.5	PH= 0ppm BZ= 50ppm
	1060	6	0	No Recovery	NA	NA	PH= NA BZ= NA
19		0	0	No Recovery	NA	NA	PH= NA BZ= NA
		21	0	No Recovery	NA	NA	PH= NA BZ= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhart Fell

Driller: Gene Carlton, Bill Sibon

SA- same as above
NA- not applicable

Samples collected per USTM standard penetration test

Colors identified using Munsell color chart

Bkgd: PH=20 ppm BZ=40-60 ppm

PROJECT NUMBER: [illegible] | PROJECT NAME: [illegible]

BORING NUMBER: 302T | COORDINATES: [illegible] | DATE [illegible]

ELEVATION: | GWL: Depth: Date/Time: | DATE ST[illegible]

ENGINEER/GEOLOGIST: D. O'Brien | Depth: Date/Time: | DATE CO[illegible]

DRILLING METHODS: Cable Tool | PAGE [illegible]

-4916

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	1050 1940 2100	8	6	V. Stiff 2.5Y(6/1) Gray gravelly clay, low plasticity Dry.	CL	3.0	PH= [illegible] BK= [illegible]
		12	0	No Recovery	NA	NA	PH= [illegible] BK= [illegible]
		16	0	No Recovery	NA	NA	PH= [illegible] BK= [illegible]
		5	0	SAA	NA	NA	PH= [illegible] BK= [illegible]
		9	0	SAA	NA	NA	PH= NA BK= NA
		7	0	SAA	NA	NA	PH= [illegible] BK= [illegible]

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhart Erie

Driller: Chris Cautter, Bill Short

Samples collected per ASTM [illegible]

Colors identified using Munsell [illegible]

SAA- same as above

NA- not applicable

Field PH = [illegible] BK = [illegible]

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-K Additional Wells		
BORING NUMBER: 302T	COORDINATES:		DATE: 1/29/93
ELEVATION:	GWL: Depth	Date/Time 4910	DATE STARTED: 1/28
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 1/31
DRILLING METHODS: Cable Tool			PAGE 7 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1400 1402 1403	8	6	V. Stiff 2.5Y(5/1) Gray gravelly clay, low plasticity dry.	CL	2.0	PH = 0ppm BG = 60cpm
		11	0	No Recovery	NA	NA	PH = NA BG = NA
		13	0	No Recovery	NA	NA	PH = NA BG = NA
	1410 1412 1414	11	6	Stiff 2.5Y(5/1) Gray gravelly clay, low plasticity dry	CL	1.5	PH = 0ppm BG = 60cpm
		12	0	No Recovery	NA	NA	PH = NA BG = NA
		14	0	No Recovery	NA	NA	PH = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkbile Rig

Driller: Gene Caulkin, Bill Schust

Sh - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: PH = 0 ppm BG = 40-60 cpm

PROJECT NUMBER: 50.03.22		PROJECT NAME: [illegible]	
BORING NUMBER: 302T		COORDINATES:	DATE:
ELEVATION:		GWL: Depth: Date/Time: 4916	DATE STARTED:
ENGINEER/GEOLOGIST: D. O'Brien		Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE: X

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	
	0800 1904 1905	2	6	V stiff, 2.5Y 4/1 Gray gravelly clay w/ sand no plastic, slightly moist	CL	4.0	PH= BK=
		NA	0	No Recovery	NA	NA	PH= NA BK= NA
		NA	0	No Recovery	NA	NA	PH= NA BK= NA
	0755 1906 1907	17	6	M. Dense, 2.5Y 4/1 Gray gravelly sand w/ clay, wet, gleyed, wet.	SW	NA	PH= 0 ppm BK= 40 cpm
	0755 1908 1909	17	6	SAA	SW	NA	PH= 0 ppm BK= 40 cpm
		NA	0	No Recovery	NA	NA	PH= NA BK= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkbigler Rig

Driller: Chris Carter, Bill Schirf

SAA - Same as above
NA - Not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: PH = 0 ppm BK = 40-60 cpm

PROJECT NUMBER: 50-08-22		PROJECT NAME: CRU-K Additional	
BORING NUMBER: 302T		COORDINATES: -4910	DATE:
ELEVATION:		GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: D. O'Brien		Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE:

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	0.0 / 1050 / 1060	7	6	Dust 2.5Y(5/1) Gray sandy gravel well graded, wet. Hard 2.5Y(5/1) Gray gravelly clay, no plasticity, dry	GW / CL	NA / 4.5	M= BK=
	0.0 / 1960 / 1965	20	2	Hard 2.5Y(5/1) gray gravelly clay, no plasticity, dry	CL	4.5	M= BK=
25		30	0	No Recovery	NA	NA	M= NA BK= NA
	0.0 / 1969 / 1969	12	6	V. Stiff 2.5Y(5/1) Gray, clay w/gravel, no plasticity dry	CL	3.5	M= 0 ppm BK= 40 ppm
30		20	0	No Recovery	NA	NA	M= NA BK= NA
		30	0	No Recovery	NA	NA	M= NA BK= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkshire Erie

Driller: Chris Carter, Bill Shurt

Blank: M= 0 ppm BK= 40-60 ppm

SA- Same as above
NA- Not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell color chart

PROJECT NUMBER: 50-03-29	PROJECT NAME: CRS [illegible]
BORING NUMBER: 302T	COORDINATES: -4916
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time
DRILLING METHODS: Cable Tool	

DATE:
DATE STA:
DATE COM:
PAGE:

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	1000 / 1912 / 7/30/91	20	6	Hard 2.5Y(5/1) Gray gravelly clay, no plasticity, dry	CL	4.0	MA= BG=
	1000 / 1921 / 7/30/91	48	6	SAA	CL	4.25	MA= BG=
25	300 / 1926 / 7/30/91	48	5	SAA	CL	4.0	MA= 0 ppm BG= 40-50 ppm
	1515 / 1932 / 7/30/91	7	4	SAA	CL	4.0	MA= 0 ppm BG= 40-50 ppm
30		12	0	No Recovery	NA	NA	MA= NA BG= NA
		15	0	No Recovery	NA	NA	MA= NA BG= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Barkley's Erie
Driller: Chris Carter
Bill Smart

SAA - same as above
NA - not applicable

Samples collected per ASTM [illegible] procedures

Colors identified using Munsell [illegible]

Blank: MA=0 ppm BG=40-50 ppm

PROJECT NUMBER: 50.02.22	PROJECT NAME: CRU-15 National		
BORING NUMBER: 302T	COORDINATES:		DATE: 11/5/92
ELEVATION:	GWL: Depth	Date/Time 4916	DATE STARTED: 11/5/92
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 11/5/92
DRILLING METHODS: Cable Tool			PAGE 11 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	HHX 1419-24 1420-27	10	6	V. Stiff 2.5Y(5/1) Gray gravelly clay, no plasticity dry.	CL	2.5	PH= 0 ppm BZ= 100 ppm
	HHE 1422-25 1423-27	17	12	SAA	CL	2.75	PH= 0 ppm BZ= 100 ppm
31		22	0	No recovery	NA	NA	PH= NA BZ= NA
	1515 1430-32 1430-33	10	6	Hard 2.5Y(5/1) Gray gravelly clay, no plasticity dry	CL	4.5	PH= 0 ppm BZ= 100 ppm
33	1535 1432-34 1433-37	15	6	SAA	CL	4.5	PH= 0 ppm BZ= 100 ppm
		30	0	No recovery	NA	NA	PH= NA BZ= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Erie

Driller: Chris Cantin, Bill Sibert

SAA- same as above
NA- not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: PH= 0 ppm BZ= 40-100 ppm

PROJECT NUMBER: [illegible] | PROJECT NAME: [illegible]

BORING NUMBER: 3821 | COORDINATES: [illegible] | DATE: [illegible]

ELEVATION: [illegible] | GWL - Depth [illegible] Date/Time 4916 | DATE STARTED: [illegible]

ENGINEER/GEOLOGIST: D. O'Brien | Depth Date/Time | DATE COMPLETED: [illegible]

DRILLING METHODS: Cable Tool | PAGE: [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	0915 119625 1100	39	6	V. Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity dry	CL	2.5	MA= [illegible] BS= [illegible]
		50/5	0	No Recovery	NA	NA	MA= NA BS= NA
30			0	No Recovery	NA	NA	MA= NA BS= NA
	0935	5	0	SAA	NA	NA	MA= NA BS= NA
35		16	0	SAA	NA	NA	MA= NA BS= NA
		27	0	SAA	NA	NA	MA= NA BS= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkshire Rig

Driller: Chris Coulter, Bill Sibert

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: MA = [illegible] ppm BS = [illegible] ppm

PROJECT NUMBER: 50-0822	PROJECT NAME: CRS 49 Fo		
BORING NUMBER: 302-T	COORDINATES:		DATE:
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE:

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1826 1829 1/4/93	0	6	V. Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity, dry.	CL	3.25	MA= BA=
37		21	0	No Recovery	NA	NA	MA= NA BA= NA
		27	0	No Recovery	NA	NA	MA= NA BA= NA
39	1830 1833 1/4/93	10	6	V. Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity, dry	CL	3.0	MA= 0ppm BA= 100ppm
	1835 1838 1/4/93	23	6	SAA	CL	3.0	MA= 0ppm BA= 100ppm
		31	0	No Recovery	NA	NA	MA= NA BA= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhalter Rig

Driller: Chris Carlton, Bill Schmitt

SAA- same as above
NA- not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Blank: MA= 0 ppm BA= 40-60 ppm

PROJECT NUMBER: [illegible] | PROJECT NAME: CRU-5 Additional

BORING NUMBER: 302T | COORDINATES: | DATE: [illegible]

ELEVATION: | GWL - Depth: Date/Time: | DATE STARTED: [illegible]

ENGINEER/GEOLOGIST: D. O'Brien | Depth: Date/Time: | DATE COMPLETED: [illegible]

DRILLING METHODS: Cable Tool | PAGE: [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	345 / 19632 / 4003	12	4	Hard 2.5Y(5/1) Gray, gravelly clay, low plasticity slightly moist	CL	4.5	M= [illegible] BZ= [illegible]
		DK	0	No Recovery	NA	NA	M= BZ=
10		6	0	No Recovery	NA	NA	M= NA BZ= NA
	1400 / 27022 / 4003	15	6	Dark 10YR(4/4) DK yellow brown mottled w/ gray silt & clay, dry	ML	NA	M= 0 ppm BZ= 400 ppm
11		17	0	No Recovery	NA	NA	M= NA BZ= NA
		19	0	No Recovery	NA	NA	M= NA BZ= NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkshire Erie

Driller: Chris Cautin, Bill Short

Samples collected per ASTM standard practice D1586

Colors identified using Munsell color chart

SA - Sample attempted
NA - Not applicable

Blank: M= 0 ppm BZ= 40-400 ppm

PROJECT NUMBER: [illegible] | PROJECT NAME: CRU [illegible]

BORING NUMBER: 309.1 | COORDINATES: | DATE: [illegible]

ELEVATION: | GWL - Depth: | Date/Time: | DATE STARTED: [illegible]

ENGINEER/GEOLOGIST: D. O'Brien | Depth: | Date/Time: 49 16 | DATE COMPLETED: [illegible]

DRILLING METHODS: Cable Tool | PAGE: 15

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	HIC 12 TCC 4 1/2 B3	14	36	V. Dark O.YR (5YR) Yellowish brown med. to coarse grained ~~gravel~~ to 3/4 in. sand w/gravel poorly graded. dry	SP	NA	M= 0 ppm BZ= 10-10 ppm
		24	0	No Recovery	NA	NA	M= NA BZ= NA
43		27	0	No Recovery	NA	NA	M= NA BZ= NA
				Begin SA sampling			M= BZ=
44							M= BZ=
							M= BZ=

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkbile Ersu

Driller: Chris Cautis, Bill Short

SA- same as above
NA- not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: M= 0 ppm BZ= 10-10 ppm

0032
0033

PROJECT NUMBER: 5095-01 | PROJECT NAME: [illegible]

BORING NUMBER: 302 | COORDINATES: | DATE: [illegible]

ELEVATION: | GWL: Depth: Date/Time: | DATE STARTED: [illegible]

ENGINEER/GEOLOGIST: D. O'Brien | Depth: Date/Time: 49 | DATE COMPLETED: 06 [illegible]

DRILLING METHODS: Cable Tool | PAGE: 1 of [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
46.5	1425 / 1700 / 1402	50 / 50 / 3	4	V. Dark. 10YR(2/1) Medium brown med. to coarse sand w/gravel poorly graded, dry	SP	NA	M+ = [illegible] BS = [illegible]
50	1510 / 1700 / 1403	18 / 27 / 39	5	V. Dark. SAA	SP	NA	M+ = NA BS = NA
55	0915 / 1700 / 1404	50/5	3	V. Dark. 10YR(2/1) Medium brown fine to med. sand w/gravel poorly graded, dry	SP	NA	M+ = 0ppm BS = 40ppm

NOTES:

Drilling Contractor: Environmental Drilling

Drilling Equipment: Buckeye Fall

Driller: Chris Carter, Bill Sibert

SAA: same as above
NA: not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: M+ = 0ppm BS = 40-40ppm

PROJECT NUMBER: [illegible]		PROJECT NAME: [illegible]	
BORING NUMBER: 3021		COORDINATES:	DATE [illegible]
ELEVATION:		GWT: Depth: Date/Time	DATE STARTED [illegible]
ENGINEER/GEOLOGIST: D. O'Brien		Depth Date/Time 49 1 6	DATE COMPLETED [illegible]
DRILLING METHODS: Cable Tool			PAGE [illegible]

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61.3	0930 12000 [illegible]	12 [illegible]	OC	V. Dark [illegible] Silty Brown Sand poorly graded Cay	SP	NA	[illegible]
75	1410 12000 [illegible]	12 37 35	5	V. Dark [illegible] Fine Medium poorly graded Sand	SP	NA	PH = 0 ppm BS = 40 cpm
76	1440 12000 [illegible]	[illegible]	16	Silt, [illegible]	SP	NA	PH = 0 ppm BS = 40 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Fall

Driller: Chris Coulter

Bill Sibert

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

Bkgd: PH = 0 ppm BS = 40-40 cpm

SAA: same as above
NA: not applicable

PROJECT NUMBER: [illegible] | PROJECT: [illegible]

BORING NUMBER: 36[illegible]-1 | COORDINATES: [illegible]

ELEVATION: [illegible] | GWL: Depth: [illegible] Date/Time: [illegible]

ENGINEER/GEOLOGIST: D. O'Brien & [illegible] | Depth: [illegible] Date/Time: 49 1.5 | DATE: [illegible]

DRILLING METHODS: Cable Tool | PAGE: [illegible]

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	[illegible]
76.5	1400 27009 B 3 min 85	9 11 15	18	M. Dense 2.5Y(5/1) Gray no to coarse sand w/gravel, well graded, wet	SW	NA	M [illegible]
80	1400 27010 8-1-13	10 14	18	SAA	SW	NA	Mt = 0ppm Bz = 100ppm
81.5							
88							
90	[illegible] By 8-1-13			No Sample			Mt = NA Bz = NA
93.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Edu

Driller: Chris Coulter

Bill Sibert

SAA: same as above
NA: not applicable

Samples collected per ASTM standard practice

colors identified using Munsell Soil Color Chart

Bz = Mt = 0ppm Bz = HC = 100ppm

BORING [illegible] COORDINATES [illegible]

ELEVATION [illegible] GWL Depth [illegible] Date/Time [illegible]

ENGINEER/GEOLOGIST D. O'Brien, B. [illegible] Water Depth [illegible] Date/Time [illegible]

DRILLING METHODS Cable Tool [illegible] 49-18 PAG[illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FOOT	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	[illegible]
9.15	0905 127012 8-9-93	6 19 33	16	V. Dense, 2.5Y(5/1) Gray, med. to crse sand w/ gravel, well graded, wet	SW	NA	
9.5	0920 127014 8-9-93	37 44 50/3	[illegible]	V. Dense. SAA	SW	NA	M[illegible] R[illegible]
10.5							
10.0	0955 127015 8-9-93	13 37 50/3	14	SAA	SW	NA	M[illegible]=0ppm R[illegible]=[illegible]ppm
10.5							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Buckeye Ecu

Driller Chris Coulter

Bill Sibert

SAA - same as above

NA - not applicable

Samples collected per ASTM standard

Colors identified using Munsell

Rinse: M[illegible]=0ppm R[illegible]=40-60ppm

ELEVATION:

COORDINATES:

ENGINEER/GEOLOGIST: D. Graham

DRILLING METHODS: Cable Tool

-49.16

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	
	1420	34 38 42	0	No Recovery			
106.5	3/1065				NA	NA	
110	1520	20					
	2/017	25	15	Dark 2.5Y(3/1) Gray fine sand poorly graded. wet.	SP	NA	M BA
111.5	3/0193	16					
				Begin continuous sampling at 114.0 ft See next page.			
114							
115							
116.5							M BA

NOTES.

Drilling Contractor: Associated Drilling

Drilling Equipment: Buckeye Ecu

Driller: Chris Coulter

Bill Sibert

SAA: same as above

NA: not applicable

Samples collected per ASTM standard

colors identified using Munsell

Rkg: M = ppm BA = HC + HCppm

0098

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 30.03.22	PROJECT NAME: CRU-K Additional Wells		
BORING NUMBER: 3027	COORDINATES:	DATE: 8/1	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED:	
ENGINEER/GEOLOGIST: DeBruin Drilling	Depth / Date/Time	DATE COMPLETED:	
DRILLING METHODS: Cable Tool		PAGE 21	

-49 16

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	[illegible]
115	0840 127019 8/12/93	17 26 29	18	V. Dense. 5Y(4/3) Olive, medium sand, trace fine gravel, well graded, wet	SW	NA	Mt = 0 BZ = 0
116	0855 127020 8/12/93	7 14 23	18	Dense. 5Y(3/1) V. dark gray medium sand, trace gravel well graded, wet.	SW	NA	Mt = 0 BZ = 0
117	0925 127021 8/12/93	14 30 39	3	SAA, V. Dense.	SW	NA	Mt = 0 BZ = 0
118	0930 8/12/93	6 19 32	0	No Recovery	NA	NA	Mt = NA BZ = NA
119	0955 8/12/93	100/5	2	V. Dense. 2.5Y(3/1) Gray coarse gravel, poorly graded, wet.	SP	NA	Mt = 0 BZ = 0
120	1010 127022 8/12/93	42 42 37	8	V. Dense. 2.5Y(3/4) Lt. olive brown med. to fine sand, poorly graded, wet	SP	NA	Mt = 0 BZ = 40 ppm
121	1030 127024 8/12/93	60/6	6	SAA	SP	NA	Mt = 0 ppm BZ = 40 ppm
122				Resume 5 ft sampling at 130.0 ft.			
123							

NOTES

Drilling Contractor: Arrowhead Drilling

Drilling Equipment: Buckhorn Drill

Chris Coulter

Bill Sikes

SAA - Same as above

NA - not applicable

Samples collected per [illegible] protocol

Colors identified using [illegible] Color [illegible]

BORING NO. [illegible] | COORDINATES

ELEVATION [illegible] | DATE [illegible]

ENGINEER/GEOLOGIST: Dobson | Depth [illegible] | Date/Time [illegible]

DRILLING METHODS: Cable Tool | [illegible]

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY IN SITU	
131.5	100 / 0902 / 1/17/93	4	4	V. Dens. 2.54(5.6) Lt. olive brown fine sand, poorly graded, wet	SP	NA	[illegible]
136	0910 / 12/23/ 1/17/93	16 / 23	15	Dens. 2.54(5.1) Gray medium to fine sand, poorly graded, wet	SP	NA	[illegible]
140	1515 / 12/23/ 1/17/93	13 / 23	7	Dens. 2.54(5.1) Gray medium to coarse sand, well graded, wet	SW	NA	Mt. 0ppm BR=10ppm
141.5							

NOTES.

Drilling Contractor: Pennsylvania Drilling — SAA - Sample [illegible] NA - Not [illegible]

Drilling Equipment: Pickens Frame — Samples collected per ASTM standard [illegible]

Driller: Chris Coulter

Bill Sibert — Colors identified using [illegible]

Bkgd: Mt = 0ppm BR = 10-10ppm

FEERNSD DRILLING

INSTALLATION

MONITORING WELL

302

TOP OF PROTECTIVE WELL COVER

INNER WELL CAP

MEASUREMENT NOTCH

CONCRETE PAD

TOP OF RISER: 2.0

49 16

DEPTH

CEMENT: 1.0 FT.

VOLCLAY GROUT: 107.9 FT.

BENTONITE SEAL: NA FT.

SAND PACK: 32.6 FT.

SCREEN: 10.0 FT.

BOTTOM OF CEMENT: 1.0 FT.

BOTTOM OF PROTECTIVE WELL COVER: 2.X FT.

TOP OF BENTONITE SEAL: NA FT.

TOP OF SAND PACK: 107.9 FT.

TOP OF SCREEN: 114.0 FT.

BOTTOM OF SCREEN: 124.0 FT.

PIEZOMETER TIP: 121.0 FT.

BOTTOM OF BORING: 141.5 FT.

BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 11 bag 4/20, 13 bag 10/20

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 29 bags

AMOUNT OF CEMENT: 1 bag

AMOUNT OF WATER USED: 100 gallon

OTHER: 2H soil, 1 water drums

TASK: 20.03.22

NOTES

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.10 IN. SLOTS.

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.

GEOLOGIST/ENGINEER: D.O'Brien

4) WATER DEPTH AND DATE: [illegible] FT. 2/6/22

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

0101

NSI FORM 01ST REV. 101

PIEZOMETER INSTALLATION SHEET

PROJECT NAME [illegible] FIELD [illegible]
PROJECT NO. [illegible] CHECKED BY [illegible]
BORING NO. 3027
PIEZOMETER NO. 3027 DATE OF INSTALLATION [illegible]

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Shoe Bit
DRILLING FLUID (S) USED	CASING SIZE (S) USED
FLUID H_2O FROM 0.0 ft TO 10.0 ft	SIZE 5.0 in FROM 0.0 ft
FLUID ____ FROM ____ TO ____	SIZE ____ FROM ____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL Blue Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 in	RISER PIPE DIAMETERS
PERFORATION TYPE:	O.D. 4 3/8 in I.D. [illegible]
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10 ft [illegible]
AVERAGE SIZE OF PERFORATIONS 0.010 in	JOINING METHOD Flush joint
TOTAL PERFORATED AREA 10.0 ft	Threaded

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: Cement				
GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 108.9	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP 108.9	BOTTOM 141.5	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 114.0	BOTTOM 124.0	TOP	BOTTOM
BOTTOM OF BOREHOLE	124.0			
GWL AFTER INSTALLATION	141.5			
	101.1 ft			

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

FERNALD
RI/FS

4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23		
BORING NUMBER: 2429	COORDINATES:	DATE: 7-28-93	
ELEVATION:	GWL: Depth 79.2 Date/Time 7-28-93	DATE STARTED:	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.6 Date/Time 8-7-93	DATE COMPLETED:	
DRILLING METHODS: Cable Tool		PAGE 1	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				See MW 3429 for description			
74.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sycum
Helper : Mark Riebodt

SAA = Same As Above
N/A = Not Applicable
Background = NA

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04-39		PROJECT NAME: RCRA Phase I	93 Update
BORING NUMBER: MW 2429		COORDINATES:	DATE: 7-27-93
ELEVATION:		GWL: Depth 79.2 Date/Time 7-28-93	DATE STARTED:
ENGINEER/GEOLOGIST: B. Yearsley		Depth 79.6 Date/Time 8-7-93	DATE COMPLETED:
DRILLING METHODS: Cable Tool			PAGE 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONDITIONS (ppm)	REMARKS
75	1535 105310 7-27-93	88 139	11	Vy Dense, 10YR (6/6) Brownish yellow, fine to crse sand w/ gravel, some coarse (2") well graded, dry	SW	NA	BZ: 40-60 MTip: 0 ppm
76	1545 105311 7-27-93	81 46	9	SAA	SW	↑	BZ: 40-60 MTip: 0 ppm
77	1610 105312 7-27-93	12 84 110	11	SAA, moist to wet	SW		BZ: 40-60 MTip: 0 ppm
78	0840 ~~105313~~ 7-28-93	6 16 24	3 All to sieve	Dense, 2.5Y (5/4) lt. olive brown, fine to crse sand w/ gravel, some coarse, well graded WET	SW		BZ: 40-60 MTip: 0 ppm
79	0850 105314 7-28-93	8 24 26	5	Vy Dense, 2.5Y (5/4) lt. olive brown, fine to crse gravel w/ sand, well graded, wet	GW		BZ: 40-60 MTip: 0 ppm
80	0935 105315 7-28-93	24 33 32	14	Vy Dense, 2.5Y (5/4) lt. olive br., med sand w/ gravel, some coarse, well graded wet (some clay)	SW		BZ: 40-60 MTip: 0 ppm
81	1000 105316 7-28-93	5 7 14	15	M. Dense, 2.5Y (5/4) lt. ol. brown, med. to crse grain sand w/ gravel, some crse well graded wet	SW		BZ: 40-60 ppm MTip: 0 ppm
82	1010 ~~105317~~ 7-28-93	4 7 8	5 All to sieve	SAA	SW		BZ: 40-60 ppm MTip: 0 ppm
83	1020 105318 7-28-93	5 9 7	10	SAA	SW		BZ: 40-60 ppm MTip: 0 ppm
84	1030 105319 7-28-93	14 12 15	11	SAA	SW	NA	BZ: 40-60 ppm MTip: 0 ppm

H_2O Table

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: [illegible]
Helper: Merrill [illegible]

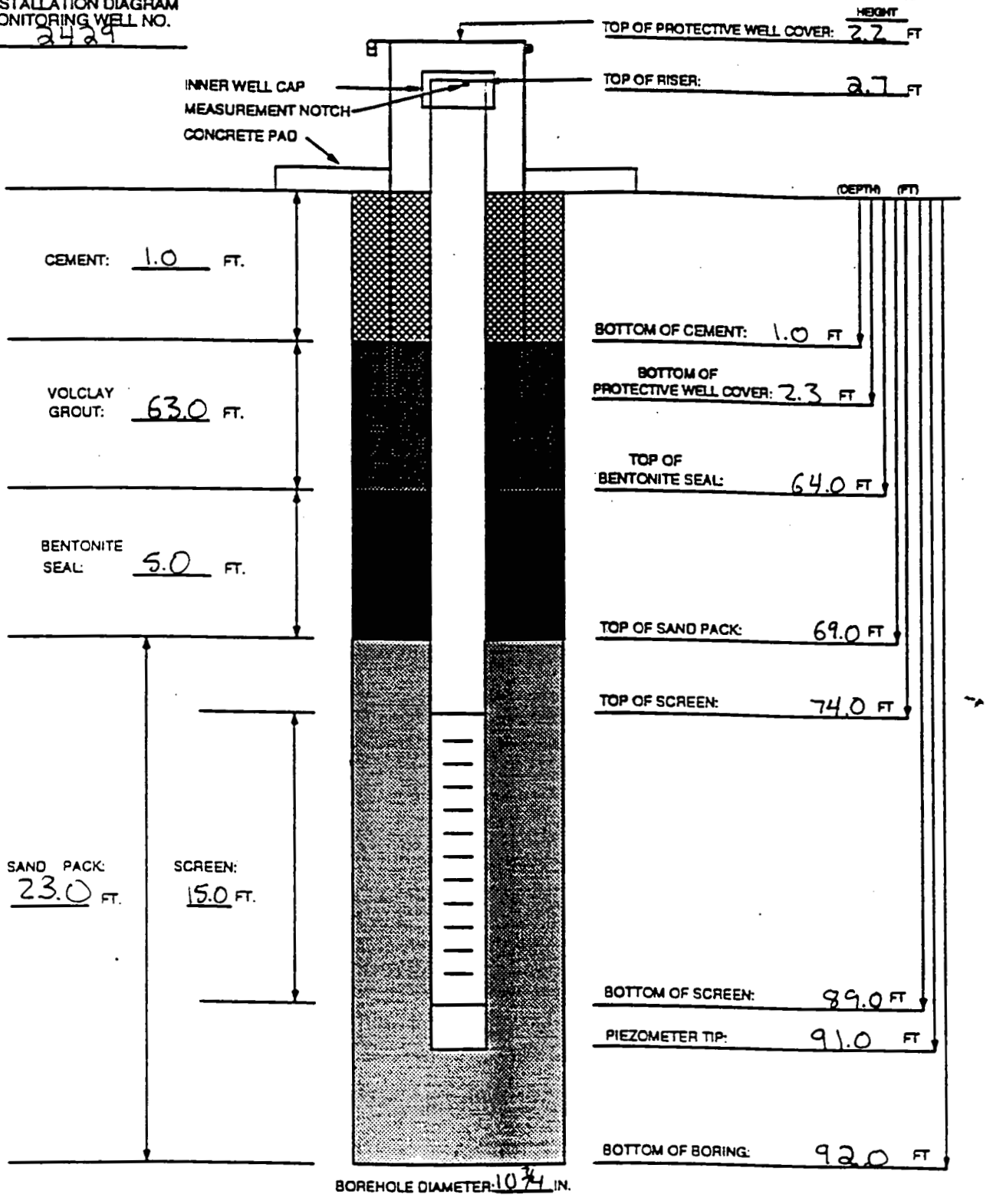
SAA = Same As Above
N/A = Not Applicable
Background = 40-60 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

0104

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2429

INSTALLATION DATE: 7-29-93 to 8-6-93



MATERIALS USED

SAND TYPE AND QUANTITY: 27 bags coarse
BENTONITE PELLETS (5-GALLON BUCKETS): 8
BAGS OF VOLCLAY GROUT: 15 bags (50lb)
AMOUNT OF CEMENT: 7 bags
AMOUNT OF WATER USED: 900 gal
OTHER: 12 Drums Soil, 1 Drum H_2O
TASK: 04.27

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.02 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 7.96 FT/ 8-6-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: B. Yeardley

0105

ASI FORM 0157 REV. (0)

27

RI/FS

-49 16

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I, 23 Well FIELD ENG./GEO. B. Yeardley DATE 8-6-93
PROJECT NO. 0427 CHECKED BY _____ DATE _____
BORING NO. 2429
PIEZOMETER NO. 2429 DATE OF INSTALLATION 7-24-93 to 8-6-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID H_2O FROM 0.0 ft TO 79.0 ft
FLUID — FROM — TO —

TYPE OF BIT Percussion Hammer Bit
CASING SIZE (S) USED:
SIZE 10 in ID FROM 0.0 TO 95.0 ft
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4.0 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.02 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 I.D. 4.0 in
LENGTH OF PIPE SECTIONS 7-10 ft, 1-4 ft, 1-2 ft
JOINING METHOD ~~Hinged locking cover~~ By 8-6-93
Screw type - flush joint threaded

PROTECTION SYSTEM

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

OTHER PROTECTION Hinged locking cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.2			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.3			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT / ~~SLURRY~~ By 8-6-93	TOP 1.0	BOTTOM 64.0	TOP	BOTTOM
BENTONITE	TOP 64.0	BOTTOM 69.0	TOP	BOTTOM
SAND	TOP 69.0	BOTTOM 92.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 74.0	BOTTOM 89.0	TOP	BOTTOM
PIEZOMETER TIP	92.0 ft			
BOTTOM OF BOREHOLE	92.0 ft			
GWL AFTER INSTALLATION	79.6 ft			

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

REMARKS _____

0106

28

MW2429

Methodology for sand pack and sieve determinate
(from R Scheper paper)

① WEMCO grain size
40% = .060 in
50% = .041 in
90% = .006 in

② 40% 90% Ratio (uniformity coefficient)
= 10 > 3 ∴ use 4 factor

③ 50% value × 4
.041 × 4 = 0.164

④ Look at distrabution curves 0.164 falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in) screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

DATE 28-JUL-93
TIME 15:53:06

WORK CARD REPORT
INORGANICS-EPM

-49 16 PAGE 1

PRIORITY

SAMPLE ID: 200008622 P/A

USER SAMPLE ID: 105320
SAMPLE FAMILY NO: 9307281540

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: RCRA PHASE I 0427
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 1000002777
RELEASE NUMBER: 1000000441
CHARGE NUMBER: RCG01
DATE SAMPLED: 28-JUL-93
SPL RECEIVED: 28-JUL-93
LOGGED SINCE:

COMMENT: SEND RESULTS TO MIKE FRANK FAX 738-3207
48 HOUR TAT

****

TASK ID: 300011486

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	6	080293-002	T.O.M.	

TASK ID: 300011487

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	41	080293-002	T.O.M.	

TASK ID: 300011488

DUE DATE: 30-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

PRIORITY

0108

30

-49 16

DATE 28-JUL-93
TIME 15:53:06

WORK CARD REPORT
INORGANICS-EPM

SAMPLE ID: 200008622

USER SAMPLE ID: 105320
SAMPLE FAMILY NO: 9307281540

****

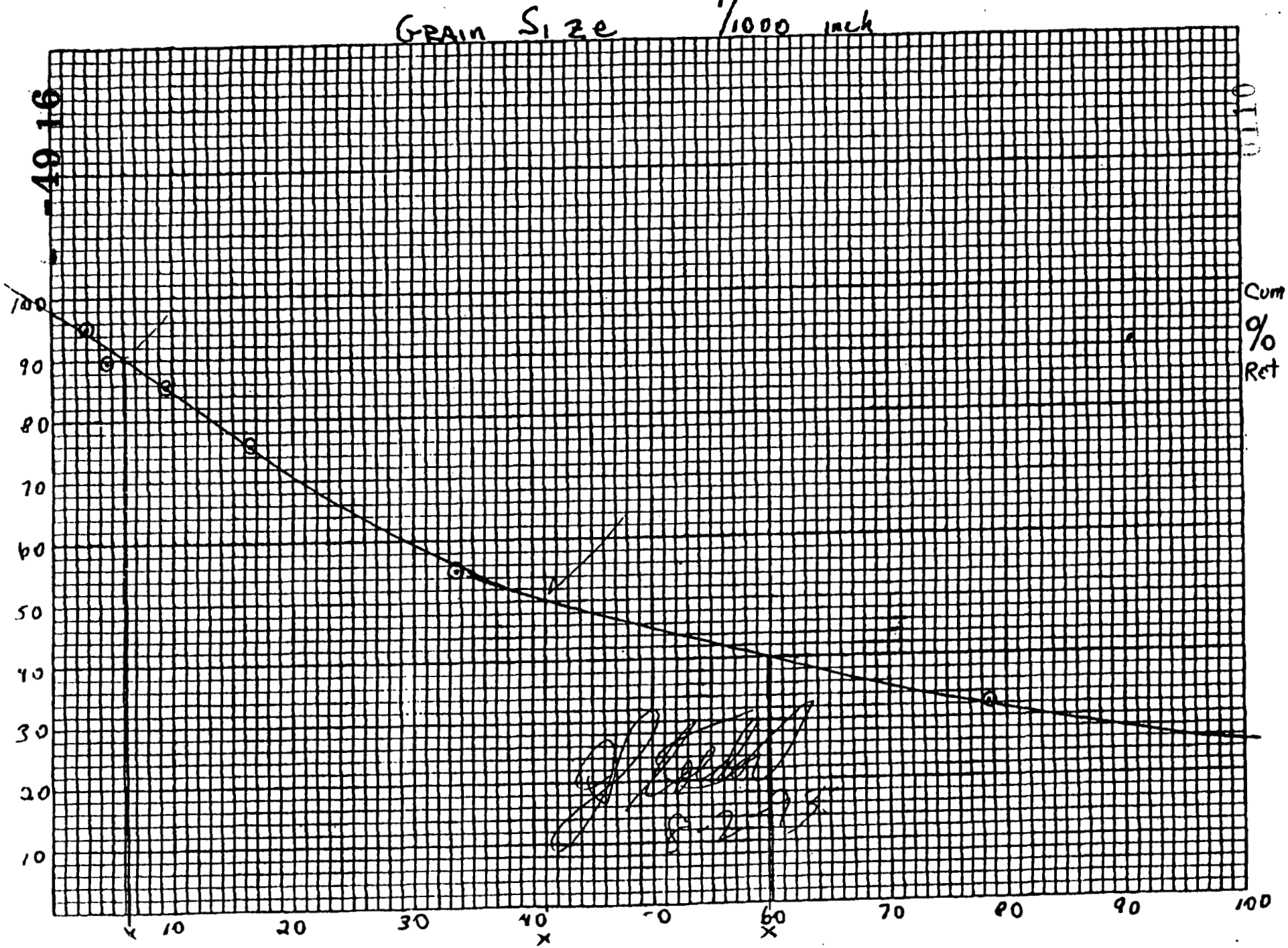
COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	60	080293-008	T.O.M.	

3 TASKS PRINTED

*** END OF REPORT ***

31

NO. 340/ 1-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH
EUGENE DIETZGEN CO.
MADE IN U. S. A.



RI/FS

VISUAL CLASSIFICATION OF SOILS 49 16

KP 7-28-93 KP 7-28-93

PROJECT NUMBER ~~04.28~~ 50.03.22	PROJECT NAME. ~~RCRA Phase 2~~ Additional monitoring well Installatio	
BORING NUMBER 2454	COORDINATES.	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5	107550 0950 7-16-93	7	6	Very Stiff (2.5Y, 5/4) light Olive Brown, Clay with trace sand, slight plasticity, moist	CL	3.0	m-tip = 0.0 ppm By = 60 cpm Total U, Total Th 00-0.5 FT #107551
1.0	0850 7-16-93	12	0	No Recovery	N/A	N/A	
1.5	0850 7-16-93	7	0	No Recovery	N/A	N/A	
2.0	107552 0855 7-16-93	3	6	Very Stiff (2.5Y, 5/3) light Olive Brown, Clay, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm By = 50 cpm Total U, Total Th 20-2.5 FT #10755
2.5	0855 7-16-93	7	4	SAA	CL	2.0	
3.0	0855 7-16-93	9	0	No Recovery	N/A	N/A	
3.5	107554 0900 7-16-93	7	6	Medium Dense (2.5Y, 6/4) Light Yellowish Brown, Clayey Silt, non-plastic, slightly moist	ML	N/A	m-tip = 0.0 ppm By = 50 cpm
4.0	0900 7-16-93	12	0	No Recovery	N/A	N/A	
4.5	0900 7-16-93	11	0	No Recovery	N/A	N/A	
5.0	107555 0905 7-16-93	6	6	Medium Dense (2.5Y, 6/6) Olive Yellow, Clayey Silt, non-plastic, slightly moist	ML	N/A	m-tip = 0.0 ppm By = 80 cpm

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration te

Colors identified using Munsell Color Char-

Background Readings

7-16-93 { m-tip = 0.0 ppm, By = 50 cpm

0111

33

-49 16

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93

PROJECT NUMBER ~~04 28~~ 50.03.28 | PROJECT NAME. KP 7-28-93 ~~RCRA Phase 2~~ Additional Monitoring Well Installatio.

BORING NUMBER 2454 | COORDINATES. | DATE 7-16-93

ELEVATION: | GWL: Depth Date/Time | DATE STARTED 7-16-93

ENGINEER/GEOLOGIST K. Payne | Depth Date/Time | DATE COMPLETED. 8-8-93

DRILLING METHODS Cable Tool | PAGE 2 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
5.5	0905 7-16-93 107557	6	6	SAA	ML	N/A	Total U, Total Th 50-5.5 FT #107556
6.0	0905 7-16-93 107558	9	6	SAA	ML	N/A	
6.5	0910 7-16-93 107559	6	6	Medium Dense (2.5Y, 5/4) light olive brown, clayey silt, slight plasticity, wet	ML	N/A	m-tip = 0.0 ppm BY = 80 cpm
7.0	0910 7-16-93 107560	11	6	Medium Dense (2.5Y, 5/4) light olive brown, clayey silt, slight plasticity, moist	ML	N/A	Sieve #107630 6.0-10.5'
7.5	0910 7-16-93 107561	13	6	SAA	ML	N/A	
8.0	0920 7-16-93 107562	12	6	Medium Dense (2.5Y, 5/4) light olive brown, clayey silt, slight plasticity, wet	ML	N/A	m-tip = 0.0 ppm BY = 70 cpm
8.5	0920 7-16-93 107563	9	6	Medium Dense (10YR, 6/1) brownish gray, clayey silt, slight plasticity, moist	ML	N/A	
9.0	0920 7-16-93 107564	9	6	Medium Dense (10YR, 5/1) Gray, clayey silt, slight plasticity, moist	ML	N/A	
9.5	0925 7-16-93 107565	3	6	Loose (10YR, 5/1) Gray, clayey silt, slight plasticity, moist	ML	N/A	m-tip = 0.0 ppm BY = 80 cpm
10.0	0925 7-16-93	4	6		ML	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

0112

Background Readings

7-16-93 { m-tip = 0.0 ppm. BY = 50 cpm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-49 16

PROJECT NUMBER ~~54.28~~ 50.03.22 (KP 7-28-93)	PROJECT NAME ~~RI/FS Phase II~~ (KP 7-28-93) Additional Monitoring Well Installatio		
BORING NUMBER 2454	COORDINATES.		DATE 7-16-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 3 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	107566 0925 7-16-93	7	~~0~~ KP 7-16-93 3	Medium Dense (10 YR, 5/1) Gray, Clayey Silt, Slight plasticity, moist	ML	N/A	Total U, Total Th 100-10.5 FT # 107567
11.0	107568 0935 7-16-93	3	6	Soft (10 YR, 5/1) Gray, Clay, High Plasticity, very moist	CL	.5	m-tip = 0.0 ppm βγ = 70 cpm
11.5	107569 0935 7-16-93	5	6	SAA	CL	.5	
12.0	107570 0935 7-16-93	7	3	~~SAS~~ KP 7-16-93 SAA	CL	.5	
12.5	107571 1320 7-16-93	2	6	Medium Stiff (10 YR, 5/1) Gray, Clay, High Plasticity, very moist	CL	1.0	m-tip = 0.0 ppm βγ = 50 cpm
13.0	107572 1320 7-16-93	2	6	Very Loose (10 YR, 5/1) Gray, Sandy Silt, Very moist, Non-plastic	ML	N/A	Sieve #107631 12.5-19.5 FT
13.5	~~107573~~ KP 7-16-93 1320 7-16-93	7	0	No Recovery	N/A	N/A	
14.0	107573 1330 7-16-93	2	6	Loose (10 YR, 5/1) Gray, Sandy Silt, Very moist, Non-plastic	ML	N/A	m-tip = 0.0 ppm βγ = 60 cpm
14.5	107574 1330 7-16-93	4	3	Loose (10 YR, 5/1) Gray, Sandy Silt, Very moist, Non-plastic	ML	N/A	
15.0	1330 7-16-93	9	0	No Recovery	N/A	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0113

Background Readings
m-tip = 0.0 ppm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -49 16

7-28-93 KP KP 7-28-93

PROJECT NUMBER ~~04.28~~ 90.03.22	PROJECT NAME ~~RCRA Phase 2~~ Additional Monitoring Well Installatio	
BORING NUMBER 2454	COORDINATES.	DATE 7-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 4 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	1345 7-16-93	5	0	No Recovery	N/A	N/A	2 spoons driven Not Enough Recovery for 15.0 - 15.5 Total U, Total Th sample
16.0	1345 7-16-93	21	0	No Recovery	N/A	N/A	
16.5	1315 7-16-93	17	0	No Recovery	N/A	N/A	
17.0	107575 1400 7-16-93	4	1	Medium Dense (10YR, 5/1) Gray, Poorly Graded Coarse Gravel, wet, Non-plastic	GP	N/A	2 spoons driven
17.5	1400 7-16-93	8	0	No Recovery	N/A	N/A	
18.0	1400 7-16-93	17	0	No Recovery	N/A	N/A	
18.5	107576 1410 7-16-93	1	6	Medium Dense (10YR, 6/1) light gray, silt with trace sand, moist, slight plasticity	ML	N/A	m-tip = 0.0 ppm βγ = 40 cpm
19.0	107577 1410 7-16-93	2	6	Very Loose (10YR, 6/1) light gray, silt with trace sand, moist, slight plasticity	ML	N/A	
19.5	1410 7-16-93	7	0	No Recovery	N/A	N/A	
20.0	107578 1425 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay, with trace sand, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 60 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

0114

Background Readings
7-21-93 { m-tip = 0.0 ppm
7-16-93 { m-tip = 0.0 ppm

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -49 16

PROJECT NUMBER ~~04.28~~ KP 7-28-93 50.03.22 | PROJECT NAME ~~KCRA~~ 7-28-93 Phase 2 Additional Monitoring Well Installat.
BORING NUMBER 2454 | COORDINATES. | DATE 7-21-93
ELEVATION: | GWL: Depth Date/Time | DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne | Depth Date/Time | DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool | PAGE 5 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.5	1425 7-21-93	4	4	SAA	CL	2.0	Total VOTh 20.0-20.5 ft #107579
21.0	1425 7-21-93	10	0	No Recovery	N/A	N/A	
21.5	107580 1440 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 90 cpm
22.0	1440 7-21-93	32	0	No Recovery	N/A	N/A	
22.5	1440 7-21-93	60	0	No Recovery	N/A	N/A	
23.0	107581 1510 7-21-93	1	6	Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm βγ = 60 cpm
23.5	107582 1510 7-21-93	5	5	SAA	CL	2.0	
24.0	1510 7-21-93	11	0	No Recovery	N/A	N/A	
24.5	107583 1525 7-21-93	1	5	Stiff (10YR, 5/1) Gray, Gravelly Clay low plasticity, moist	CL	1.0 ~~N/A~~ KP 7-21-93	m-tip = 0.0 ppm βγ = 60 cpm
25.0	1525 7-21-93	5	0	No Recovery	N/A	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
7-21-93 { m-tip = 0.0
βγ = 60

0115

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

49 16

PROJECT NUMBER ~~64.28~~ 50.03.22 KP 7-28-93	PROJECT NAME ~~RCRA Phase 2~~ KP 7-28-93 Additional Monitoring Well Installati		
BORING NUMBER 2454	COORDINATES.		
ELEVATION:	GWL: Depth	Date/Time	DATE 7-21-93
ENGINEER/GEOLOGIST K Payne	Depth	Date/Time	DATE STARTED 7-16-93
DRILLING METHODS Cable Tool			DATE COMPLETED 8-8-93
			PAGE 6 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25.5	1525 7-21-93	7	0	No Recovery	N/A	N/A	
26.0	0745 7-22-93	10	6	Stiff (10YR, 5/1) Gray, Silty Clay slight plasticity, ~~very~~ KP 7-22-93 moist	CL	2.0	m-tip = 0.0 ppm βγ = 40 cpm
26.5	0745 7-22-93	15	0	No Recovery	N/A	N/A	Total V, Total Th 25.5 - 26.0 Ft #107584
27.0	0745 7-22-93	15	0	No Recovery	N/A	N/A	
27.5	107585 0755 7-22-93	7	6	Very Stiff (10YR, 5/1) Gray, Silty Clay ~~slight plast~~ KP 7-22-93 with trace sand, slight plasticity, moist	CL	3.0	m-tip = 1.2 ppm βγ = 70 cpm
28.0	107586 0755 7-22-93	12	5	SAA	CL	3.5	
28.5	0755 7-22-93	15	0	No Recovery	N/A	N/A	
29.0	107587 0810 7-22-93	8	6	Medium Dense (10YR, 5/1) Gray, Sandy Silt, non-plastic, moist	KP 7-22-93 ~~CL~~ ML	KP 7-22-93 ~~2.5~~ N/A	m-tip = 0.0 ppm βγ = 50 cpm Rinsate #107590
29.5	107588 0810 7-22-93	8	6	Very Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.5	
30.0	107589 0810 7-22-93	18	4	SAA	CL	KP 7-22-93 ~~N/A~~ 2.5	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
7-21-93 { m-tip = 0.0 ppm, βγ = 60 cpm
7-22-93 { m-tip = 0.0 ppm, βγ = KP 7-22-93

0116

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -49 16

PROJECT NUMBER ~~04-28~~ 50.03.22 KP 7-28-93	PROJECT NAME ~~RCRA Phase 2~~ Additional Monitoring Well Installation KP 7-28-93		
BORING NUMBER 2454	COORDINATES.		DATE 7-22-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 7 OF 20

DEPTH (FT)	SAMPLE TYPE & NO (KP 7-27-93)	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	107590 107621 0910 7-22-93	8	6	Very Stiff (10YR, 5/1) Gray, Silty Clay with trace sand, slight plasticity, moist	CL	2.5	M-tip = 0.0 ppm βγ = 50 cpm Total V, Total Th 30.0-30.5 FT ~~#107592~~ KP 7-22-93 ~~107595~~ KP 7-22-9 #107597
31.0	107591 0910 7-22-93	20	6	Dense (2.5Y, 6/6) olive yellow, Silty Sand, slightly moist	KP 7-22-93 ~~MAC~~ SM	N/A	
31.5	0910 7-22-93	28	0	No Recovery	N/A	N/A	
32.0	107592 1020 7-22-93	6	6	Dense (2.5Y, 6/6) Olive yellow, Silty sand, slightly moist	SM	N/A	M-tip = 0.0 ppm βγ = 50 cpm
32.5	107593 1020 7-22-93	16	6	SAA	SM	N/A	
33.0	107594 1020 7-22-93	17	3	Dense (2.5Y, 6/3) light Yellowish Brown, clayey Silt with trace sand, moist	ML	N/A	
33.5							
34.0							
34.5							
35.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings (m-tip = 0.0 ppm

FERNALD
RI/FS

-49 16

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~04-28~~ 50.03 22 KP 7-28-93	PROJECT NAME ~~RCRA Phase 2~~ KP 7-28-93 Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES	DATE 7-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 8 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35.5 36.0 36.5	107595 1035 7-22-93	16 17 27	14	Dense (2.5Y, 6/4) light yellowish brown, Poorly Graded Fine Sand, Dry	SP	N/A	m-tip = 0.0 ppm BY = 40 cpm
37.0 38.0 39.0 40.0							
41.0	107596 1045 7-22-93	65 35 25	18	Very Dense (2.5Y, 6/4) light yellowish brown, Well Graded Sand with trace gravel, Dry	SW	N/A	m-tip = 0.0 ppm BY = 60 cpm
42.0 43.0 44.0 45.0	KP 7-27-93						
46.0	~~107597~~ 107617 1410 7-22-93	50 35 28	15	Very Dense (2.5Y, 5/6) light olive brown, Well Graded Sand with trace gravel, Dry	SW	N/A	m-tip = 0.0 ppm BY = 60 cpm
47.0 48.0 49.0 50.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0118

Background Readings
7-22-93 { m-tip = 0.0 ppm
BY = 60 cpm

FERNALD
RI/FS

-49 16

VISUAL CLASSIFICATION OF SOILS

KP 7-28-93

PROJECT NUMBER ~~04-28~~ 50.03.22	PROJECT NAME. ~~RCRA Phase 2~~ Additional Monitoring Well Installati	
BORING NUMBER 2454	COORDINATES.	DATE 7-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K Payne	Depth Date/Time	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE 9 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
~~1545~~ ~~1-22-93~~	107598 1545 7-22-93	8 14 24	12	Dense (2.5Y, 5/4) light olive brown, Poorly Graded Fine Sand, Dry	SP	N/A	m-tip = 0.0 ppm βγ = 70 cpm
52.0							
53.0							
54.0							
55.0							
56.0	107599 0910 7-23-93	10 20 50	10	Very Dense (5Y, 5/3) Olive, Poorly Graded Fine Sand, moist	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
57.0							
58.0							
59.0							
60.0	107600 0925 7-23-93	8 17 14	17	Very Dense (5Y, 4/4) Olive, Well Graded Sand with trace gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
61.0							
62.0	107601 1030 7-23-93	6 17 20	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand with trace gravel, wet	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
63.0	107602 1315 7-23-93	9 20 24	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0 ppm βγ = 10 cpm
64.0							
65.0				See p. 10			

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings
7-22-93 { m-tip = 0.0 ppm, βγ = 60 cpm
7-23-93 { m-tip = 0.0 ppm, βγ = 60 cpm

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOIL 49 16

PROJECT NUMBER ~~04-28~~ 50.03.22 (KP 7-28-93)	PROJECT NAME. ~~RCRA Phase 2~~ Additional Monitoring Well Installati (KP 7-28-93)	
BORING NUMBER 2454	COORDINATES.	DATE 7-23-93
ELEVATION:	GWL: Depth 57.25 FT Date/Time 7-24-93/0630	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE 10 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
66.0	107603 1340 7-23-93	15 25 30	16	Very Dense (2.5Y, 3/3) Dark Olive Brown, Poorly Graded Fine Sand, Wet	SP	N/A	m-tip = 0.0 ppm βγ = 70 cpm
67.0	107604 1400 7-23-93	35 35 50	18	Very Dense (10YR, 5/4) Yellowish Brown, well Graded Sand with trace ~~Sand~~ Gravel, wet (KP 7-23-93)	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
68.0 / 69.0	107605 1415 7-23-93	35 24 20	17	Dense (2.5Y, 5/4) light olive brown ~~Poorly Gra~~ well Graded Sand with trace Gravel, wet (KP 7-23-93)	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm Hydropunch 68.0 FT #107606
70.0	107608 1015 7-24-93	15 25 33	18	Very Dense (2.5Y, 5/4) light olive brown, well Graded sand with trace Gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm Sieve #107607
71.0							
72.0							
73.0							
74.0							
75.0							
76.0	107609 1045 7-24-93	7 17 24	18	Dense (2.5Y, 5/4) light olive brown, well graded sand with trace gravel, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
77.0							
78.0							Hydropunch 78.0 ft # 107610
79.0							
80.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

Background Readings
7-22-93 { m-tip = 0.0 ppm, βγ = [illegible] cpm
7-24-93 { m-tip = 0.0 ppm, βγ = 60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~04-28~~ KP 7-28-93 50.03.22	PROJECT NAME ~~RCRA Phase 2~~ KP 7-28-93 Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES.	DATE 7-24-93
ELEVATION:	GWL: Depth 54.80 FT Date/Time 7-25-93/~~0710~~ KP-25-93	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time 0710	DATE COMPLETED. 8-8-93
DRILLING METHODS Cable Tool		PAGE 11 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
81.0	107611 1535 7-24-93	18	7 17 27	Dense (2.5Y, 5/4) light olive brown well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm βγ = 70 cpm
82.0							
83.0							
84.0							
85.0	107612 0750 7-25-93	18	18 43 50	Very Dense (2.5Y, 5/3) olive, Poorly Graded fine sand, wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
86.0							
87.0							
88.0							Hydropunch 88.0 FT #107613
89.0							
90.0	107614 1245 7-25-93	17	4 5 11	Medium Dense (2.5Y, 5/3) olive, well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm βγ = 60 cpm Rinsate #107615
91.0							
92.0							
93.0							
94.0							
95.0							

0121

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

Background Readings
7-24-93 (m-tip = 0.0 ppm
7-25-93 (m-tip = 0.0 ppm

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-49 16

PROJECT NUMBER ~~04.22~~ 50.03.22 (KP 7-29-93)	PROJECT NAME ~~RCRA Phase~~ Additional Monitoring Well Installation (KP 7-29-93)		
BORING NUMBER 2454	COORDINATES.		DATE
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 12 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
96.0	107616 1453 7-26-93	35 37 50/2	KP 7-26-93 ~~18~~ 15	Very Dense (2.5Y, 5/3) light olive brown, Poorly Graded Fine Sand, Wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
97.0							
98.0							Hydropunch 98.0 ~~FT~~ KP 7-26-93 F #107618
99.0							
100.0	107619 0725 7-27-93	8 14 30	18	Dense (5Y, 4/4) olive, Poorly Graded Fine Sand, Wet	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
101.0							
102.0							
103.0							
104.0							
105.0	KP 7-27-93						
106.0	~~10-70~~ 107620 0900 7-27-93	4 14 27	18	SAA	SP	N/A	m-tip = 0.0 ppm βγ = 60 cpm
107.0							
108.0							Hydropunch 108.0 FT #107622
109.0							
110.0							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

0122

Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

Background Readings:
7-25-93 { m-tip = 0.0 ppm
7-27-93 { m-tip = 0.0 ppm

44

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER ~~04.28~~ KP 7-28-93 50.03.22	PROJECT NAME ~~RCRA Phase 2~~ KP 7-28-93 Additional Monitoring Well Installati		
BORING NUMBER 2454	COORDINATES		DATE 7-27-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool			PAGE 13 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
111.0	107623 1330 7-27-93	1 6 13	18	Medium Dense SAA	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
112.0							
113.0							
114.0							
115.0							
116.0	107624 1535 7-27-93	7 11 20	18	Dense (5Y, 4/4) Olive, Poorly Graded Fine Sand, Wet	SP	N/A	m-tip = 0.0 ppm βγ = 40 cpm
117.0							
118.0							Hydropunch Rinsate #107625 Hydropunch 118.0 FT #107626
119.0							
120.0							
121.0	107627 1315 7-28-93	7 12 28	18	SAA	SP	N/A	m-tip = 0.0 ppm βγ = 50 cpm
122.0							
123.0							
124.0							
125.0	107628 0925 7-29-93	6 16 23	18	Dense (5Y, 4/1) Dark Gray, Silty Clay, Low Plasticity, Moist	CL	2.0	m-tip = 0.0 ppm βγ = 70 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
John Leon

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0123

Background Readings
7-27-93 { m-tip = 0.0 ppm
7-28-93 { m-tip = 0.0 ppm
7-29-93 { m-tip = 0.0 ppm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation	
BORING NUMBER 2454	COORDINATES	DATE 7-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-16-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Cable Tool		PAGE 14 OF 20

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				See previous page			
126.0	1300 7-29-93			Bottom of Boring			Shelby Tube #107629 Driven 1.5 FT
127.0				Bottom of Sampling			
128.0							
129.0							

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

John Leon

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell ~~Cotto~~ Color Chart

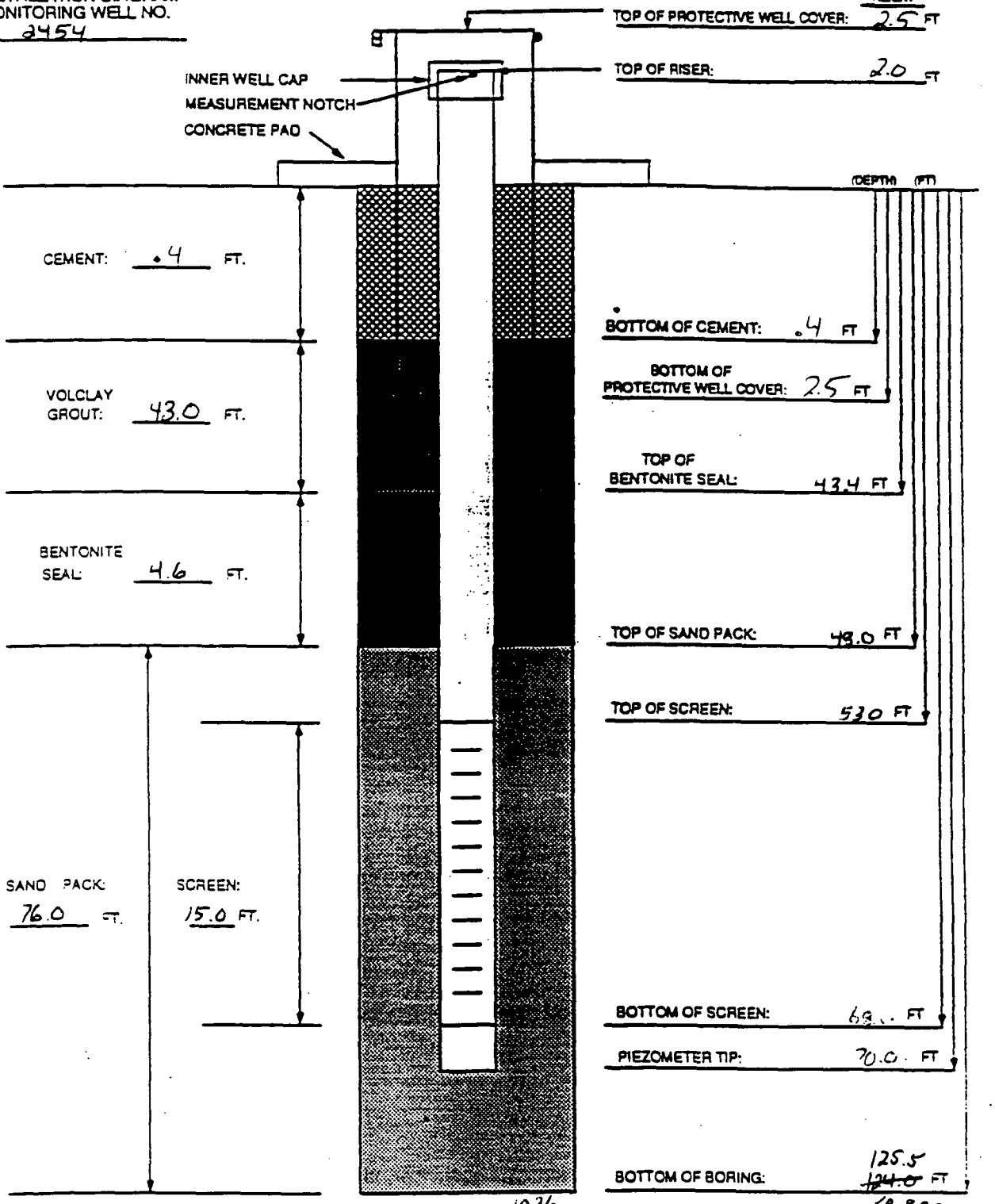
KP 7-29-93

Background Readings

7-29-93 (m-tip = 0.0 ppm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2454

INSTALLATION DATE: 8-8-93



MATERIALS USED:

SAND TYPE AND QUANTITY: 34 50lb bags of 1020
BENTONITE PELLETS (5-GALLON BUCKETS): 5 buckets
BAGS OF VOLCLAY GROUT: 650 lbs
AMOUNT OF CEMENT: 47 lbs.
AMOUNT OF WATER USED: 700 gallons
OTHER: 18 Drums Soil, 1 Drum Grout, 2 Drums Alum
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH ~~a~~ END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 55.39 F
5) TOP OF CASING IS SECURED WIT STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH E GROUND LEVEL
7) WELL CASING HAS A PROTECTIV COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

01.25

FERNALD RI/FS

-4916

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Additional Monitoring Well Installation FIELD ENG./GEO. K. Payne DATE
PROJECT NO. 2248-193 50.03.22 CHECKED BY DATE
BORING NO. 2454
PIEZOMETER NO. 2454 DATE OF INSTALLATION 8-8-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 70.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion
CASING SIZE (S) USED:
SIZE 10.0 ID FROM 0.0 FT TO 125.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 15.0 FT

RISER PIPE MATERIAL 316 stainless stee
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 5-10 FT, 1-5 F
JOINING METHOD Screw type-flush joi

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 IN

OTHER PROTECTION Hinged Locking Cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM 0.4 FT		
Cement GROUT/SLURRY	TOP 0.4 FT	BOTTOM 43.4 FT	TOP	BOTTOM
BENTONITE	TOP 43.4 FT	BOTTOM 48.0 FT	TOP	BOTTOM
SAND	TOP 48.0 FT	BOTTOM 125.5 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 53.0 FT	BOTTOM 68.0 FT	TOP	BOTTOM
PIEZOMETER TIP	70.0 FT			
BOTTOM OF BOREHOLE	125.5 FT			
GWL AFTER INSTALLATION	55.39 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement was placed from 0.0 to 0.4 ft to hold the protective cover in place.

K. Payne 2454 page 17 of

DATE 26-JUL-93
TIME 14:21:05

WORK CARD REPORT
INORGANICS-EPM

PAGE 1

-4916

AMPLE ID: 200008401

P/A

USER SAMPLE ID: 107607
SAMPLE FAMILY NO: 9307261400

24 hr

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: FACILITIES CHARACTERIZATION
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 100000275C
RELEASE NUMBER: 100000043C
CHARGE NUMBER: RJV01
DATE SAMPLED: 23-JUL-93
SPL RECEIVED: 26-JUL-93
LOGGED SINCE:

739 - phone

COMMENT: No comments entered.

send results to Mike Franke

****

TASK ID: 300011188

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	6	7-27-93	BB/TOM	[illegible]

TASK ID: 300011189

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	34	7-27-93	BB/TOM	[illegible]

TASK ID: 300011190

DUE DATE: 27-JUL-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

49

MPLE ID: 200008401

USER SAMPLE ID: 107602 -4916
SAMPLE FAMILY NO: 9307261400

****

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	53	7-27-93	BB/TOM	[illegible]

3 TASKS PRINTED

*** END OF REPORT ***

-49 16

Customer Number: 107607

MATERIAL: _____ SAMPLE NUMBER: 200008401

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 125.5275 ✓

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	39.30 ✓	31.30 ✓	31.30 ✓	78.7
20	23.80 ✓	18.96 ✓	50.26 ✓	33.5
40	22.81 ✓	18.17 ✓	68.43 ✓	16.7
60	15.54 ✓	12.38 ✓	80.81 ✓	9.8
100	11.56 ✓	9.21 ✓	90.02 ✓	5.9
200	8.24 ✓	6.56 ✓	~~90.58~~ 96.58 T.O.M.	3.0
Pan	3.30 ✓	2.63 ✓	99.21 ✓ 7-27-93	

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

Analyzed by:	Checked by:	Date analyzed:
BBeegle	Tom McCullough	7-27-93

GRAIN SIZE RETAINED

40 %	~~5.9~~ ~~52.7~~ 53 T.O.M. 7-27-9 ✓
50 %	~~34.0~~ ~~37.8~~ 34 T.O.M 7-27-
90 %	~~5.9~~ 6 T.O.M 7-27-9

Wt - 125.5275 =
BBeegle 7-27-93

Wt - 39.2951 =
Wt - 23.8088 =
Wt - 22.8129 =
Wt - 15.5352 =
Wt - 11.5646 =
Wt - 8.2374 =
Wt - 3.3028 =
Tom McCullough

page 20 of

B Beagle 7-27-93

NO. 3401 -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.

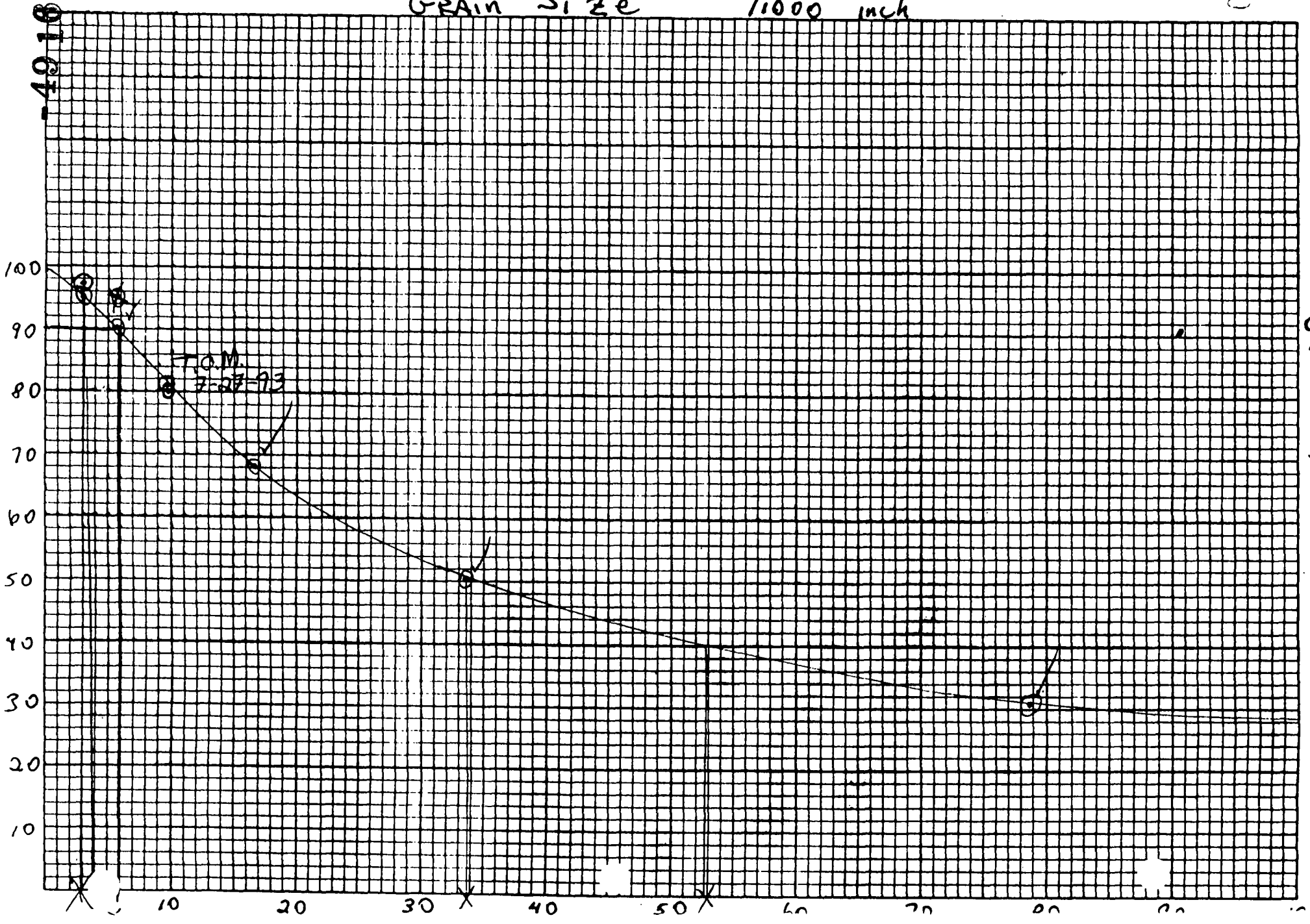
Facity # 200008401

customer # 107607

01320

GRAIN SIZE 1/1000 inch

-4918



VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER	~~030.13.000~~ 0439	PROJECT NAME	Fernald RI/FS Twelve well		
BORING NUMBER	3900	COORDINATES	NA	DATE	7/12/93 7/13/93
ELEVATION	NA	GWL: Depth	~~NA~~ 3.0 ft Date/Time	~~NA~~ 7/14/93	DATE STARTED ~~7/12/93~~
ENGINEER/GEOLOGIST	Swann	Depth	NA Date/Time	NA	DATE COMPLETED 8-11-93
DRILLING METHODS	Cable Tool				PAGE 1 OF 13

DEPTH, Ft.	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY, IN.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
0.0	13:40 109848 7/13/93	2 11 16	6 6 0	hard, (7.5YR, 2.5/2) very Dark Brown, Low plasticity, dry fine grain sand/silt.	SM	NA ~~3.5~~ CB 8/18/93	BG = 0.0 cpm MT = 0.0 ppm
1.5							
3.0	13:45 109849 7/13/93	7 13 14	6 0 0	hard (7.5YR, 4/2) brown, fine grain sand/silt, Low plasticity, dry	SM	NA ~~4.0~~ CB 8/18/93	BG = 0.0 cpm MT = 0.0 ppm
4.5	13:50 109850 7/13/93	13 17 18	6 0 0	hard (7.5YR, 4/2) Brown, fine grain sand/silt, Low plasticity, dry	SM	NA ~~4.0~~ CB 8/18/93	BG = 0.0 cpm MT = 0.0 ppm
6.0	14:30 109851 7/13/93	8 7 6	6 6 0	stiff (10YR, 4/6) dark yellowish brown, Low plasticity, moist clay/silt	CL/ML	1.5	BG = 0.0 cpm MT = 0.0 ppm
7.5	14:40 109852 7/13/93	4 6 5	6 6 6	stiff (10YR, 6/1) gray, clay/silt, low plasticity, moist	CL/ML	1.5	BG = 0.0 cpm MT = 0.0 ppm
9.0	14:50 109853 7/13/93	5 6 6	6 6 6	stiff (10YR, 6/1) gray, clay/silt Low plasticity, moist, sand seam at 8.7 feet	CL/ML	1.5	BG = 0.0 cpm MT = 0.0 ppm

NOTES Pennsylvania Drilling
Driller - Dave Newman
Helper - Mike Leon
Samples collected per ASTM standard penetration test. Colors identified using Munsell Color Chart.

Background Beta Gamma = 60-80 cpm
Micro Tip = 0.0 ppm

BG = Beta Gamma
MT = Micro Tip
SAA = Same As Above

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER ~~409105.030.13.000~~ 04.33	PROJECT NAME Fernald RI/FS Twelve well		
RING NUMBER 3900	COORDINATES N/A	DATE 7/13/93	
ELEVATION: N/A	GWL: Depth NA Date/Time NA	DATE STARTED 7/13/93	
ENGINEER/GEOLOGIST Swann	Depth NA Date/Time NA	DATE COMPLETED 8-11-93	
DRILLING METHODS Cable tool		PAGE 2 OF 13	

DEPTH (FT) 9.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	15:00	4	6	soft, (10yr, 5/1) gray, low	CL/ML	0.5	Bγ = 0.0 cpm
	109854	3	6	plasticity clay/silt, moist			MT = 0.0 ppm
10.5	7/13/93	8	6	6 in sand seam at 10.0 feet well graded			
	10:15	14	6	medium dense, (10yr, 5/2) grayish	~~SW~~ GS	NA	Bγ = 0.0 cpm
	109855	16	6	brown, medium to coarse	~~NA~~ SW/GW		MT = 0.0 ppm
12.0	7/14/93	13	6	sand and gravel, moist. well graded			
	10:25	8	6	medium dense (10yr, 5/2) grayish			Bγ = 0.0 cpm
	109856	10	6	brown sand and gravel, wet	SW/GW	NA	MT = 0.0 ppm
13.5	7/14/93	11	0	rust brown layer of sand at 12.5 feet (approx) to 12.8 feet			Approx water depth off spoon = 13.0 feet GS 7/14/93
	10:30	7	6	Loose (10yr 5/3) brown, medium			Bγ = 0.0 cpm
	109857	3	2	to coarse grain sand with gravel,	SW/GW	NA	MT = 0.0 ppm
15.0	7/14/93	2	0	wet, well graded			
	10:40	4	6	medium dense (10yr, 6/8) brownish			Bγ = 0.0 cpm
	109858	7	0	yellow, medium to coarse sand	~~GM~~ SW/GW	NA	MT = 0.0 ppm
16.5	7/14/93	10	0	and gravel, wet, well graded			
	10:55	13	6	medium Dense (10yr, 6/8) brownish			Bγ = 0.0 cpm
	109859	14	0	yellow, medium to coarse sand and	~~GM~~ SW/GW	NA	MT = 0.0 ppm
18.0	7/14/93	10	0	gravel, wet, well graded			

WTFS will install Hydro punch 10 feet below water table will continuous sample to 20.0 feet

SAA = Same As Above
MT = Micro Tip
Bγ = Beta Gamma

Background
MT = 0.0 Bγ = 40 cpm

See Pg 1

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VISUAL CLASSIFICATION OF SOILS - 4916

PROJECT NUMBER ~~409105.030.13.000~~ 04.33	PROJECT NAME Fernald RI/FS	
BORING NUMBER 3900	COORDINATES NA	DATE 7/15/93
ELEVATION NA	GWL: Depth NA Date/Time NA	DATE STARTED 7/13/93
ENGINEER/GEOLOGIST SWANN	Depth NA Date/Time NA	DATE COMPLETED 8-11-93
DRILLING METHODS Cable Tool		PAGE 3 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USCS)	REMARKS
18.0	11:05	12	6	medium Dense (10YR, 4/3) brown, medium to coarse grain sand and gravel, poorly sorted, wet	SW/GW	NA	MT = 0.0 ppm
	109860	16	4				BG = 0.0 cpm
20.0	7/14/93	13	0				
	07:20			drilled to 20.0 feet, will begin standard sampling at 25.0' (every five feet) until we get to 34 feet where we will begin continuous sampling again	NA	NA	Hydro punch sample pulled at 23.0 feet
	109861						# 109861
	7/15/93						
25.0	07:45	6	6	medium dense (7.5YR, 4/4) brown, poorly graded, medium grain sand, moist	SP	NA	MT = 0.0 ppm
	109862	5	6				BG = 0.0 cpm
26.5	7/16/93	6	0				
30.0	09:30	5	6	medium dense (10YR, 4/3) brown ~~well sorted sand~~ (7.5) medium to coarse (7.5) grain sand and gravel, wet, poorly graded.	SP/GP	NA	MT = 0.0 ppm
	109863	8	6				BG = 0.0 cpm
31.5	7/16/93	12	0				
	109864			drilled to 30.0 feet, installed Hydro punch point at 33.0 feet, will start continuous sampling at 34.0 feet	NA	NA	Hydro punch sample at 33.0 feet # 109864
	109865						continue with Hydro punch sample from 33.0 feet - sample # # 109865

NOTES

See page 1

Background
MT = 0.0 ppm
BG = 40-80 cpm

0193

YS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER ~~409105.030.13.060~~ 04.33	PROJECT NAME Fernald RI/FS		
BORING NUMBER 3900	COORDINATES NA	DATE 7/22/93	
ELEVATION: NA	GWL: Depth NA Date/Time NA	DATE STARTED 7/13/93	
ENGINEER/GEOLOGIST Swann	Depth NA Date/Time NA	DATE COMPLETED 8-11-93	
DRILLING METHODS Cable Tool		PAGE 4 OF 13	

DEPTH (Ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
34.0	14:15	27	6	Very Dense (10yr, 4/3) brown, well graded ~~sand~~ coarse grain sand and gravel, wet	SW/GW	NA	MT = 0.0 ppm Bγ = 0.0 cpm
	109866	28	6				
35.5	7/22/93	23	0				
	14:45	9	6	Dense (10yr, 5/1) gray, well graded, medium to coarse sand and gravel, wet	SW/GW	NA	MT = 0.0 ppm Bγ = 0.0 cpm
	109867	23	0				
37.0	7/22/93	16	0				
	15:00	19	6	medium dense (10yr, 5/1) gray, well graded, medium to coarse sand and gravel, wet	SW/GW	NA	MT = 0.0 ppm Bγ = 0.0 cpm
	109868	11	0				
38.5	7/22/93	8	0				
	16:00	7	6	medium dense, (10yr, 5/1) gray, well graded, medium to coarse sand and gravel, wet (TS) 7/22/93	SW/GW	NA	MT = 0.0 ppm Bγ = 0.0 cpm
	109869	11	2				
40.0	7/22/93	11	0				
43.0 ~~41.5~~	109870			Hydro punch sample at ~~42.0~~ 43.0'		NA	Hydropunch sample
(TS) 7/22/93 43.0 ~~43.0~~	109871			Hydro punch sample at 43.0' second set of same sample as above		NA	Hydropunch sample

Notes
~~See page 1 for~~ (TS) 7/22/93
Penn Drilling
driller = Cris Coulter
Helper = Mike Leon

See page 1

Background
MT = 0.0 ppm
(TS) Bγ = 40 cpm 7/22/93

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VISUAL CLASSIFICATION OF SOILS

-49 16

PROJECT NUMBER 04.33	PROJECT NAME R Well CRU 05		
BORING NUMBER 3900	COORDINATES NA		DATE 7/25/93
ELEVATION: NA	GWL: Depth NA - Date/Time NA		DATE STARTED 7-13-93
ENGINEER/GEOLOGIST T. Swann	Depth NA Date/Time NA		DATE COMPLETED 8-11-93
DRILLING METHODS Cable Tool			PAGE 5 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
40.0							
41.5	08:00 109872 7/26/93	30 50/4 ~~7/25/93~~ TS 7/26/93 0	6 2 0	very dense (10YR/5/1) gray, well graded medium ~~grain~~ to coarse grain sand and gravel, wet CB 8/19/93	SW/GW	N/A	MT = 0.0 ppm TS 7/26/93 ~~BG = 40 cpm~~ BG = 0.0 cpm
43.0	08:40 109873 7/26/93	39 39 50	6 6 3	very dense (10YR, 4/1) dark gray well graded medium to coarse grain sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm BG = 0.0 cpm
44.5	09:45 109874 7/26/93	15 42 45	6 3 0	very dense (10YR, 5/1) gray, well graded medium to coarse sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm BG = 0.0 cpm
46.0	10:15 109875 7/26/93	5 12 20	6 6 0	dense (10YR, 4/1) dark gray, poorly graded sand with some gravel, wet	SP ~~GP~~ CB 8/19/93	N/A	MT = 0.0 ppm BG = 0.0 cpm
47.5	10:45 109876 7/26/93	6 30 31	6 6 6	dense (10YR, 4/1) dark gray, poorly graded medium grain sand and gravel. sample grades from medium to coarse sand and gravel to medium grain sand, wet	SP/GP	N/A	MT = 0.0 ppm BG = 0.0 cpm
49.0	13:40 109877 7/26/93	16 20 12	6 6 6	dense (10YR, 4/1) dark gray, poorly ~~sorted~~ graded medium grain sand, moist CB 8/19/93	SP ~~SW~~ ~~GP~~ CB 8/19/93	N/A	MT = 0.0 ppm BG = 0.0 cpm

NOTES

N/A = Not Applicable

Background
MT = 0.0
BG = 0-40 cpm

See page 1

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 04.33	PROJECT NAME Fernald RI/FS	
BORING NUMBER 3900	COORDINATES N/A	DATE 7/26/93
ELEVATION: ~~7.80~~ CB 8/11/93 N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST T. Swam	Depth N/A Date/Time N/A	DATE COMPLETED 8-11-93
DRILLING METHODS Cable Tool		PAGE 6 OF 13

DEPTH (FT) 49.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY USCS	REMARKS
	14:10	3	6	medium dense (10YR, 4/1) dark gray, medium to coarse sand and gravel, wet	SP/GP	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109878	10	6				
50.5	7/26/93	12	6				
	08:10	4	6	very Dense (10YR, 5/1) gray, medium grain sand, wet, ~~well gra~~ TS 7/27/93 poorly graded	SP ~~GP~~ CB 8/11/93	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109879	26	6				
52.0	7/27/93	50	6				
	08:40	27	6	very Dense (10YR, 4/1) dark gray, ~~med~~ CB 8/11/93 poorly graded, medium grain sand and gravel, moist	SP/GP	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109880	45	6				
53.5	7/27/93	50/4	0				
	09:00	25	6	very Dense (10YR, 5/2) grayish brown, CB 8/11/93 poorly graded, medium to coarse sand and gravel, wet	SP/GP	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109881	41	6				
55.0	7/27/93	50	6				
	10:00	12	6	CB 8/11/93 ~~Den~~ Very Dense (10YR, 5/2) grayish brown poorly graded, medium grain sand, moist	TS 7/27/93 ~~SP~~ SP	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109882	24	6				
56.5	7/27/93	33	6				
	10:25	19	6	very dense (10YR, 5/2) grayish brown, poorly graded, medium sand with some gravel, wet	SP	N/A	Bγ = 0.0 cpm MT = 0.0 ppm
	109883	27	6				
58.0	7/27/93	30	6				

NOTES

See page 1

Background
MT = 0.0 ppm
Bγ = 0 – 40 cpm

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VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER 04.33	PROJECT NAME 12 well - Boring 3900		
BORING NUMBER 3900	COORDINATES N/A	DATE 7/27/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED 7-13-93	
ENGINEER/GEOLOGIST T. Swann	Depth N/A Date/Time N/A	DATE COMPLETED 8-11-93	
DRILLING METHODS Cable Tool		PAGE 7 OF 13	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
58.0	10:45	7	6	medium dense (10YR, 5/2) grayish brown, poorly ~~sorted~~, medium grain sand, moist to wet, graded TS 7/27/93	SP	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109884	10	6				
59.5	TS 7/27/93	15	6				
	13:30	4	6	medium dense, (10YR, 5/2) grayish brown, poorly ~~sorted~~ fine to medium grain sand with minor gravel, wet, graded TS 7/27/93	SP	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109885	5	6				
61.0	7/27/93	8	6				
	14:50	30	6	dense, (10YR, 5/2) grayish brown, poorly graded, fine to medium grain sand, wet	SP ~~SW~~ CB 8/14/93	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109886	50/4	~~6~~ 4 CB 8/14/93				
62.5	7/27/93	0	0				
	15:45	36	6	dense (10YR, 5/2) grayish brown poorly graded, medium to coarse sand and gravel, wet	TS 7/27/93 ~~GP~~ SP ~~GP~~	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109887	47	6				
64.0	7/27/93	50/2	CB 8/14/93 ~~6~~ 3				
	09:00	32	6	dense (10YR, 5/1) gray, poorly graded sand and gravel, ~~wet~~ CB 8/14/93 coarse grain, wet	SP/ GP	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109888	36	6				
65.5	7/28/93	50/3	0				
	09:30	38	6	dense (10YR, 5/1) gray, poorly graded sand and gravel, coarse grain, wet	SP/ GP	N/A	BG = 0.0 cpm MT = 0.0 ppm
	109889	33	6				
67.0	7/28/93	50	0				

NOTES

See page 1

Background
BG = 0-40
MT = 0.0

0137

VISUAL CLASSIFICATION OF SOILS

-49 16

PROJECT NUMBER 04.33	PROJECT NAME Boring 3900	
BORING NUMBER 3900	COORDINATES N/A	DATE 7/28/93
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST T. SWANN	Depth N/A Date/Time N/A	DATE COMPLETED 8-11-93
DRILLING METHODS CABLE TOOL		PAGE 8 OF 13

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
67.0	10:20	6	6	Dense (10YR, 5/1) gray, well graded coarse grain sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm
	109890	26	4				BG = 0.0 cpm
68.5	7/28/93	42	0				
	10:55	12	6	medium Dense (10YR, 5/2) grayish brown, well graded coarse sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm
	109891	15	6				BG = 0.0 cpm
70.0	7/28/93	14	6				
	14:30	26	6	dense (10YR, 5/2) grayish brown, well graded coarse grain sand and gravel, wet.	SW/GW	N/A	MT = 0.0 ppm
	109892	50/4	4				BG = 0.0 cpm
71.5	7/28/93	0	0				
	15:00	9	6	dense (2.5 YR, 4/1) dark gray, well graded coarse sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm
	109893	26	4				BG = 0.0 cpm
73.0	7/28/93	40	0				
	16:00	37	6	Dense (2.5YR, 5/1) gray, well graded coarse grain sand and gravel, wet	SW/GW	N/A	MT = 0.0 ppm
	109894	50/4	4				BG = 0.0 cpm
74.5	7/28/93	0	0				
	09:30	7	6	medium Dense (2.5Y 4/1) dark gray well graded sand with some gravel, wet	SW	N/A	MT = .4 ppm
	109895	14	6				BG = 40 cpm
76.0	7/29/93	16	0				Start sieve analysis sampling

NOTES

See page 1

Background
BG: 0-40 cpm
MT: 0.0 ppm

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FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 04.33	PROJECT NAME. Twelve well	
RING NUMBER. 3900	COORDINATES:	DATE 7-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST Ken Geiger	Depth Date/Time	DATE COMPLETED: 8-11-93
DRILLING METHODS Cable Tool		PAGE 9 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76.0	1100	22		Very Dense (2.5Y, 4/1) Dark Gray			MT = 0 ppm
	109895	03	18	Poorly Graded Medium Sand	SP	NA	BZ = 40 cpm
		02		with Some Gravel, wet			
77.5	7-29-93						
	1350	12		Very Dense (2.5Y, 4/1) Dark Gray			MT = 0 ppm
	109897	25	18	Poorly Graded Medium Sand	SP	NA	BZ = 40 cpm
		35		with Some Gravel, wet			
79.0	7-29-93						
	1410	4		Medium Dense (2.5Y, 4/1) Dark			MT = 0 ppm
	109898	6	18	Gray Poorly Graded Fine	SP	NA	BZ = 40 cpm
		12		Sand with Some Gravel			
80.5	7-29-93			wet			
	1530	7		Very Dense (2.5Y, 4/1) Dark			MT = 0 ppm
	109899	26	18	Gray Poorly Graded Medium	SP	NA	BZ = 40 cpm
		27		Sand with Some Gravel,			
82.0	7-29-93			wet			
	1600	13		Very Dense (2.5Y, 4/1) Dark			MT = 0 ppm
	109900	[illegible]	18	Gray Well Graded Sand	SW	NA	BZ = 40 cpm
		[illegible]		with Gravel, wet			
83.5	7-29-93						
	1820	2		Medium Dense (2.5Y, 4/1) Dark			MT = 0 ppm
	109901	12	9	Gray Well Graded Sand with	SW	NA	BZ = 40 cpm
		15		Some Gravel, wet			Composite Sample 109901
85.0	7-30-93						Sample # ~~109903~~

NOTES

See Page 1

See Continued Log
BZ = 40 cpm
MT = 0 ppm

0139

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04 33	PROJECT NAME: Twelve Well		
BORING NUMBER: 3900	COORDINATES:		DATE 7-30-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7-13-93
ENGINEER/GEOLOGIST: Ken Geiger	Depth	Date/Time	DATE COMPLETED: 8-11-93
DRILLING METHODS: Cable Tool			PAGE 10 OF 13

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
85.0	0845	8		Dense (2.5Y, 4/1) Dark Gray Poorly Graded Fine Sand with Some Gravel, wet	SP	NA	mT = 0ppm βγ = 40cpm
	104902	18	18				
	7-30-93	19					
86.5	1015	16		Very Dense SAA	SP	NA	mT = 0ppm βγ = 40cpm
	104903	30	14				
	7-30-93	38					
88.0	1040	2		Dense (2.5Y, 4/1) Dark Gray well Graded Sand with some Gravel, wet	SW	NA	mT = 0ppm βγ = 40cpm
	104904	8	18				
	7-30-93	25					
89.5	1115	4		Dense (2.5Y, 4/1) Dark Gray well Graded Sand with some Gravel, wet	SW	NA	mT = 0ppm βγ = 40cpm
	104905	16	18				
	7-30-93	18					
91.0	1510	40		Very Dense (2.5Y, 4/1) Dark Gray well Graded Gravelly Sand, wet	SW	NA	mT = 0ppm βγ = 40cpm
	104906	50/2	6				
	7-30-93						
92.5	1540	45		Very Dense (2.5Y, 4/1) Dark Gray well Graded Sandy Gravel, wet	GW	NA	mT = 0ppm βγ = 40cpm
	104907	50/3	6				
	7-30-93						

NOTES

See page 1

Background Levels
βγ = 40-60 cpm
mT - 0ppm

FERNALD
RI/FS

-49 16

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: OU 33	PROJECT NAME: Twelve well	
BORING NUMBER: 3900	COORDINATES:	DATE 8-4-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-13-93
ENGINEER/GEOLOGIST Ken Geiger	Depth Date/Time	DATE COMPLETED: 9-11-93
DRILLING METHODS Cable Tool		PAGE 11 OF 13

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
940	0845	22		Very Dense (2.5Y, 4/1) Dark			MT = 0ppm
	109903	23	15	Gray well graded Sandy	GW	NA	BZ = 40cpm
	8-4-93	32		Gravel, wet			
955				Bottom of Boring			

NOTES

See Next

See Second Sheet

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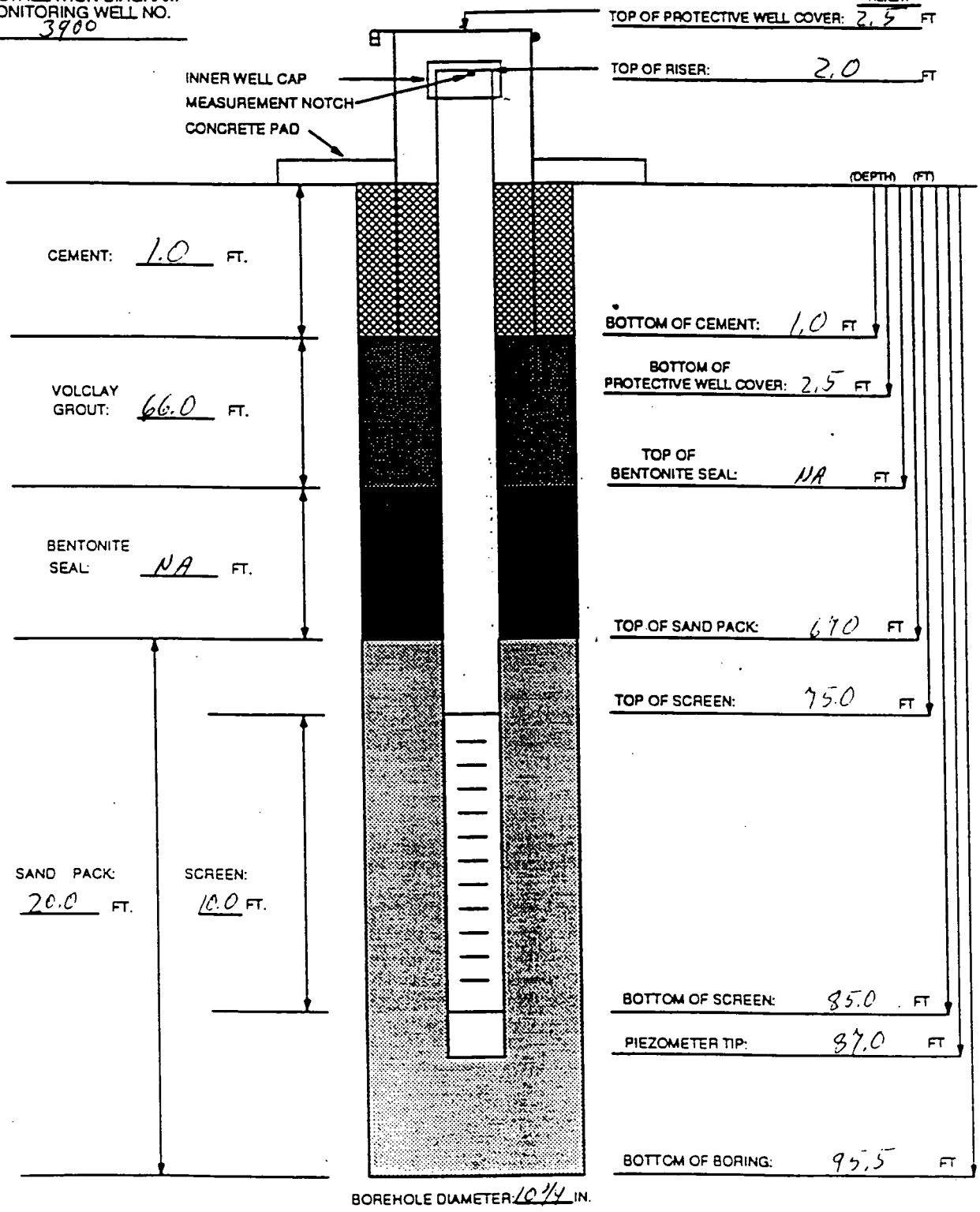
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3900

INSTALLATION DATE: 8-11-92 **4916**



BOREHOLE DIAMETER: 10 1/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 - 70 Bags 430/15 Bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 27 - 50 lb Bags
AMOUNT OF CEMENT: 20 Bags
AMOUNT OF WATER USED: 100 gal
OTHER: 16 Drums Drill Cuttings; 1 Drum Water Level
TASK: 04.03

NOTES:

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

GEOLOGIST/ENGINEER: Ken Cowell
Tracy Brown

0142

ASI FORM 2157 REV. 0

RI/FS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME Twelve Well
FIELD ENG./GEO. T Swann, C Geiger DATE 8-11-93
PROJECT NO. 04.33
CHECKED BY _____ DATE _____
BORING NO. 3900
~~PIEZOMETER~~ Monitoring Well NO. 3900 JKG 8-11-93
DATE OF INSTALLATION 8-11-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer Percussion Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0' TO 13.0'	SIZE 10" FROM 0.0' TO 95.0'
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0" ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8" I.D. 4.0"
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 7-10', 1-5', 1-2' (1-10' Screen with 2' Sump)
AVERAGE SIZE OF PERFORATIONS .020"	JOINING METHOD Screw Type Flush
TOTAL PERFORATED AREA 10.0'	Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'	OTHER PROTECTION Hinged well cover
PROTECTIVE PIPE O.D. 10 3/4 in	with Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
Concrete GROUT/SLURRY	TOP 1.0	BOTTOM 67.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 67.0	BOTTOM 87.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 75.0	BOTTOM 95.0	TOP	BOTTOM
PIEZOMETER TIP	87.0			
BOTTOM OF BOREHOLE	95.5			
GWL AFTER INSTALLATION	10.8			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS well Allowed To Collapse To 87.0'

DATE 04-AUG-93
TIME 16:01:38

WORK CARD REPORT
INORGANICS-EPM

PAGE 4916

SAMPLE ID: 200009226 P/A

USER SAMPLE ID: 109909
SAMPLE FAMILY NO: 9308041600

STUDY: FACILITIES CHARACTERIZATION
PROJECT NAME: RCRA PHASE II - 12 WELL PROGRAM
SAMPLING SITE:
SAMPLING GROUP: FACILITIES CHARACTERIZATION
MATERIAL NAME: M320/SOIL

SUBMISSION ID: 1000002885
RELEASE NUMBER: 1000000509
CHARGE NUMBER: RJM01
DATE SAMPLED: 30-JUL-93
SPL RECEIVED: 04-AUG-93
LOGGED SINCE:

COMMENT: SEND RESULTS TO MIKE FRANK, JOEL WRIGHT
2 DAY TAT PRIORITY

****

TASK ID: 300012532

DUE DATE: 06-AUG-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 90% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	5	8-6-93	BB	

TASK ID: 300012533

DUE DATE: 06-AUG-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 50% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

ASL/ EST CONC

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	21	8-6-93	BB	

TASK ID: 300012534

DUE DATE: 06-AUG-93
HOLDING TIME DAYS: 28

METHOD/OPERATION
9158/DET OF PARTICLE SIZE, SIEVE ME
9158/DET OF PARTICLE SIZE, 40% RETA

INSTRUMENT CLASS/ INSTRUMENT NAME

Crossch
Entered o
Approved o

SAMPLE ID: 200009226

USER SAMPLE ID: 109909
SAMPLE FAMILY NO: 9308041600

-4916

****

COMPONENT	UNITS	RESULTS	TASK DATE	ANALYST	APPROVED BY
SOLID	.001 inc	30	8-6-93	BB	

3 TASKS PRINTED

*** END OF REPORT ***

METHOD: 9158 SIEVE ANALYSIS

CUSTOMER NUMBER: 109909

MATERIAL:

SAMPLE NUMBER: 200009226

Sample Weight: 114.54 g

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	24.54	21.4	21.4	78.7
20	17.46	15.2	36.6	33.5
40	25.66	22.4	59.0	16.7
60	21.97	19.2	78.2	9.8
100	12.63	11.0	89.2	5.9
200	7.69	6.7	95.9	3.0
PAN	3.80	3.3	99.2	

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

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

Analyzed by:	Checked by:	Date analyzed:
B. Beagle	Tom McCullough 8-6-93	8-6-93

GRAIN SIZE RETAINED

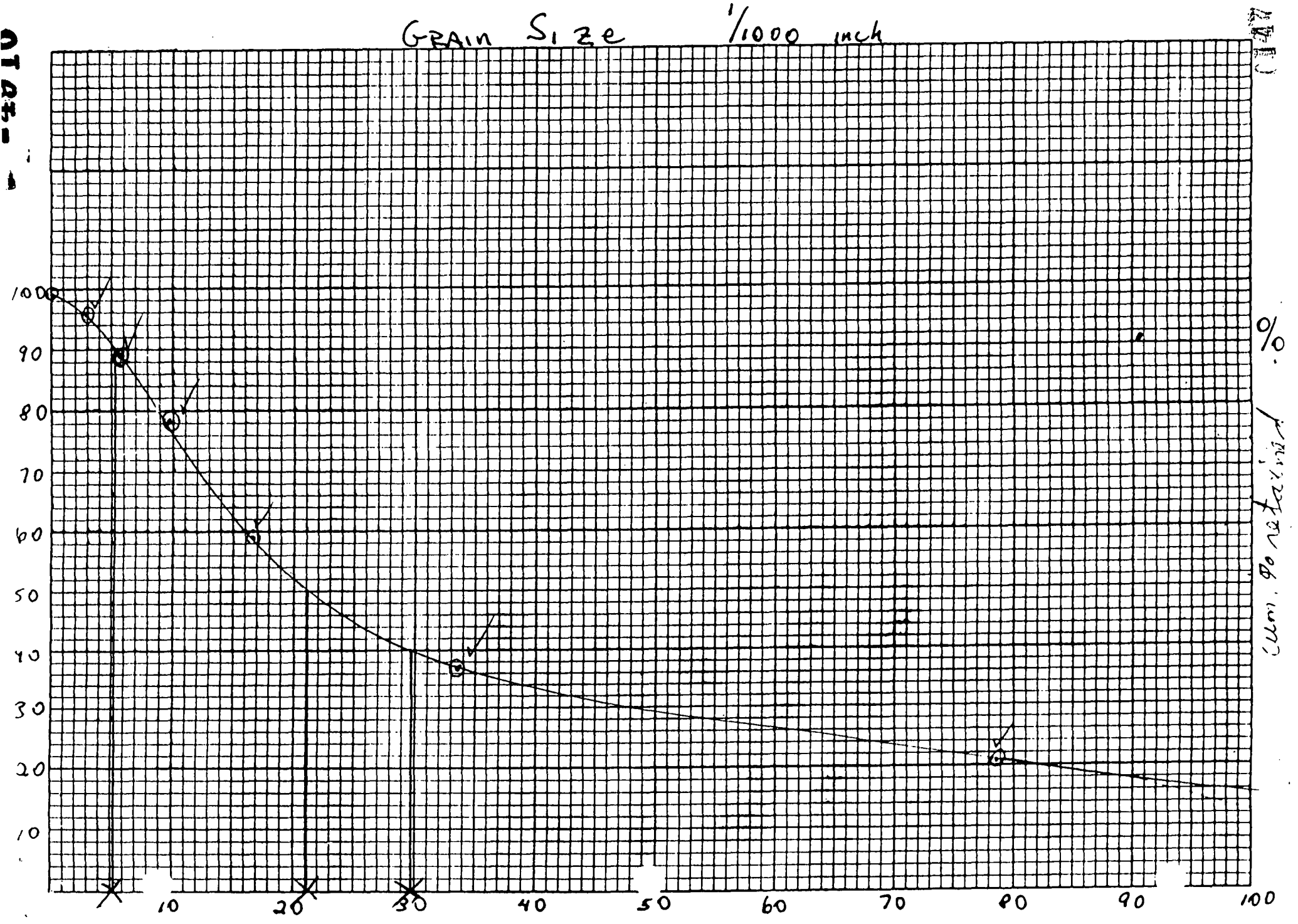
90% 5

50% 21

40% 30

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

EUGENE DIETZGEN CO
MADE IN U. S. A.



Well # 3900

Sieve Analysis

8-6-93

Sample # 109909

-4916

Ken Geiger

Retained Values

40% .030

50% .021

90% .005

$\frac{.030}{.005} = 6.0$ 6.0 > 3 use a factor of 4

4 X .021 = .084

.084 most closely fits the coarse grain sand and the .020 screen size.

0148

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11091	COORDINATES.	DATE 8-9-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 8-9-93
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
8-9-93 ↓ 0.5	0731 070527 070528 070529	15	6	HARD (10YR 4/2) DARK GRAYISH BROWN, SILTY CLAY, low PLASTICITY, DRY. Some gravel inclusions, fill.	CL	4+	MT = 0.0 ppm Bg = 80 cpm
1.0	0731	17	6	HARD (10YR 4/2) DARK GRAYISH BROWN, SILTY CLAY, low plasticity, DRY.	CL	4+	MT = 0.0 ppm Bg = 80 cpm 070530
1.5	0731 070531 070532 070533	15	6	SAA Sample 1	CL	4+	MT = 0.0 ppm Bg = 80 cpm
2.0	0737	6	6	VERY STIFF (10YR 5/2) GRAYISH BROWN, SILTY CLAY, LOW PLASTICITY, DRY.	CL	2.0	MT = 0.0 ppm Bg = 80 cpm 070534
2.5	0737	7	6	SAA	CL	2.0	MT = 0.0 ppm Bg = 80 cpm 070535
3.0	0737 070536 070537 070538	7	6	SAA Sample 2	CL	2.0	MT = 0.0 ppm Bg = 80 cpm
3.5	0757	4	6	VERY STIFF (10YR 4/2) DARK GRAYISH BROWN, SILTY CLAY, DRY. LOW TO MEDIUM PLASTICITY.	CL	3.0	MT = 0.0 ppm Bg = 80 cpm 070539
4.0	0757	7	6	SAA	CL	3.0	MT = 0.0 ppm Bg = 80 cpm 070540
↑ Original Hole 4.5	0757	9	6	SAA Sample 3	CL	3.0	MT = 0.0 ppm Bg = 80 cpm 070541
Second Hole ↓ 5.0	0858	7	6	VERY STIFF (10YR 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, Some small gravel, medium plasticity, DRY	CL	2.0	MT = ppm Bg = cpm 070542
5.0							

NOTES

SAA - Same As Above

Driller - Resin Drill Contractor

Driller - M. Bentley

Helper - S. Anderson

Background MT - 0.0 ppm Bg = 80 cpm

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11091	COORDINATES:	DATE 8-9-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 8-9-93
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1'	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
8-9-93 5.5	0858	8	6	VERY STIFF (10YR, 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, SOME SMALL GRAVEL, MEDIUM PLASTICITY, DRY.	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070543-A
6.0	0858	7	6	SAA Sloon 4	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070544-A
6.5	0903 070545 070546 070547	16	6	VERY STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN SILTY CLAY, MEDIUM PLASTICITY, DRY	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm
7.0	0903	16	6	SAA	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070548-A
7.5	0903	17	6	SAA Sloon 5	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070549-A
8.0	0919	7	6	SAA	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070550-A
8.5	0919	15	6	HARD (2.5Y, 5/6) light olive brown silty clay, some silt laminae, core parts along silty laminae, low to medium plasticity, DRY. A few small gravel pebbles. Silty layers are (2.5Y, 6/2) light gray.	CL	4.0+	HNT = 0.0 ppm; BG = 80 cpm; 070551-A
9.0	0919	15	6	SAA Sloon 6	CL	4.0+	HNT = 0.0 ppm; BG = 80 cpm; 070552-A
9.5	0930 070553 070554 070555	5	6	STIFF (2.5Y, 5/6) light olive brown, silty clay, medium to high plasticity, DRY.	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm
10.0	0930	6	6	SAA	CL	2.0	HNT = 0.0 ppm; BG = 80 cpm; 070556-A

NOTES

SAA - Same As Above

Driller - Rexon Drill Contractor

Driller - M. Santin

Helper - B. Anderson

Background HNT - 0.0 ppm; BG = 80 cpm

0150

PROJECT NUMBER: [redacted]	PROJECT NAME: [redacted]	
BORING NUMBER: [redacted]	COORDINATES: [redacted]	DATE [redacted]
ELEVATION: [redacted]	GWL: Depth [redacted] Date/Time [redacted]	DATE STARTED: [redacted]93
ENGINEER/GEOLOGIST O. Costello	Depth [redacted] Date/Time [redacted]	DATE COMPLETED: 8-9-93
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF [redacted]

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	10.0							
8-9-93 ↓	10.5	0930	8	6	STIFF (2.5Y 5/6) light olive brown, silty clay. Some silt laminae, low to medium plasticity, dry. A few small gravel pebbles. Stock 7↑	CL	1.0	MT = 0.0 ppm BG = 40 cpm 070557-A
	11.0	0945	4	6	SAA	CL	1.0	MT = 0.0 ppm BG = 80 cpm 070561-A
	11.5	0945	5	6	SAA	CL	1.0	MT = 0.0 ppm BG = 80 cpm 070562-A
	12.0	0945	7	6	STIFF (2.5Y 5/6) light olive brown, silty clay. Silty laminae up to 1/4 inch thick, medium plasticity, moist. Stock 8↑	CL	1.0	MT = 0.0 ppm BG = 80 cpm 070563-A
	12.5	0950 070564 070565 070566	6	6	SAA	CL	1.0	MT = 0.0 ppm BG = 80 cpm
	13.0	0950	8	6	SAA	CL	1.0	MT = 0.0 ppm BG = 80 cpm 070567-A
↑ 8-9-93	13.5	0950	10	6	MEDIUM DENSE (2.5Y 6/2) light gray, clayey SILT, WET. Stock 9↑	ML	NA	MT = 0.0 ppm BG = 80 cpm 070568-A
					Total Depth - 13.5 ft. Pushed Hydropunch to 16.5, pulled back to 14.0. Sampled.			MT = ppm BG = cpm
					070558 - T Blank 070559 - Hydropunch VOA's 070560 - Gross A16 Screen			MT = ppm BG = cpm
								MT = ppm BG = cpm

NOTES

SAA - Same As Above

Driller - Penn Drill
Contractor
Driller - M. Bentley
Helper - B. Anderson

Background
MT = 0.0
BG = 80

RI/FS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME CRU-5 FIELD ENG./GEO. O. Costello DATE 8-9-93
PROJECT NO. 50.05.18 CHECKED BY _____ DATE _____
BORING NO. B-11091
PIEZOMETER NO. B-11091 DATE OF INSTALLATION 8-9-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT Hollow Stem Auger 4¼ inch ID
CASING SIZE (S) USED:
SIZE _____ FROM NA TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

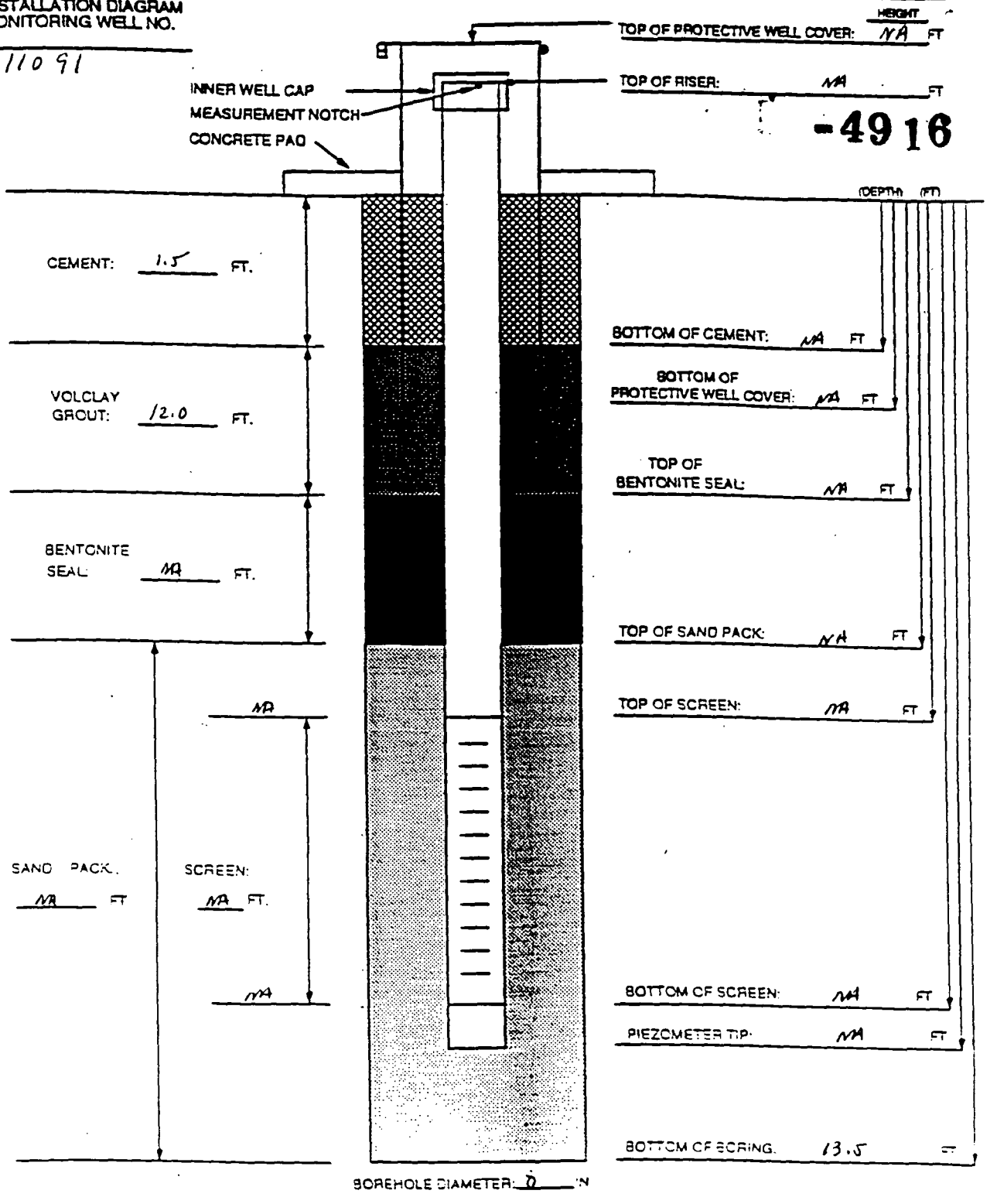
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 NA	BOTTOM 1.5 NA	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.5			
SWL AFTER INSTALLATION	NA			

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

INSTALLATION DIAGRAM
MONITORING WELL NO.

110 91

INSTALLATION DATE: 8/9/93



BOREHOLE DIAMETER: 10 IN

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 10 gallons
OTHER: NA
TASK: NA

NOTES

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0 NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST ENGINEER: O Gisella
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH ENCLOSURE

0153

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: B # 11092	COORDINATES:	DATE: 8-5-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 8-5-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 8-6-93	
DRILLING METHODS: AUGER		PAGE 1 OF 4	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	122427 122428 122429 ~~0930~~ 8-5-93	22 PP 1.5 ~~53~~ 1500	6	DENSE, ~~LIGHT GRAY (2.5Y 7/1)~~, POORLY GRADED, SAND ~~BROWN~~ WITH SOME ~~FINES~~ MEDIUM GRAVEL, DRY.	~~GW~~ SW ~~SP~~	NA	MICROTIP = ~~4.2~~ ppm BG = 80 cpm
1.0	122436 1500 ~~0932~~ 8-5-93	17	6	MEDIUM DENSE, LIGHT OLIVE BROWN (2.5Y 5/4) POORLY GRADED, FINE SAND, DRY	SP	NA	
1.5	122437 122438 122439 ~~0933~~ 1500 8-5-93	20 PP 1.5	6	SAA	SP	NA	1500 TIME ~~0930~~
2.0	122440 1530 8-5-93	17	6	SAA	SP	NA	MICROTIP = 2.0 ppm BG = 50 cpm
2.5	122441 1530 8-5-93	6	6	VERY STIFF, ~~VERY DARK GRAY (2.5Y 3/1)~~, LIGHT OLIVE BROWN (2.5Y 5/6), SILTY CLAY, MED. PLASTICITY, MOIST. SAME AS 2.5 - 3.0	CL	2.0	
3.0	122442 122443 122444 1530 8-5-93	27	6	VERY STIFF, VERY DARK GRAYISH BROWN (2.5Y 3/2), SILTY CLAY, MED PLASTICITY SLIGHTLY MOIST	CL	2.5	TIME 1530
3.5	122445 0730 8-6-93	7	NA	NO RECOVERY	NA	NA	MICROTIP = NA ppm BG = ~~50~~ NA cpm 8-6-93
4.0	122446 0730 8-6-93	3	NA	NO RECOVERY	NA	NA	
4.5	122447 0730 8-6-93	4	NA	NO RECOVERY	NA	NA	TIME 0730
	122448 0795 8-6-93	7	6	LOOSE, OLIVE BROWN (2.5Y 4/4) POORLY GRADED FINE SAND, WITH TRACE OF MED. GRAVEL, SLIGHTLY MOIST	SP	NA	MICROTIP = 1.8 ppm BG = 50 cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
BETA GAMMA - 50 cpm
MICROTIP 0.5 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

0154

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: B# 11092	COORDINATES:	DATE: 8-6-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-5-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-6-93	
DRILLING METHODS: AUGER		PAGE 2 OF 4	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	122499 0745 8-6-93	8	6	STIFF, OLIVE BROWN (2.5Y 4/3), SILTY CLAY, WITH SOME FINE GRAVEL & SAND, MED. PLASTICITY, SLIGHTLY MOIST	CL	1.75	SEE PREVIOUS PAGE
6.0	122450 0745 8-6-93	11	6	VERY STIFF, LIGHT OLIVE BROWN (2.5Y 5/6), SILTY CLAY WITH TRACE OF FINE SAND, MED. PLASTICITY, MOIST	CL	2.25	
6.5	122901 122902 122903 0800 8-6-93	17	6	SAA	CL	2.25	MICROTIP = 20 PPM BZ = 90 CPM
7.0	122904 0800 8-6-93	12	6	SAA	CL	2.5	
7.5	122905 0800 8-6-93	10	6	VERY SOFT, LIGHT OLIVE BROWN (2.5Y 5/6) CLAYEY SILT, WITH TRACE OF FINE SAND, NON PLASTIC TO SLIGHTLY PLASTIC, WET	ML	1.5	
8.0	~~122906~~ PR 8-6-93		~~6~~	(7.5 FEET TOTAL DEPTH)			MICROTIP = PPM BZ = CPM
8.5	~~122907~~ PR 8-6-93		PR 8-6-93 ~~6~~				
9.0	~~122908~~ PR 8-6-93						
9.5	~~122909~~ ~~122910~~ ~~122911~~ PR 8-6-93						MICROTIP = PPM BZ = CPM
	~~122912~~ PR 8-6-93						

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

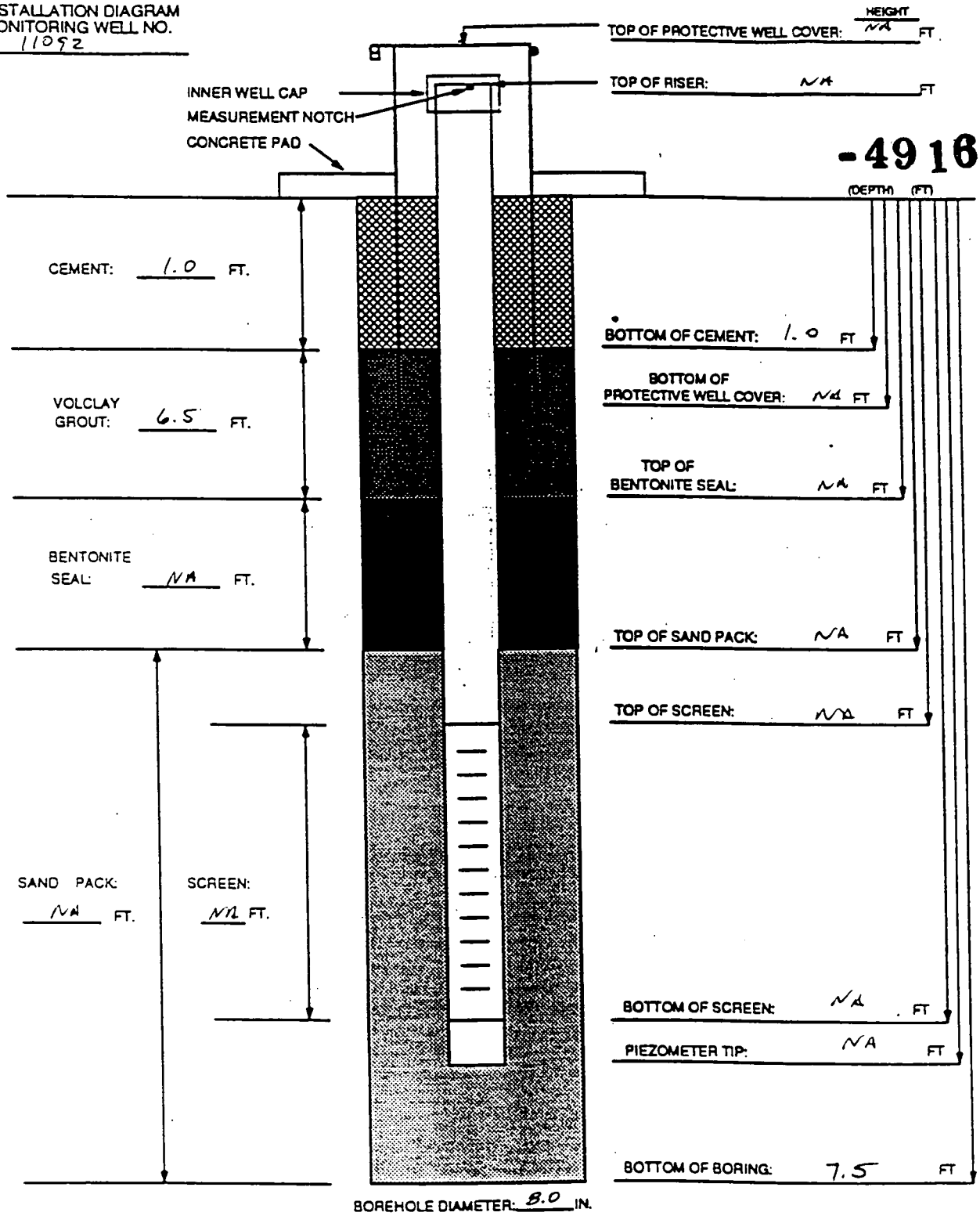
SAA = Same As Above
N/A = Not Applicable

Background =
BZ = 50 cpm
MT = 22 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11092

INSTALLATION DATE: 8-6-93



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2.5
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 15 GALLONS
ER: NA
TASK: 50.03.10

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT/NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME CRU 5 PHASE II FIELD ENG./GEO. RILEY DATE 8-6-9
PROJECT NO. 50.03.18 CHECKED BY DATE
BORING NO. 11052
PIEZOMETER NO. NA DATE OF INSTALLATION 8-6-93

BOREHOLE DRILLING

DRILLING METHOD AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION GROUTED UP TO 1.0 FOOT BELOW SURFACE, CONCRETE TO 0.0 FEET

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 7.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	7.5			
GWL AFTER INSTALLATION	NA			

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

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50.03.18	PROJECT NAME: CDV-5	
BORING NUMBER: 11094	COORDINATES:	DATE: 8-9-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-9-93
ENGINEER/GEOLOGIST: J. Costello	Depth Date/Time	DATE COMPLETED: 8-10-93
DRILLING METHODS: Hollowstem Auger		PAGE 1 OF 34

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (OA: 8-10-93)
8-9-93 0.0	1412 070568 070569 070570	22	6	HARD (10YR 4/4) DARK yellowish-brown, SILTY CLAY, low plasticity, DRY. Some coarse pebbles from sulfur.	CL	4.0+	MICROTIP = 2.5 ppm BG = 90 cpm
0.5	1412	18	6	SAA	CL	4.0+	070571-A
1.0	1412 070572 070573 070574	37	6	HARD (10YR 3/3) DARK BROWN, SILTY CLAY, low plasticity, DRY. Occasional gravel pebbles, small. 1)	CL	4.0+	
1.5	1427	18	6	VERY STIFF (5Y 4/4) OLIVE; SILTY CLAY, low plasticity, DRY.	CL	3.0	MICROTIP = 1.6 ppm BG = 90 cpm 070575A
2.0	1427	27	6	SAA	CL	3.0	070576A
2.5	1427 070577 070578 070579	38	6	VERY STIFF (2.5Y N2/) VERY DARK GRAY, SILTY CLAY, low to medium plasticity, DRY. 2)	CL	3.5	
3.0	1445	14	6	SAA	CL	3.5	MICROTIP = 1.4 ppm BG = 80 cpm 070580-A
3.5	1445	17	6	SAA	CL	3.5	070581-A
4.0	1445	28	6	HARD (2.5Y 4/4) DARK yellowish-brown; SILTY CLAY, low plasticity, DRY. 3)	CL	4.0+	070582-A
4.5	N/A	28	6	VERY STIFF (2.5Y N2/) VERY DARK GRAY, SILTY CLAY; MOTTLED APPEARANCE, medium plasticity, DRY.	CL	3.0	MICROTIP = .7 ppm BG = 90 cpm 070583-A
5.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment :
Driller : Joe Land
Helper : James Anderson

SAA = Same As Above
N/A = Not Applicable

Background = 90.0 BG
0.0 MICROTIP

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: OU-5	
BORING NUMBER: 11094	COORDINATES:	DATE: 8-9-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-9-93
ENGINEER/GEOLOGIST: D. Gaskill	Depth Date/Time	DATE COMPLETED: 8-10-93
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 4

8-9-93

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	1454	32	6	VERY STIFF (2.5Y, N2/) VERY DARK GRAY, SILTY CLAY, MOTTLED APPEARANCE, MEDIUM PLASTICITY, DRY.	CL	3.0	MICROTIP = .7 PPM BG = 90 CPM 070584-A
5.5	1454	42	6	SAA 4)	CL	3.0	070585-A
6.0	1308 070586 070587 070588	38	6	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY MEDIUM PLASTICITY, MOTTLED APPEARANCE, DRY.	CL	3.0	
6.5	1308	47	6	SAA	CL	3.0	MICROTIP = .5 PPM BG = 90 CPM 070589-A
7.0	1309	53	6	SAA 5)	CL	3.0	070590-A
7.5	1319	5	6	VERY STIFF (10YR, 4/3) BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY.	CL	3.0	070591-A
8.0	1319	7	6	SAA	CL	3.0	MICROTIP = 1.4 PPM BG = 80 CPM 070592-A
8.5	1319	11	6	VERY STIFF (7.5YR, 3/2) DARK BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY. 6)	CL	3.0	070593-A
9.0	1344 070594 070595 070596	6	6	SAA Clayey	CL	2.5	
9.5	1344	8	6	MEDIUM STIFF (10YR, 4/3) BROWN ~~SILTY CLAY~~ SILT, VERY CLAYEY DRY BREAKS by c/c 8-9-93 like a silt. DRY	ML ~~CL~~ ~~MC~~ ~~SC~~ CL 8-9-93	NA ~~3.0~~	MICROTIP = 1.6 PPM BG = 90 CPM 070597-A
10.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : SSHA
Driller :
Helper :

SAA = Same As Above
N/A = Not Applicable

Background = 90.0 BG

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME.	
BORING NUMBER. 11094	COORDINATES:	DATE 8-10-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 8-10-93
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 4

	DEPTH 1 FT 1	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1	RECOVERY 1 IN 1	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS (8-10-93 GIC)
8-9-93 ↓ ↑ 8-9-93	10.0	1544	9	6	MEDIUM DENSE (10YR, 4/3) BROWN, CLAYEY SILT, VERY CLAYEY BUT BEHAVES LIKE A SILT. DRY Spoon 71 ↑	ML	NA	MT = 1.6 ppm Bg = 90 cpm 070598-A
8-10-93 ↓	11.0	0734	23	6	MEDIUM DENSE (10YR, 5/6) yellowish brown, clayey silt, moist. Laminated bands of clay and silt, but mostly silt.	ML	NA	MT = 1.6 ppm Bg = 90 cpm 070599-A
	11.5	0734	17	6	SAA	ML	NA	MT = 1.6 ppm Bg = 90 cpm 070600-A
	12.0	0734	12	6	SAA Spoon 8 ↑	ML	NA	MT = .5 ppm Bg = 90 cpm 070701-A
	12.5	0745 070702 070703 070704	33	6	VERY DENSE (10YR, 5/6) FINE GRAINED SAND, POORLY GRADED, WET. Yellowish brown. / VERY DENSE (10YR, 5/6) COARSE GRAINED SAND, POORLY GRADED, WET. Yellowish brown.	SC / SC	NA / NA	MT = 0.0 ppm Bg = 90 cpm
	13.0	0745	28	6	VERY DENSE (10YR, 5/6) yellowish brown, COARSE GRAINED SAND, POORLY graded, WET.	SC	NA	MT = 0.0 ppm Bg = 90 cpm 070705-A
	13.5	0745	22	6	VERY DENSE (10YR, 4/1) DARK GRAY, CLAYEY SILT, WET. Spoon 9 ↑	ML	NA	MT = 0.0 ppm Bg = 90 cpm 070706 A (LAST SOIL SAMPLE)
	14.0	1036	5	0	FROM 13.5 to TOTAL DEPTH OF 16.5 was FIRST PENETRATED by Hydropunch. When spoon was driven, there was no	NA	NA	MT = NA Bg = NA cpm
	14.5	1036	6	0	RECOVERY, NO SAMPLES TAKEN. Hydropunch Pilot Hole	NA	NA	MT = NA ppm Bg = NA cpm
	15.0	1036	5	0	NA Spoon 10 ↑ ↓	NA	NA	MT = NA ppm Bg = NA cpm

NOTES

SAA - Same As Above

Driller - Penn Drill Contractor

Driller - J. Rabb

Helper - J. Anderson

Background MT - 0.0 ppm Bg = 90 cpm

0160

8 2

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER. CRU-5 SC.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11094	COORDINATES.	DATE 8-10-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED. 8-10-93
DRILLING METHODS Hollow Stem Auger		PAGE 4 OF 4

DEPTH (FT) 13.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
13.5	1043	5	0	NO Sample recovery. See P.3	NA	NA	MT = NA ppm Bg = NA cpm
16.0	1043	6	0	NA Hydropunch Pilot Hole	NA	NA	MT = NA ppm Bg = NA cpm
16.5	1043	5	0	NA	NA	NA	MT = NA ppm Bg = NA cpm
				Total Depth 16.5' Hydropunch - 15.0-16.0			MT = ppm Bg = cpm
				Collected Rinsate After this Boring. See FADL.			MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

8-10-93

NOTES

SAA - Same As Above

Driller - Penn Drill Contractor

Driller - J. Cobb

Helper - J. Anderson

Background

MT = 0.0 ppm

Bg = 80 cpm

210

33

INSTALLATION DIAGRAM
MONITORING WELL NO.

11094

INSTALLATION DATE: 6-7-93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT

INNER WELL CAP

MEASUREMENT NOTCH

CONCRETE PAD

-4916

(DEPTH) (FT)

CEMENT: 1.5 FT.

VOLCLAY GROUT: 12.0 FT.

BENTONITE SEAL: NA FT.

SAND PACK: NA FT

SCREEN: NA FT.

NA

NA

BOTTOM OF CEMENT: 1.5 FT

BOTTOM OF PROTECTIVE WELL COVER: NA FT

TOP OF BENTONITE SEAL: NA FT

TOP OF SAND PACK: FT

TOP OF SCREEN: FT

BOTTOM OF SCREEN: NA FT

PIEZOMETER TIP: NA FT

BOTTOM OF BORING: 13.5 FT

BOREHOLE DIAMETER: 8 IN

MATERIALS USED

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5 GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 2

AMOUNT OF CEMENT: 1

AMOUNT OF WATER USED: 10 gallons

OTHER: NA

TASK: NA

NOTES

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS NA IN I.D. 316 STAINLESS STEEL PIPE WITH 0.NA IN SLOTS

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG

GEOLOGIST ENGINEER: O. Lashlee

4) WATER DEPTH AND DATE NA FT NA

5) TOP OF CASING IS SECURED W/ STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH GROUND LEVEL

7) WELL CASING HAS A BOTTOM COVER IN THE GROUND

0162 34

RI/FS

PIEZOMETER INSTALLATION SHEET - 4916

PROJECT NAME CW-5 FIELD ENG./GEO. O. Costello DATE 8-9-93
PROJECT NO. 50-03.18 CHECKED BY _____ DATE _____
BORING NO. 1104 _____
PIEZOMETER NO. 1104 DATE OF INSTALLATION 8-9-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Hollow Stem Auger - 4 1/4 in. ID
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE _____ FROM NA TO _____
FLUID NA FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____	RISER PIPE MATERIAL _____
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS: _____
PERFORATION TYPE: _____	O.D. NA I.D. _____
SLOTS ☐ NA HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS _____	JOINING METHOD _____
TOTAL PERFORATED AREA _____	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (NA)		ELEVATION (NA)	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.5	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.5			
SWL AFTER INSTALLATION	NA			

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

C183

85

VISUAL CLASSIFICATION OF SOILS

4918

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11096	COORDINATES.	DATE 06-05-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 06-05-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 06-05
DRILLING METHODS Hollow Stem Auger 4 1/4 inch ID		PAGE 1 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				Cement - 8 inches			
0.5	1040	4	6	HARD (10YR, 3/3) DARK BROWN, SILTY CLAY, LOW PLASTICITY, DRY.	CL	4+	MT = 0.0 ppm Bg = 140 cpm
1.0	1040 122951 122952 122953	4	6	HARD (10YR, 3/3) DARK BROWN, SILTY CLAY, LOW PLASTICITY, DRY. 3/4 inch lense of coarse grained sand.	CL	4+	MT = 0.0 ppm Bg = 140 cpm 122954-A
1.5	1040	4	6	STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY WITH OCCASIONAL large gravel cobbles. Spoon 1	CL	1.0	MT = 0.0 ppm Bg = 140 cpm
2.0	1046	5	6	SAA	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122958-A
2.5	1046	7	6	SAA	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122959-A
3.0	1046 122960 122961 122962	7	6	STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, medium to high plasticity, moist, occasional large gravel cobbles. Spoon 2	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122985, 986, 987 Dup
3.5	1330	4	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY, medium to high plasticity, DRY.	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122963-A
4.0	1330	4	6	SAA	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122964-A
4.5	1332	5	6	SAA Spoon 3	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122965-A
5.0	1335	5	6	SAA	CL	1.0	MT = 0.0 ppm Bg = 140 cpm 122966-A

NOTES

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - B. Anderson

Rig Mobile 80

SAA - Same As Above

Background

MT - 0.0

Bg = 120.0

0164

86

VISUAL CLASSIFICATION OF SOILS - 4916

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11096	COORDINATES.	DATE 06-05-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 06-05-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED 06-05
DRILLING METHODS: Hollow Stem Auger 4 1/4 inch ID		PAGE 2 OF

DEPTH (FT) 5.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	1335	6	6	STIFF (2.5Y, N3/) VERY DARK GRAY, SILTY CLAY, medium to high plasticity; Dry.	CL	1.5	MT = 0.0 PP in BJ = 140 CP in 122967-A
6.0	1335	6	6	SAA Sample 4 ↑	CL	1.5	MT = 0.0 PP in BJ = 140 CP in 122968-A
6.5	1347 122969 122970 122971	6	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY, medium to high plasticity, Dry.	CL	1.0	MT = 0.0 PP in BJ = 140 CP in
7.0	1347	6	6	SAA	CL	1.0	MT = 0.0 PP in BJ = 140 CP in 122972-A
7.5	1347	6	6	SAA Sample 5 ↑	CL	1.0	MT = 0.0 PP BJ = 140 CP 122973 A
8.0	1402	3	6	SAA	CL	1.0	MT = 0.0 PP BJ = 140 CP 122974-A
8.5	1402	5	6	VERY STIFF (2.5Y, 3/1) VERY DARK GRAY, SILTY CLAY, LOW TO MEDIUM PLASTICITY, DRY.	CL	2.0	MT = 0.0 PP BJ = 140 CP 122975-A
9.0	1402	7	6	VERY STIFF (2.5Y, 4/3) OLIVE, SILTY CLAY, LOW TO MEDIUM PLASTICITY, DRY. Sample 6 ↑	CL	2.0	MT = 0.0 PP BJ = 140 CP 122976
9.5	1412 122977 122978 122979	4	6	STIFF (2.5Y, 5/6) light olive brown, SILTY CLAY, moist, medium plasticity, (looks a little siltier than before.)	CL	1.0	MT = 0.0 PP BJ = 140 CP
10.0	1412	5	6	STIFF (2.5Y, N/3) VERY DARK GRAY, SILTY CLAY, medium plasticity, moist	CL	1.0	MT = 0.0 P BJ = 140 CP 122980 A

NOTES

SAA - Same As Above

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - B. Andersen

Rig Mobile 80

Organic MT - 0.0

BJ - 120.0

0165 S1

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5		4916
BORING NUMBER. 11096	COORDINATES:		DATE 06-05-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06-05-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 06-05-
DRILLING METHODS Hollow Stem Auger 4 1/4 inch ID			PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10.5	1412	6	6	STIFF (2.5Y, N3/) very DARK GRAY, SILTY CLAY, medium plasticity; moist. Sample 7	CL	2.0	MT = 0.0 ppm Bg = 140 cpm 122581-A
11.0	1426	1	6	STIFF (2.5Y, N4) DARK GRAY, SANDY CLAY, medium plasticity, moist. (NOTE - first appearance of SAND)	CL	2.0	MT = 0.0 ppm Bg = 140 cpm 122582-A
11.5	1426	2	6	SAA	CL	2.0	MT = 0.0 ppm Bg = 140 cpm 122583 A
12.0	1426	1	6	STIFF (2.5Y, N4) DARK GRAY, SANDY CLAY, medium plasticity, wet. Sample 8	CL	2.0	MT = 0.0 ppm Bg = 140 cpm 122584-A
12.5	1432 122592 122593 122594	7	6	MEDIUM DENSE (2.5Y, 3/2) very DARK GRAYISH BROWN; medium to coarse grained SAND, poorly graded, wet.	SC	NA	MT = 0.0 ppm Bg = 140 cpm
13.0	1432	8	6	STIFF (2.5Y, 5/6) light olive brown, SILTY CLAY, medium plasticity, wet.	CL	1.5	MT = 0.0 ppm Bg = 140 cpm 122595-A
13.5	1432	10	6	MEDIUM DENSE (2.5Y, N4) DARK GRAY, CLAYEY SILT, WET. Sample 9	ML	NA	MT = 0.0 ppm Bg = 140 cpm 122596 A
			6 cpm 6-5-93	TOTAL DEPTH = 13.5 FT. Hydropunch - 14.0 - 16.0			MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES:

Driller - Rein Drill Contractor

Driller - M. Bentley

Helper - B. Anderson

Log Made By

SAA - Same as Above

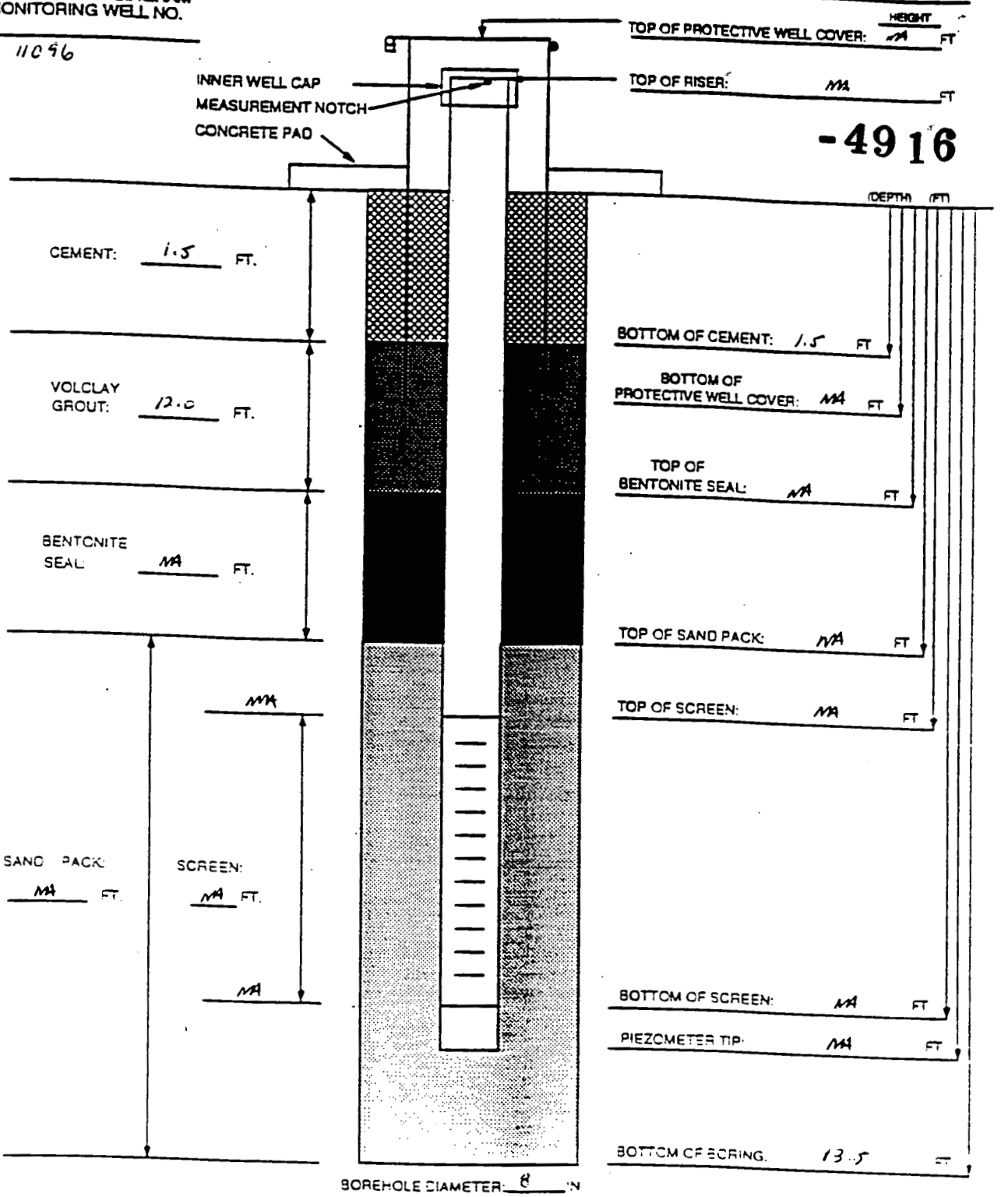
Background

MT - 0.0

Bg = 120.0

INSTALLATION DIAGRAM
MONITORING WELL NO. 11096

INSTALLATION DATE: 08-05-93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5 GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 15 gallons
OTHER: NA
TASK: NA

NOTES

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0 NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH LOCK.

GEOLOGIST ENGINEER: O. Costello

0167

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RI/FS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME CAU-5
PROJECT NO. 50-03-18
BORING NO. 11096
PIEZOMETER NO. 11096

FIELD ENG./GEO. D. Costello DATE 08-93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 08-05-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger 4¼ ID
DRILLING FLUID (S) USED:
FLUID _____ FROM _____ TO _____
FLUID _____ FROM NA TO _____

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	13.5			
SWL AFTER INSTALLATION	NA			

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

168

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

.916

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 11098	COORDINATES		DATE 06AUG93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 06AUG93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 07AUG93
DRILLING METHODS HOLLOW STEM AUGER - CONTINUOUS SAMPLER			PAGE 1 OF 5

BORED THROUGH 1FT OF CONCRETE AND GRAVEL/SAND

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	06AUG 122785 122786 122787	N/A	6	MEDIUM STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, YELLOW MOTTLES, MEDIUM PLASTICITY, MOIST	CL	0.75	MT: 0 BY: 100 A 06AUG93 17:00
	122788		6	STIFF (5Y, 4/2) OLIVE GRAY, SILTY CLAY, TRACE BLACK MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.5	ARC
1	122789 122790 122791 1315		6	SAA VERY STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, BLACK MOTTLES, MEDIUM PLASTICITY, MOIST	CL	3.5	TIME: 1315 A
	06AUG 122792		6	HARD (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, INCREASED SILT, TRACE GRAY MOTTLES, LOW PLASTICITY, MOIST	CL	>4.5	MT: 0 BY: 100 ARC
2	122793		6	VERY SOFT (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY TRACE SAND, GRAY MOTTLES, MEDIUM PLASTICITY, MOIST	CL	<0.25	ARC
	122794 122795 122796 1315		6	SAA	CL	0.5	TIME: 1315 A
3	06AUG 122797		6	SAA	CL	0.75	MT: 0 BY: 100 ARC
	122798		6	STIFF (5Y, 4/2) OLIVE GRAY, SILTY CLAY, TRACE GRAY, YELLOW MOTTLES, SAND, MEDIUM PLASTICITY, MOIST	CL	1.5	ARC
4	122799		3	SAA	CL	1.0	TIME 1315 ARC
	06AUG 122800		6	STIFF (5Y, 2.5/2) BLACK, SILTY CLAY, TRACE ORGANICS, SAND, MEDIUM PLASTICITY, MOIST	CL	1.75	MT: 0 BY: 120 ARC
5	122801		6	SAA	CL	2.0	ARC
	122802	N/A	6	STIFF (5Y, 3/2) DARK OLIVE GRAY, SILTY CLAY, TRACE GREEN MOTTLES, ORGANICS, MEDIUM PLASTICITY, MOIST			TIME: 1440 ARC

SET CONTINUOUS SAMPLER

DRILLING FIRM: PENN DRILL

DRILLERS RON CONNERS, TEDISAIS

RIG SIMCO 4000 TR2

UNITS MEASURED
MICROTIP = ppm
BY = CPM
α = CPM
ARC = ARCHIVE

BACKGROUND READINGS:
MICROTIP 0 ppm
BY 150 CPM
α N/A CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

0169

91

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS / PHASE II		
BORING NUMBER 11098	COORDINATES	DATE 06AUG93	
ELEVATION	GWL. Depth Date/Time	DATE STARTED 06AUG93	
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED 07AUG93	
DRILLING METHODS HOLLOW STEM AUGER CONTINUOUS SAMPLER		PAGE 2 OF 5	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	06AUG 122803 ~~122805~~ 122804 ~~122806~~ 122805 ~~122~~	N/A	6	STIFF (5Y, 5/4) OLIVE SILTY CLAY GRAY MOTTLES, TRACE SAND, MEDIUM PLASTICITY, MOIST	CL	1.25	MT: 0 BY: 120 A
7	122806		6	MEDIUM STIFF (2.5Y, 6/2) LIGHT BROWNISH GRAY, SILTY CLAY, TRACE SAND, ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	0.75	ARC
	122807 1440		6	SAA	CL	1.75	TIME: 1440 ARC
8	06AUG 122808		6	SAA	CL	1.5	MT: 0 BY: 120 ARC
	122809		6	SAA	CL	1.5	ARC
9	122810 1440		6	SAA	CL	1.5	TIME: 1440 ARC
1440 1540	06AUG 122811 122812 122813		6	HARD (2.5Y, 6/2) LIGHT BROWNISH GRAY, VERY SILTY CLAY, TRACE SAND ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	4.5	MT: BY: A
	122814		6	(2.5Y, 6/2) LIGHT BROWNISH GRAY, CLAYEY SILT, TRACE ORANGE MOTTLES VERY MOIST	ML	—	ARC
10				STIFF (2.5Y, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.0	
	122815		6	(2.5Y, 5/3) LIGHT OLIVE BROWN GRAVELLY, SILTY SAND, WET	SP	—	TIME ARC
11	06AUG 122816		6	(2.5Y, 4/2) DARK GRAYISH BROWN, SANDY, SILTY, GRAVEL, WET	GM	—	MT: 0 BY: 140 ARC
	122817		6	VERY STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, TRACE GRAVEL, ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.75	ARC
	122818 1540	N/A	6	(2.5Y, 4/2) DARK GRAYISH BROWN, CLAYEY SILT, SOME YELLOW FINE SAND LAYERS, MEDIUM PLASTICITY, MOIST	ML	—	TIME: 1540 ARC

DRILLING FIRM: PENN DRILL
DRILLERS RON CONNERS, TED BAIS
SIMCO 4000 TRR

UNITS MEASURED
MICROTIP = PPM
BY = CPM
N = CPM

BACKGROUND READINGS:
MICROTIP 0 PPM
BY 150 CPM
N N/A CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

0170

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS / PHASE II		
BORING NUMBER 11098	COORDINATES		DATE 06AUG93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 06AUG93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 07AUG93
DRILLING METHODS NOLLOW STEM AUGER CONTINUOUS SAMPLER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	06AUG 122819 122820 122821	N/A	6	STIFF (2.5Y, 4/2) DARK GRAY, SILTY CLAY, 0.25' IN LAYERS OF FINE SILTY SAND, LOW PLASTICITY, MOIST	CL	1.5	MT: 0 BY: 140 A
13	122822		6	MEDIUM STIFF (2.5Y, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, TRACE, FINE ORANGE SAND MOTTLES, MEDIUM PLASTICITY, MOIST	CL	0.75	ARC
	122823 1540		6	SAA	CL	1.0	TIME: 1540 ARC
14	06AUG 122824		6	(2.5Y, 5/4) LIGHT OLIVE BROWN SANDY SILT, VERY MOIST 08AUG93 BEM	ML	—	MT: 0 BY: 140 ARC
	122825	N/A	6	VERY STIFF (5Y, 4/3) OLIVE SILTY CLAY, TRACE SAND, MEDIUM PLASTICITY MOIST	CL	3.75	ARC
				(2.5Y, 6/2) LIGHT BROWNISH GRAY, SANDY, ~~SILTY CLAY~~ ~~SILTY CLAY~~, MOIST 08AUG93 BEM CLAYEY SILT	ML	—	
				BOTTOM OF BORING			TIME: 1540
15							MT: BY:
16							TIME
17							MT. BY:

5FT CONTINUOUS SAMPLER UNITS MEASURED

DRILLING FIRM: PENN DRILL

DRILLER: RON CONNERS, TEDRAIS

SIMCO 4000 TR2

TRACE GAS READINGS

MONITOR: PPM

BY = CPM

= CPM

MONITOR PPM

BY CPM

CPM

NO RECOVERY (NR) SAME AS ABOVE (SAA)

0171

93

RI/FS

PIEZOMETER INSTALLATION SHEET

-4916

PROJECT NAME CRW 5 / PHASE II
FIELD ENG./GEO. BE. MULLER
DATE 8/7/93
PROJECT NO. 50.0318
CHECKED BY
DATE
BORING NO. 110948
PIEZOMETER NO. N/A
DATE OF INSTALLATION N/A

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS: CEMENT GROUT/SLURRY	TOP 0 FT TOP 1 FT	BOTTOM 1 FT BOTTOM 15.5 FT	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	15.5 FT			
GWL AFTER INSTALLATION	N/A			

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

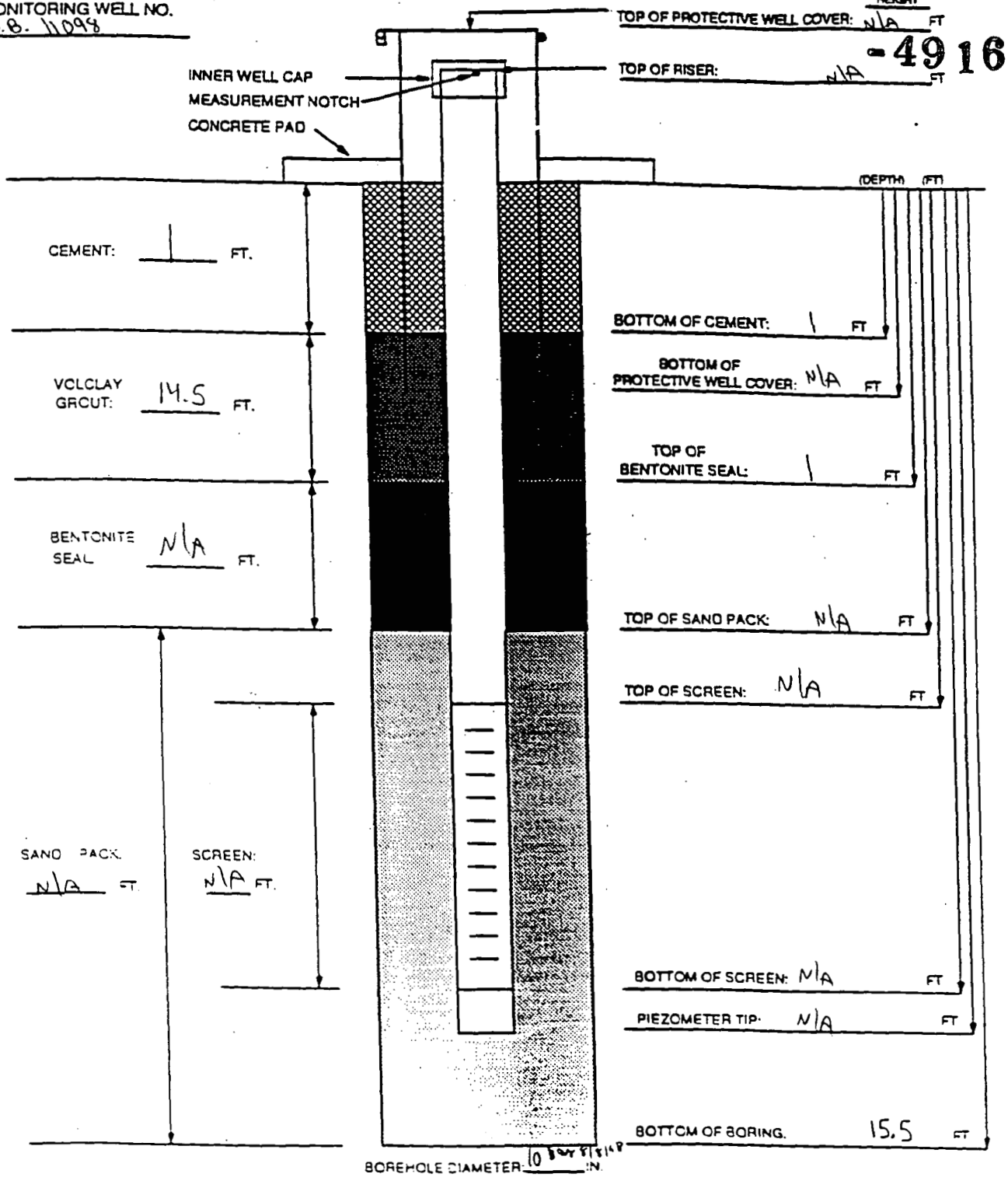
0172

REMARKS

GW

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
S.B. 11098

INSTALLATION DATE: Aug. 7, 1993



MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5 GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 5
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 55 GAL
OTHER: N/A
DATE: 5.03.18

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SLMP
DESIGNED BY ENGINEER B E Miller
4) WATER DEPTH AND DATE 10.4 FT 8/7/93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0173

RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS / PHASE II		
BORING NUMBER 11102	COORDINATES		DATE 09-10 AUG 93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 09 AUG 93
ENGINEER/GEOLOGIST B. E. MULLER	Depth	Date/Time	DATE COMPLETED 11 AUG 93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	09 AUG 122830 122831 122832	17	6/6/6/6	HARD (2.5Y, 4/4) OLIVE BROWN, SILTY CLAY, TRACE SAND, GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0 BY: 140 A
	122833	20	0/6/6/6	HARD (2.5Y, 3/3) DARK OLIVE BROWN, SILTY CLAY, TRACE ORGANICS, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARC
1	122834 122835 122836 1335	21	0/0/3/6 (HAUL) BROWN	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE ORANGE MOTTLES, LOW PLASTICITY, MOIST	CL	>4.5	TIME: 1335 A
	09 AUG 122837	17	6/6/6/6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE SAND, GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0 BY: 90 ARC
2	122838	18	6/6/6/6	STIFF (5Y, 4/1) DARK GRAY, SILTY CLAY, TRACE GREENISH GRAY MOTTLES, ORGANICS, MEDIUM PLASTICITY, MOIST	CL	1.0	ARC
	122839 122840 122841 1348	17	0/0/6/6	SAA	CL	0.25	TIME: 1348 A
3	09 AUG 122842	10	6	MEDIUM STIFF (5Y, 3/2) DARK OLIVE GRAY, SILTY CLAY, TRACE ORGANICS, MEDIUM PLASTICITY, MOIST	CL	0.5	MT: 0 BY: 100 ARC
	122843	12	6	SAA	CL	<0.25	ARC
4	122844 1506	14	6	STIFF (5Y, 4/2) OLIVE GRAY, SILTY CLAY, TRACE ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.0	TIME: 1505 ARC
	10 AUG 122848	10	6/6	STIFF (5Y, 6/1) LIGHT GRAY, SILTY CLAY, TRACE YELLOW MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.0	MT: 0 BY: 100 ARC
5	122849	12	6/6	SAA	CL	2.25	ARC
	— 0910	19	0/3	NR	—	—	TIME: 0910 —

DRILLING FIRM: PENN DRILL

DRILLERS JEFF BENTLY, JEFF CHEKAN

RIG ACKER SOIL SENTRY

DESCRIPTION BASED ON MUNSELL

UNITS: MEASURED BACKGROUND READINGS

MT = PPM MT 0 PPM

BY = CPM BY 100 CPM

N = CPM N N/A CPM

ARC = ARCHIVE

NR = NO RECOVERY (NR)

SAA = SAME AS ABOVE (SAA)

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/ PHASE II		
BORING NUMBER 11102	COORDINATES		DATE 10 AUG 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 09AUG93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 11AUG93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	10AUG93 122850 70651 70652	12	6/6	VERY STIFF (5Y, 4/4) OLIVE, SILTY CLAY, TRACE YELLOW AND LIGHT GRAY MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.25	MT: 0 A BY: 100
7	70653	15	6/6	SAA	CL	1.0	ARC
	70654 0945	19	3/0	SAA	CL	<0.25	TIME: 0945 ARC
8	10AUG 70655	8	6	STIFF (5Y, 4/1) DARK GRAY, SILTY CLAY TRACE ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST. SOME 1" GRAVEL SEAMS - WET	CL	1.25	MT: 0 BY: 120
	70656	11	6	MEDIUM STIFF (2.5Y, 4/4) OLIVE BROWN, SILTY CLAY, TRACE ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST. 1 IN. FINE ORANGE SAND SEAMS - WET	CL	0.75	
9	70657 1050	14	6	VERY SOFT (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, TRACE GRAY AND ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	<0.25	TIME: 1050
				BOTTOM OF BORING			MT: BY:
10				HYDROPUNCH 10AUG93 1400 70658 - VOA 70659 - GROSS α/β			TIME
11							MT: BY:
							TIME:

DRILLING FIRM: PENN DRILL
DRILLERS: JEFF BEASLY, TED BAIS
RIG: ACKER SOIL SENTRY
DESCRIPTION BASED ON MUNSELL

UNITS MEASURED
MICROTIP = ppm
BY = CPM
α = CPM
ARC = ARCHIVE

BACKGROUND READINGS:
MICROTIP 0 ppm
BY 100 CPM
α N/A CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

RI/FS

3/4

PIEZOMETER INSTALLATION SHEET 4916

PROJECT NAME CRUS / PHASE II FIELD ENG./GEO. B.E. MULLER DATE 11AUG93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11C02
PIEZOMETER NO. N/A DATE OF INSTALLATION 11AUG93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT HOLLOW STEM AUGER
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A
N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 9	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP ↓	BOTTOM ↓	TOP	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	9			
GWL AFTER INSTALLATION				

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

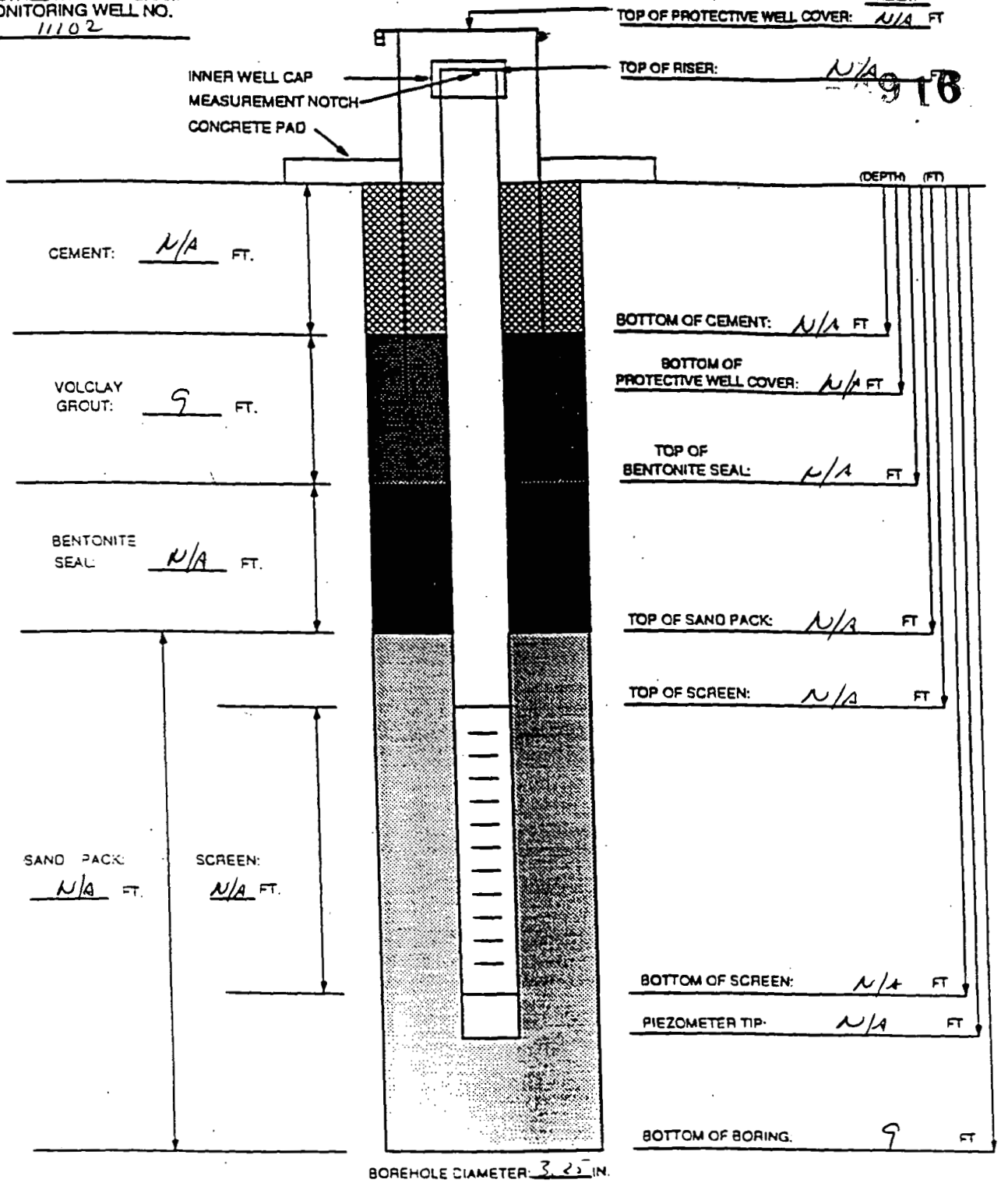
0176

REMARKS _____

INSTALLATION DIAGRAM
MONITORING WELL NO.
11102

INSTALLATION DATE: 11 AUG 93

2/4



BOREHOLE DIAMETER: 3.25 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 1 BAG
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: 5 GALS
OTHER: N/A
TASK: 50.03.18

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE 11 AUG 93 6.5
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER:

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]	
BORING NUMBER: [illegible]	COORDINATES: [illegible]	[illegible]
ELEVATION: [illegible]	GWL: Depth [illegible] Date/Time [illegible]	DATE STARTED: 8-7-93
ENGINEER/GEOLOGIST: O. Costello	Depth [illegible] Date/Time [illegible]	DATE COMPLETED: 8-7-
DRILLING METHODS: Hollow Stem Auger - 4¼ inch ID		PAGE 1 OF

8-7-93

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				Cement - 8 inches			
0.5	1330 070501 070502 070503	6	6	HARD (10YR, 3/1) VERY DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY. LARGE GRAVEL COBBLES.	CL	4+	MT = 0.0 ppm; BG = 800 cpm
1.0	1330	6	6	SAA	CL	4+	MT = 0.0 ppm; BG = 800 cpm; 070504-A
1.5	1330 070505 070506 070507	7	6	SAA Sample 1'	CL	4+	MT = 0.0 ppm; BG = 800 cpm
2.0	1340	8	6	STIFF (2.5Y, N3/) VERY DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. A few SMALL GRAVEL PEBBLES.	CL	1.5	MT = 0.0 ppm; BG = 1800 cpm; 070508 A
2.5	1340	8	6	SAA	CL	1.5	MT = 0.0 ppm; BG = 1800 cpm; 070509-A
3.0	1340 070510 070511 070512	8	6	SAA Sample 2'	CL	1.5	MT = 0.0 ppm; BG = 1800 cpm
3.5	1350	5	6	SAA	CL	1.5	MT = 0.0 ppm; BG = 150 cpm; 070512-A
4.0	1350	7	6	STIFF (10YR, 4/2) DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY	CL	1.5	MT = 0.0 ppm; BG = 150 cpm; 070513 A
4.5	1350	6	6	SAA Sample 3'	CL	1.5	MT = 0.0 ppm; BG = 150 cpm; 070514-A
5.0	1350	1	6	STIFF (10YR, 4/2) DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY, MOTTLED [illegible]	CL	1.0	MT = 0.0 ppm; BG = 150 cpm; 070515-A

NOTES: SAA SAME AS ABOVE

Driller - Rexon Drill Contractor

Driller - M. Stalley

Helper - [illegible]

Site Manager [illegible]

Background MT = [illegible] BG = [illegible]

0178

100

PROJECT NUMBER: [illegible] | PROJECT: [illegible]

BORING NUMBER: [illegible] | COORDINATES: [illegible] | DATE: [illegible]

ELEVATION: [illegible] | GWL: Depth [illegible] Date/Time [illegible] | DATE STARTED: 8-7-93

ENGINEER/GEOLOGIST O. Costello | Depth [illegible] Date/Time [illegible] | DATE COMPLETED: 8-7-93

DRILLING METHODS: Hollow Stem Auger | PAGE 2 OF [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-7-93 5.0							
5.5	1358	2	6	STIFF (10YR 4/2) DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY, MOTTLED APPEARANCE.	CL	1.0	MT = 0.0 ppm; Bg = 140 cpm; 070516 A
6.0	1358	3	6	SAA Sample 4 ↑	CL	1.0	MT = 0.0 ppm; Bg = 140 cpm; 070517-A
6.5	1404 070518 070519 070520	3	6	STIFF (10YR 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, MEDIUM to high PLASTICITY, MOIST.	CL	1.0	MT = 0.0 ppm; Bg = 120 cpm
7.0	1404	3	6	SAA	CL	1.0	MT = 0.0 ppm; Bg = 120 cpm; 070521 A
7.5	1404	3	6	SAA Sample 5 ↑	CL	1.0	MT = 0.0 ppm; Bg = 120 cpm; 070522 A
8.0	1426	4	6	SAA	CL	1.0	MT = 0.0 ppm; Bg = 120 cpm; 070523 A
8.5	1426	4	4	LOOSE (10YR 4/2) DARK GRAYISH BROWN, COARSE GRAINED GRAVEL mixed with COARSE GRAINED SAND, WELL graded, WET	GC	NA	MT = 0.0 ppm; Bg = 120 cpm; 070524 A
9.0	1426	7	6	MEDIUM DENSE (10YR 5/4) YELLOWISH BROWN, Clayey SILT, WET Sample 6 ↑	ML	NA	MT = 0.0 ppm; Bg = cpm; 070525-A
				Total Depth - 9.0			MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm

NOTES

Driller - Penn Drill
Contractor

Driller - [illegible]
Helper - [illegible]

SAA - Same As Above

Clean ground
MT - [illegible]
Bg - [illegible]

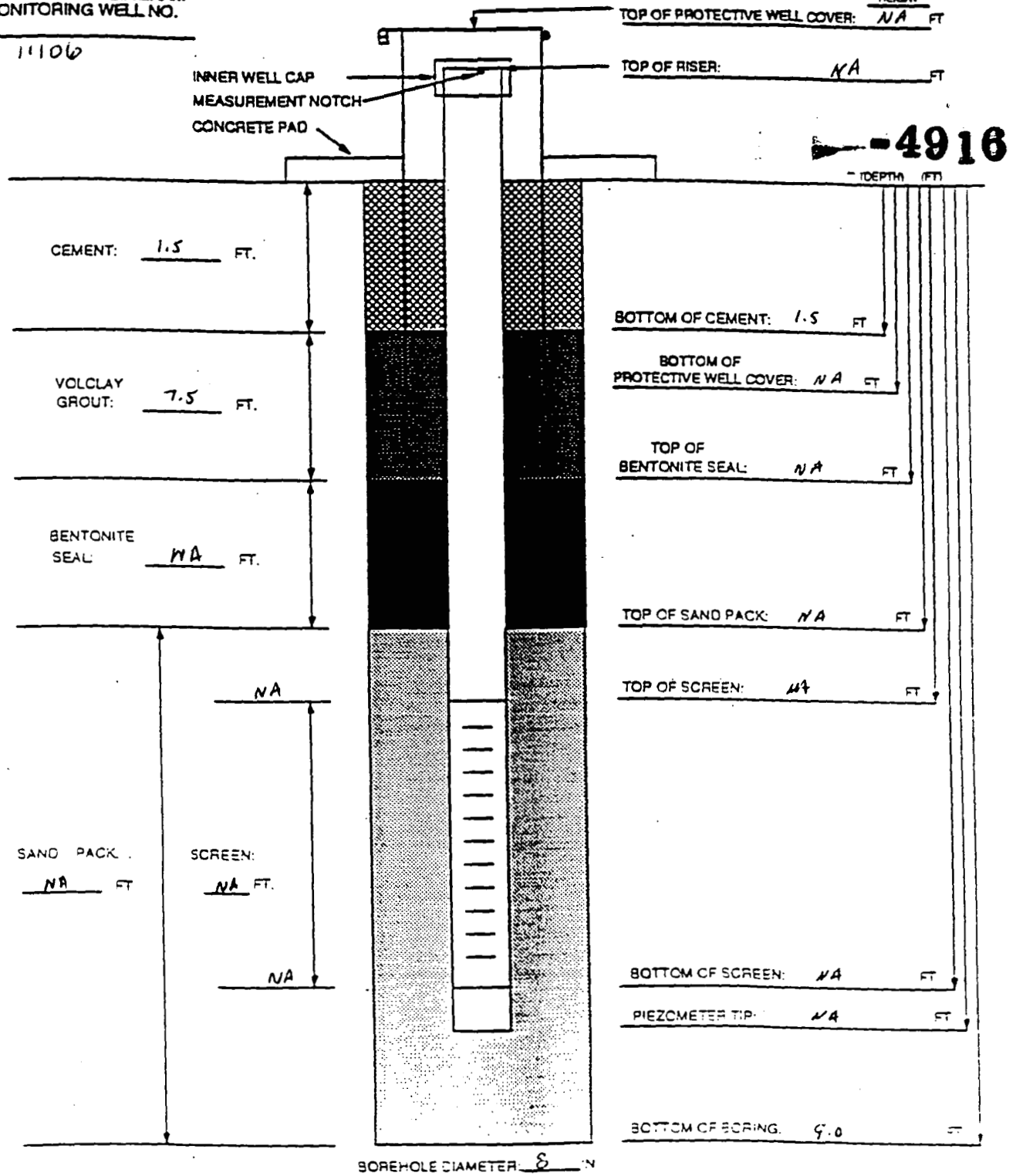
0179

101

INSTALLATION DIAGRAM
MONITORING WELL NO.

11106

INSTALLATION DATE: 8-7-93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 15 gallons
OTHER:
TASK: NA

NOTES

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH NA IN. SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST/ENGINEER: O. Loskill
4) WATER DEPTH AND DATE NA - NA
5) TOP OF CASING IS SECURED W[illegible] STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
*WELL CASING HAS BEEN CUT OFF LOWER IN [illegible]

0180

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RI/FS

PIEZOMETER INSTALLATION SHEET 4916

PROJECT NAME CEW-5 FIELD ENG./GEO. O. Cosello DATE 8-7-93
PROJECT NO. 50.03.18 CHECKED BY DATE
BORING NO. 11106
PIEZOMETER NO. 11106 DATE OF INSTALLATION 8-7-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger 4¼ in ID
DRILLING FLUID (S) USED:
FLUID FROM TO
FLUID FROM TO

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH
PROTECTIVE PIPE O.D.

OTHER PROTECTION

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.5	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE	9.0			
SWL AFTER INSTALLATION				

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

0181

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER: 50.03.13	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: 1107	COORDINATES:	DATE: 8-7-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-7-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-7-93	
DRILLING METHODS: AUGER		PAGE 1 OF 4	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	122945 122946 122947 1305 8-7-93	27	6	DENSE, GRAY (2.5Y 6/1), WELL GRADED GRAVEL WITH SOME SAND, DRY	GW	NA	MICROTIP = 2.0 ppm BG = 1500 cpm
1.0	122906 1305 8-7-93	21	6	SAA	GW	NA	
1.5	122907 122908 122909 1305 8-7-93	17	6	SAA STIFF, VERY DARK GRAY (2.5Y 3/1), SILTY CLAY, MED. PLASTIC, DRY	GW CL	NA 1.75	
2.0	122910 1330 8-7-93	30	6	SAA w/ LIGHT OLIVE BROWN (2.5Y 5/6) IRON STAINING	CL	2.0	MICROTIP = 0.0 ppm BG = 350 cpm
2.5	122911 1330 8-7-93	15	6	SAA	CL	2.0	
3.0	122912 122913 122914 1330 8-7-93	17	6	STIFF GRAY (2.5Y 5/1), SILTY CLAY WITH (2.5Y 5/6) LIGHT OLIVE BROWN IRON STAINING, MED. PLASTICITY, SLIGHTLY MOIST	CL	1.25	
3.5	122915 1340 8-7-93	3	6	SAA w/ SOME LARGE COBBLES & SAND (LARGE COBBLE BLOCKED SCREEN)	CL	1.25	MICROTIP = 8.0 ppm BG = 800 cpm
4.0	122916 1340 8-7-93	5	0	NO RECOVERY	NA	NA	
4.5	122917 1340 8-7-93	5	0	NO RECOVERY	NA	NA	
	122918 1345 8-7-93	12	6	SAA (W/ SOME SAND) AND (WITH SOME LARGE COBBLES)	CL	1.5 NA 9-7-93 TR	MICROTIP = 0.0 ppm BG = 250 cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Auger
Driller: Joe Rhae
Helper: James Anderson

SAA = Same As Above
N/A = Not Applicable

Background = BG 80 cpm, MT 0.0 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: 11107	COORDINATES:	DATE: 8-7-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-7-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-7-93	
DRILLING METHODS: AUGER		PAGE 2 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	122919 1345 8-7-93	15	6	SAA (NO MORE LARGE COBBLES)	CL	1.5	SEE PREVIOUS PAGE
6.0	122920 1345 8-7-93	7	6	SAA	CL	1.5	
6.5	122921 122922 122923 1405 8-7-93	16	6	SAA (WITH A MARKED INCREASE IN SILT)	CL	1.75	MICROTIP = 0.0 PPM BG = 100 CPM
7.0	122924 1405 8-7-93	10	6	VERY STIFF, LIGHT GRAY (2.5Y 7/1) CLAYEY SILT, MOTTLED WITH (2.5Y 5/6) LIGHT OLIVE BROWN IRON STAIN, LOW PLASTIC MOIST TO WET	ML	2.0	
7.5	122925 1405 8-7-93	11	6	SOFT, OLIVE YELLOW (2.5Y 6/8), CLAYEY SILTY SAND, (POORLY GRADED), WET	SM	0.5	
8.0	122926 1420 8-7-93	10	6	VERY STIFF, GRAY (2.5Y 6/1) CLAYEY SILT, WITH SOME FINE GRAVEL, MOTTLED WITH LIGHT OLIVE BROWN (2.5Y 5/6) IRON STAINING, LOW PLASTICITY TO NON, ~~MOIST~~ WET	ML	2.5	MICROTIP = 0.0 PPM BG = 90 CPM
8.5	122927 1420 8-7-93	16	6	SAA VERY MOIST	ML	2.5	
9.0	122928 1420 8-7-93	26	6	SAA MOIST	ML	2.5	
9.5	~~122929~~ 122930 ~~122931~~	PR 8-7-93		(9.0 FEET TOTAL DEPTH)			MICROTIP = PPM BG = CPM
	122932	PR 8-7-93					

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JOE RAABS
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

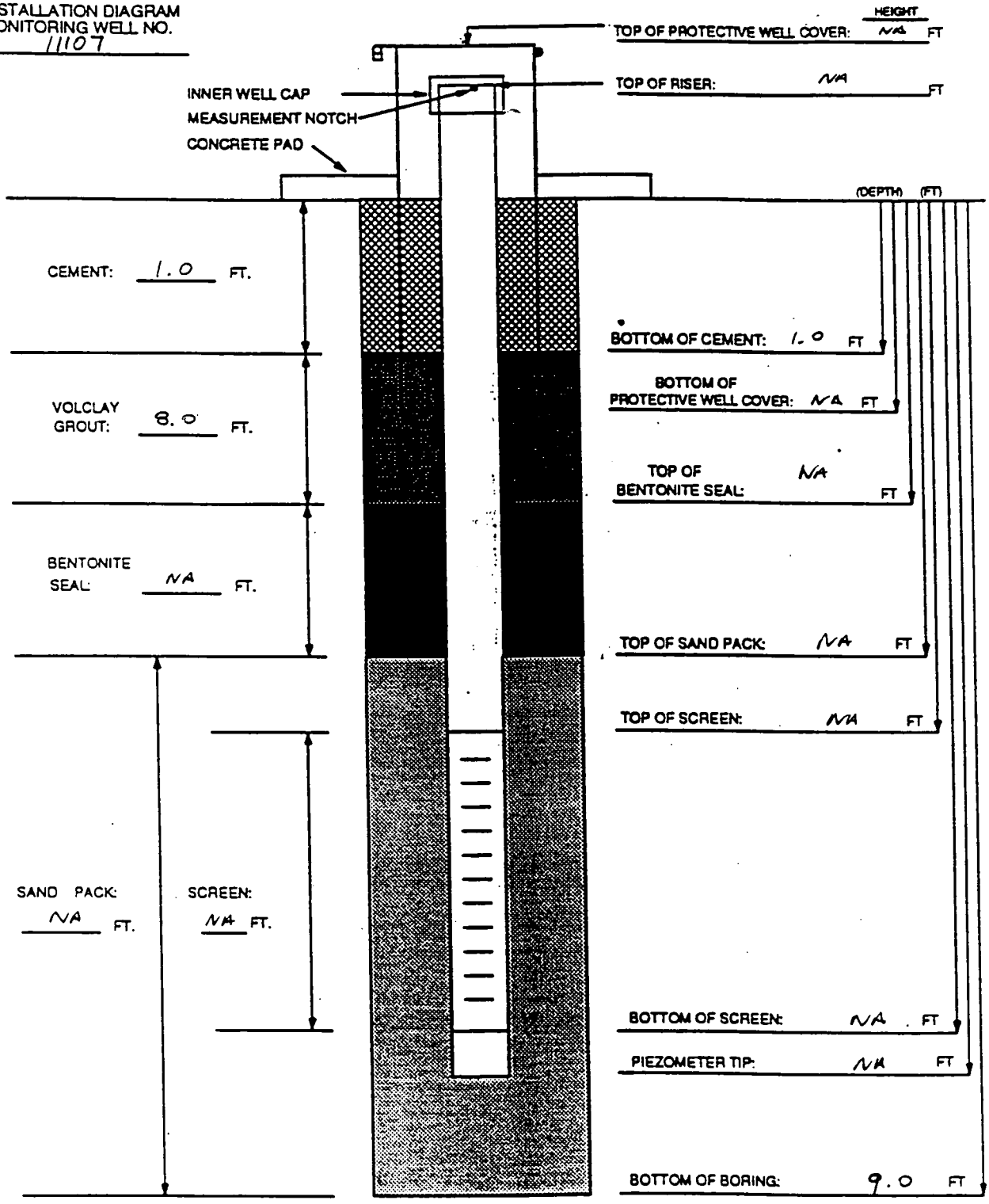
Background =
BG : 80 CPM
MT : 0.0 PPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

-4910

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11107

INSTALLATION DATE: 8-7-93



HEIGHT
TOP OF PROTECTIVE WELL COVER: NA FT
TOP OF RISER: NA FT
BOTTOM OF CEMENT: 1.0 FT
BOTTOM OF PROTECTIVE WELL COVER: NA FT
TOP OF BENTONITE SEAL: NA FT
TOP OF SAND PACK: NA FT
TOP OF SCREEN: NA FT
BOTTOM OF SCREEN: NA FT
PIEZOMETER TIP: NA FT
BOTTOM OF BORING: 9.0 FT

BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 15 GALLONS
ER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT/ NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

ASI FORM 0157 REV (0)

PAGE 4004

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME CRU 5 PHASE II FIELD ENG./GEO. RILEY DATE 8-7-93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11107
PIEZOMETER NO. NA DATE OF INSTALLATION 8-7-93

BOREHOLE DRILLING

DRILLING METHOD AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION GROUTED TO 1.0 FEET BELOW SURFACE, CONCRETE TO 0.0 FEET

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
CONCRETE BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 9.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	~~9.0~~ NA 8-7-93			
BOTTOM OF BOREHOLE	9.0			
GWL AFTER INSTALLATION	NA			

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

C185 107

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER # 11138 E-4	COORDINATES	DATE 8-8-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-8-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-8-93	
DRILLING METHODS Hand Auger		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FT	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070461 [0951]	N/A	6.0	Very Soft (2.5Y 5/4) Lt. Olive Brown clayey Silt w/ some fine grained sand, and well graded gravel DRY	ML	<.5	Bg = BG Microhp = 0.0 ppm SPA 746 "Fill Gravel"
0.5	070466 [0954]	N/A	6.0	SAA	SAA	SAA	Bg = BG Microhp = 0.0 ppm SPA 347
1.0	070462 [0957]	N/A	6.0	SAA	SAA	SAA	Bg = BG ppm Microhp = 0.0 ppm SPA 762
1.5	070463 [0959]	N/A	6.0	Very Soft (2.5Y 4/4) Olive clayey Silt w/ some sand (fine grained) & well graded gravel, nonplastic DRY	ML	<.5	Bg = BG SPA-817 Microhp = 0.0 ppm pieces of wood "Fill gravel"
2.0	070464 [1000]	N/A	6.0	Very Soft (10YR 4/4) Dark Yellowish Brown clayey Silt w/ some fine grained sand and well graded gravel Nonplastic DRY	ML	<.5	Bg = BG SPA-832 Microhp = 0.0 ppm "White gravel"
2.5	070465 [1002]	N/A	6.0	SAA	SAA	SAA	Bg = BG Microhp = 0.0 ppm SPA-796
3.0							

NOTES

Hand Augered by Jerome Fox
Roger Jackson

SAA = same as above
N/A = not applicable

Soil sample

0186

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #11138 E-6	COORDINATES		DATE 8-8-93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 8-8-93
ENGINEER/GEOLOGIST T. Layne	Depth	Date/Time	DATE COMPLETED 8-8-93
DRILLING METHODS Hand Auger			PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070467 1004	N/A	6.0	SAA	SAA	SAA	Rγ = BG microRP = 0.0 ppm SPA-812
3.5	070472 070482 1010 070478 070486 ~~070480~~ TL 8-13-93	N/A	6.0	SAA	SAA	SAA	Rγ = BG microRP = 0.0 ppm piece of "white" gravel SPA-883
4.0	070468 1012	N/A	6.0	Very S-yt (10YR 3/4) Dark Yellowish Brown clayey Silt w/ some fine-grained sand Nonplastic Slightly moist	ML	<.5	Rγ = BG microRP = 0.0 ppm SPA-770
4.5	1014 070469	N/A	6.0	SAA	SAA	SAA	Rγ = BG microRP = 0.0 ppm SPA-828
5.0	1018 070474	N/A	6.0	SAA w/ trace well graded gravel	SAA	SAA	Rγ = BG microRP = 0.0 ppm SPA-781
5.5	070475 070483 1020 070471 070487	N/A	6.0	SAA	SAA	SAA	Rγ = BG microRP = 0.0 ppm SPA-805
6.0							

NOTES

Hand Augered by Tyrone Price
Forest Inman

SAA - Same As Above
N/A = not applicable

* Description based on ASTM Standard visual-tactile test
* Soil colors identified by the Munsell color chart

Background
Rγ = 200-240
microRP = 0.0 ppm

1061

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING~~ WELL NO. SOIL BORING #11138 E-6

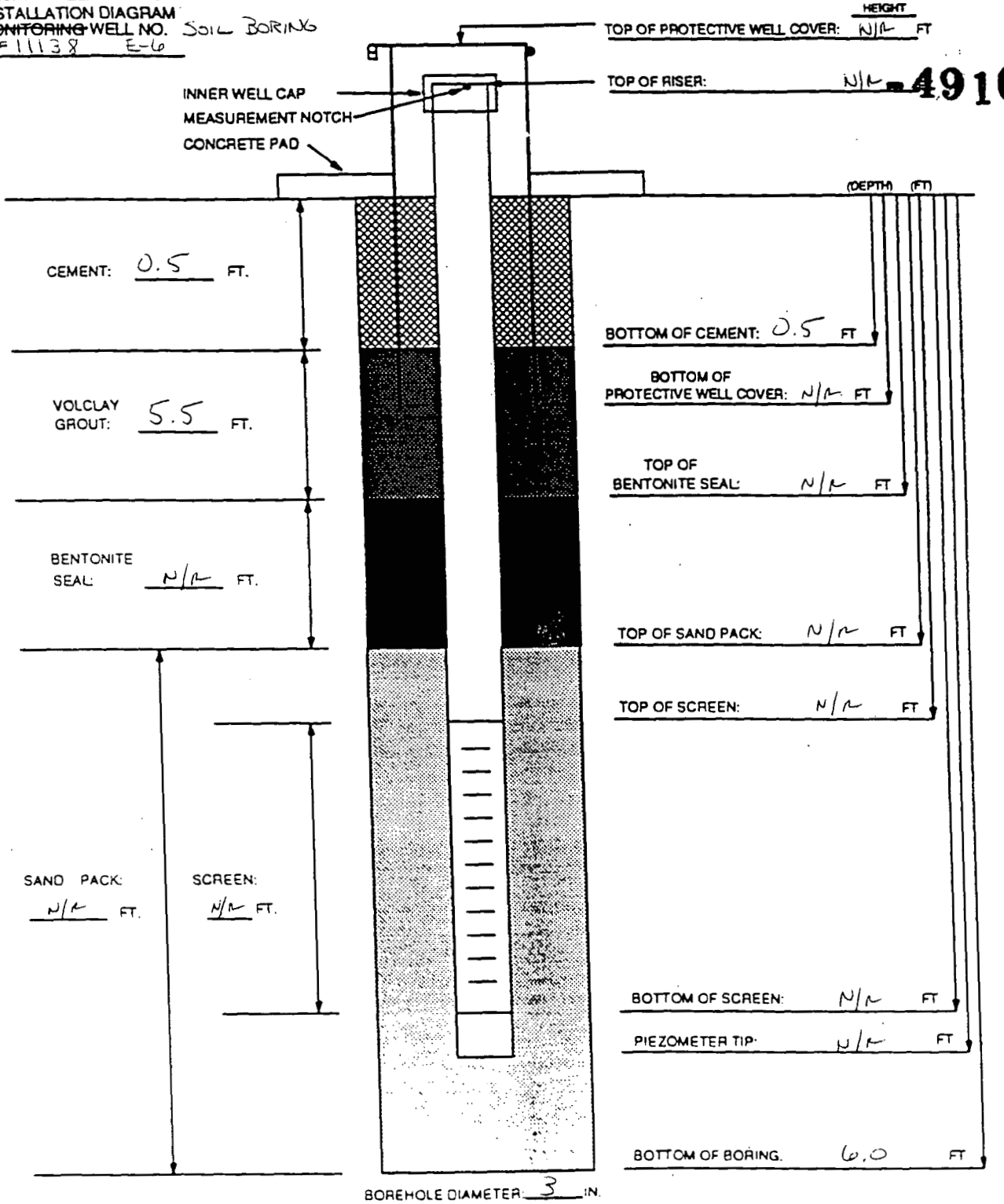
INSTALLATION DATE: 8-8-93

HEIGHT

TOP OF PROTECTIVE WELL COVER: N/A FT

TOP OF RISER: N/A

4916



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY N/A

BENTONITE PELLETS (5-GALLON BUCKETS): N/A

BAGS OF VOLCLAY GROUT 5

AMOUNT OF CEMENT 5

AMOUNT OF WATER USED [illegible]

OTHER

TASK [illegible]

NOTES

1) RISER PIPE IS ____ IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS ____ IN ID 316 STAINLESS STEEL PIPE WITH 0 ____ IN SLOTS

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP

GEOLOGIST/ENGINEER [illegible]

4) WATER DEPTH AND DATE N/A FT: [illegible]

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0188

ASI FORM 0157 REV

110

RI/FS

SOIL BORING

~~PIEZOMETER~~ INSTALLATION SHEET - 4916

Cu 5 Surface and Subsurface

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-8-93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. #11138 E-6
PIEZOMETER NO. N/R DATE OF INSTALLATION 8-8-93

BOREHOLE DRILLING

DRILLING METHOD Hand Auger
DRILLING FLUID (S) USED:
FLUID N/R FROM N/R TO N/R
FLUID N/R FROM N/R TO N/R

~~TYPE OF BIT~~ _____
~~CASING SIZE (S) USED:~~ N/R
~~SIZE _____ FROM _____ TO _____~~
~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/R

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/R		N/R	
GROUND SURFACE	0.0		N/R	
BOTTOM OF PROTECTIVE PIPE	N/R		N/R	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/R		N/R	
BOTTOM OF BOREHOLE	6.0		N/R	
GWL AFTER INSTALLATION	N/R		N/R	

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

REMARKS _____

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Cin 5 Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER # 11139 E-5	COORDINATES	DATE 8-8-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-8-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-8-93	
DRILLING METHODS Hand Auger		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070452 0855	N/A	6.0	Very Soft (2.5Y 5/4) Lt Olive Brown Clayey Silt w/ sand (fine grained), Nonplastic, well-graded gravel DRY	ML	<.5	By = BG Microtip = 0.0 ppm ("White" gravel) SPA - 908
0.5	070470 0902 070480 070476 070484 ~~070~~ 0.5-1.3	N/A	6.0	SAA	SAA	SAA	By = BG Microtip = 0.0 ppm SPA - 1010
1.0	070453 0905	N/A	6.0	SAA	SAA	SAA	By = BG Microtip = 0.0 ppm SPA - 869
1.5	0911 070454	N/A	6.0	SAA	SAA	SAA	By = BG Microtip - 0.0 ppm SPA - 930
2.0	070455 0914	N/A	6.0	SAA	SAA	SAA	By = BG Microtip - 0.0 ppm SPA - 829
2.5	0918 070456	N/A	6.0	SAA	SAA	SAA	By = BG Microtip = 0.0 ppm SPA - 240
3.0							

Moist [illegible] Square Plate - Total [illegible]

SAA - Same as above
NA - Not applicable

* Sample [illegible] per ASTM Standard Penetration Test
* Soil color [illegible] by the Munsell Color Chart

Background
By = 190 - 240 ppm
Microtip = [illegible] ppm

190

1/2

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Gn 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER # 11139 E-5	COORDINATES	DATE 8-8-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-8-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-8-93	
DRILLING METHODS Hand Auger		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070470 TL-8-13-93 09201 070457	N/A	6.0	SAA	SAA	SAA	Bg = BG microhp = 0.0 ppm SPA - 806
3.5	070458 0924	N/A	6.0				Bg = BG microhp = 0.0 ppm SPA - 781
4.0	070459 0927	N/A	6.0	Very soft (10YR 3/4) Dark Yellowish Brown clayey Silt w/ some sand and trace of Well graded gravel nonplastic DRY	ML	<.5	Bg = BG SPA - 776 microhp 0.0 ppm "Fill gravel"
4.5	070460 0929	N/A	6.0	SAA	SAA	SAA	Bg = BG microhp 0.0 ppm piece of wood SPA - 850
5.0	070475 0932	N/A	6.0	SAA	SAA	SAA	Bg = BG microhp. 0.0 ppm SPA - 803
5.5	070471 070471 0935 070471 070475	N/A	6.0	SAA	SAA	SAA	Bg = BG microhp. 0.0 ppm SPA - 815
6.0							

NOTES

Hand Auger used by [illegible] Hydrone [illegible] Field Technician

Shelby tubes in lieu [illegible] N/A not applicable

Background Bg = 145 - 240 ppm microhp = 0.0 ppm

* Sample taken for [illegible] Standard [illegible] test

* All counts calibrated by the Mobile Lab [illegible]

C191

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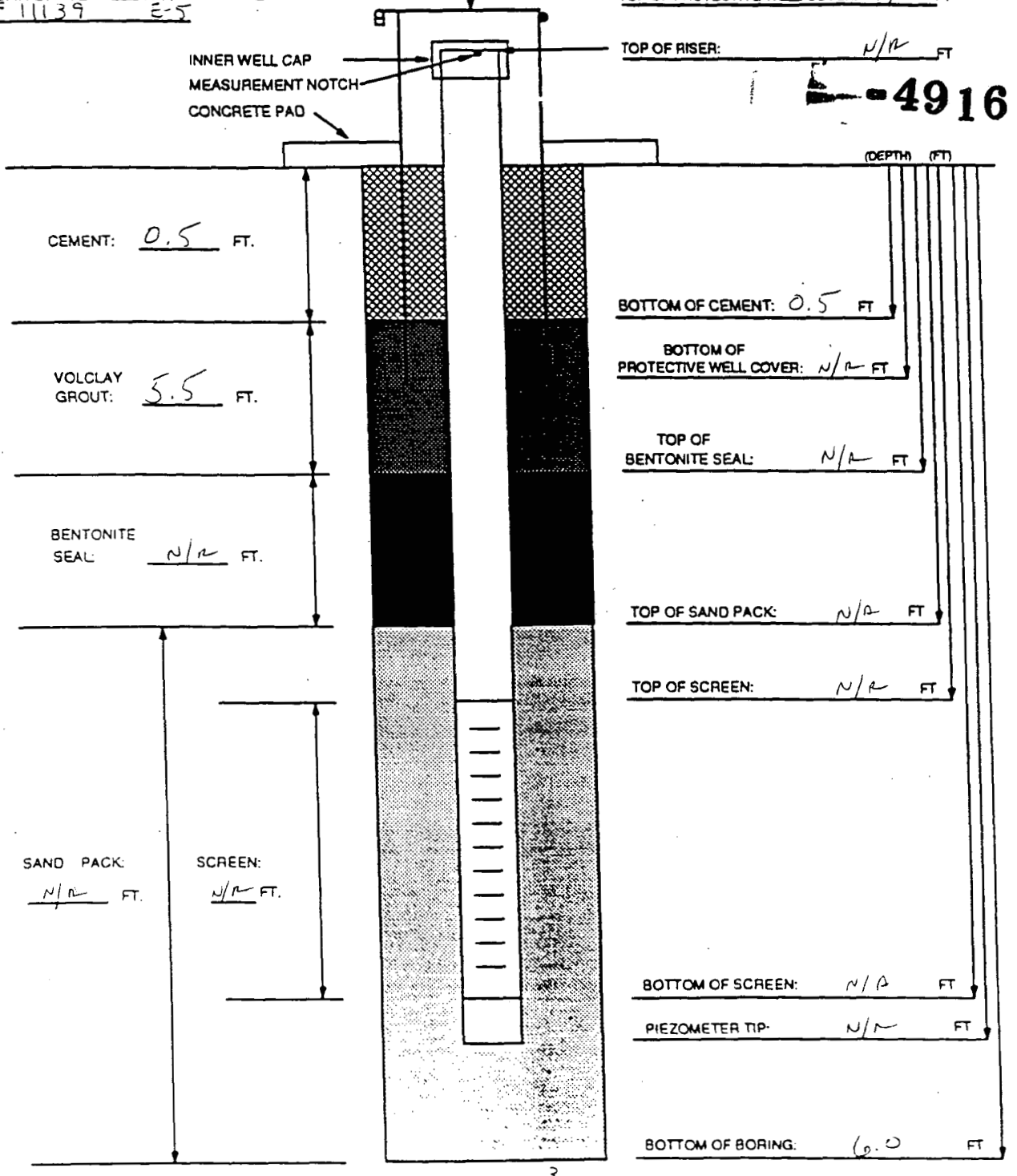
FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. SOIL BORING
11139 E-5

INSTALLATION DATE: 8-8-93

HEIGHT
TOP OF PROTECTIVE WELL COVER: N/A FT

TOP OF RISER: N/A FT

-4916



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: [illegible]
AMOUNT OF CEMENT: [illegible]
AMOUNT OF WATER USED: [illegible] gal
OTHER:
TASK: SO[illegible]

NOTES

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE N/A FT/ [illegible]
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: [illegible]

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RI/FS

Soil Boring

~~PIEZOMETER~~ INSTALLATION SHEET - 4916

Cru 5 Surface and Subsurface

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-8-93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. #11139 E-5
PIEZOMETER NO. N/A DATE OF INSTALLATION 8-8-93

BOREHOLE DRILLING

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

~~TYPE OF BIT~~ _____
~~CASING SIZE (S) USED:~~ N/A
~~SIZE~~ _____ ~~FROM~~ _____ ~~TO~~ _____
~~SIZE~~ _____ ~~FROM~~ _____ ~~TO~~ _____

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP N/A	BOTTOM	TOP N/A	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER 50.03.18	PROJECT NAME Chin 5 Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #11140 E-4	COORDINATES	DATE 8-7-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-7-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-7-93	
DRILLING METHODS Hand Auger		PAGE 1 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070442 1015	N/A	6.0	Very Soft (10YR 4/4) Dark Yellowish Brown clayey Silt w/ some sand, well-graded gravel Nonplastic DRY	ML	<.5	Bg = 300 cpm microRp = 0.0 ppm SPA = 2,060
0.5	070443 1018	N/A	6.0	SAA	SAA	SAA	Bg = 200 cpm microRp = 0.0 ppm SPA = 1,590
1.0	1020 070400 070411 070415 070421	N/A	6.0	SAA	SAA	SAA	Bg = 340 cpm microRp = 0.0 ppm SPA ~~1,390~~ 2,070 TR 8-7-93
1.5	1022 070444	N/A	6.0	SAA	SAA	SAA	Bg = 380 cpm microRp = 0.0 ppm SPA = 1,390
2.0	070445 1035	N/A	6.0	Very Soft (10YR 4/3) Brown Clayey Silt w/ some sand (fine grained), Nonplastic Slightly Moist	ML	<.5	Bg = 240 cpm microRp = 0.0 ppm SPA 1360
2.5	070446 1051	N/A	6.0	SAA Nonplastic to low plasticity	SAA	SAA	Bg = 86 microRp = 0.0 ppm SPA = 1,000
3.0							

NOTES

Cores logged by Tyrone Price
Project Manager

SAA = same as has been
[illegible]

* = Sample collected for RCRA Standard Analytical Test
+ = Soil Sample collected [illegible]

Surface Background
Bg = 14.5 - 40 cpm
microRp = 0.0 ppm

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Ch 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation	
BORING NUMBER # 11140 E-4	COORDINATES	DATE 8-9-93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-7-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-7-93
DRILLING METHODS Hand Auger		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070447 1044	N/A	6.0	SAA	SAA	SAA	Bg = BG Microkp = 0.0 ppm SPA = 867
3.5	070448 1047	N/A	6.0	SAA	SAA	SAA	Bg = BG Microkp = 0.0 ppm SPA = 874
4.0	070449 1049	N/A	6.0	SAA	SAA	SAA	Bg = BG Microkp = 0.0 ppm SPA = 805
4.5	070450 1052	N/A	6.0	SAA	SAA	SAA	Bg BG Microkp = 0.0 ppm SPA = 898
5.0	070451 1051	N/A	6.0	Very Soft (10YR 3/4) dark yellowish Brown Clayey Silt w/ some fine grained sand and well-graded gravel, nonplastic Slightly moist	ML	<.5	Bg BG Microkp = 0.0 ppm "Fill gravel" SPA = 903
5.5	070407 070412 070417 1111 070422	N/A		SAA	SAA	SAA	Bg = BG Microkp = 0.0 ppm SPA = 723

NOTES

Project Thomas

Site Lane Co Grove

N/A = not applicable

0195

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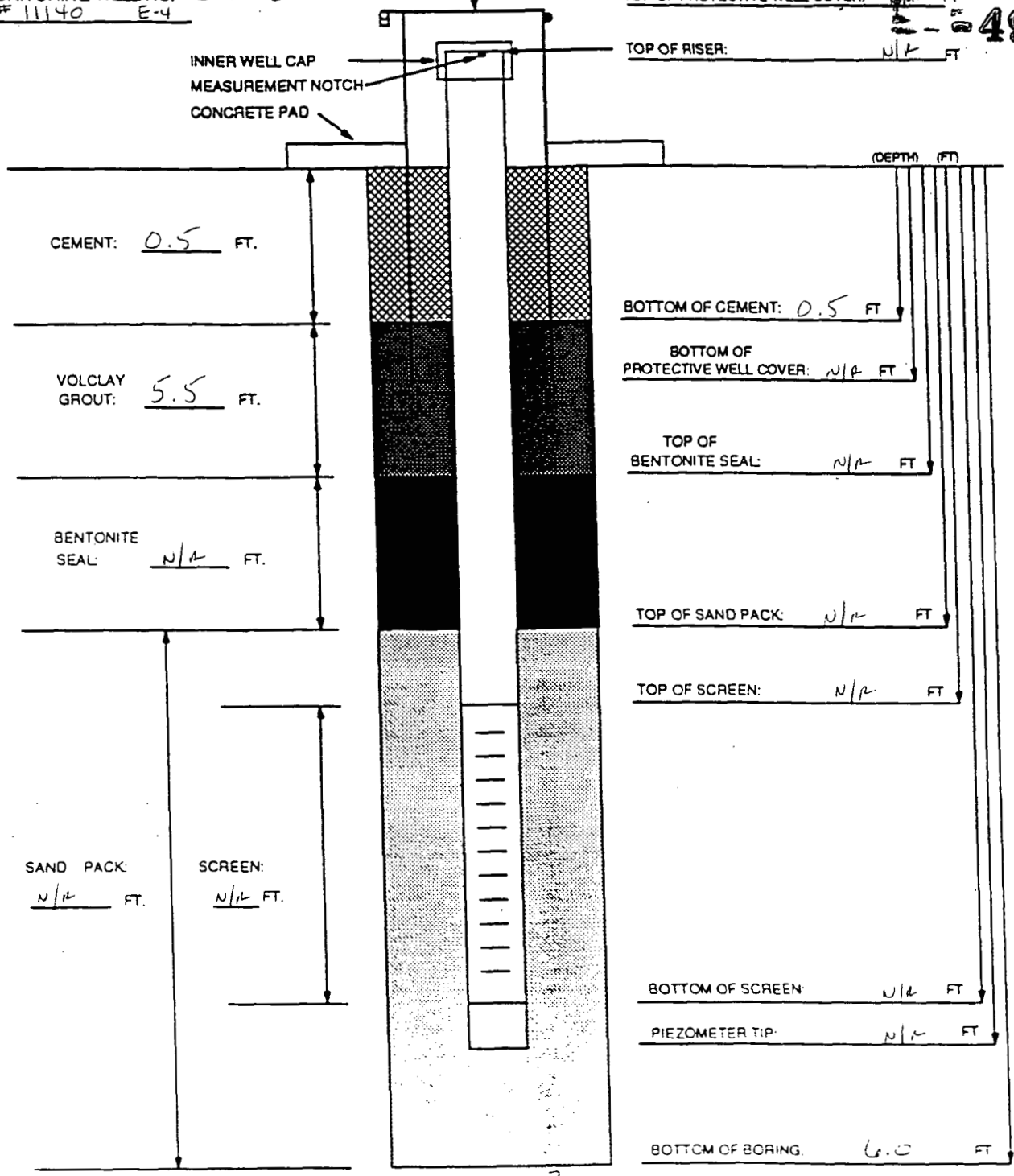
FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. SOIL BORING
11140 E-4

INSTALLATION DATE: 8-7-93

4916



BOREHOLE DIAMETER 3 IN

MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT 2
AMOUNT OF CEMENT 1/2
AMOUNT OF WATER USED [illegible]
OTHER
TASK 52.03.[illegible]

NOTES

1) RISER PIPE IS N/A IN ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS
2) SCREEN IS N/A IN ID 316 STAINLESS STEEL PIPE WITH 0 N/A IN SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG
GEOLOGIST/ENGINEER [illegible]
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH A LOCK

ASI FORM 0157 REV [illegible]

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RI/FS

Soil Boring

~~PIEZOMETER~~ INSTALLATION SHEET

Crus Surface and Subsurface

-4916

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-7-93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. #11140 E-4
PIEZOMETER NO. N/A DATE OF INSTALLATION 8-7-93

BOREHOLE DRILLING

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

~~TYPE OF BIT~~ _____
~~CASING SIZE (S) USED:~~
~~SIZE _____ FROM N/A TO _____~~
~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

N/A

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

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Cm 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface-Subsurface Soil Sampling Investigation	
BORING NUMBER #11141 E-3	COORDINATES	DATE 8-7-93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-7-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-7-93
DRILLING METHODS Hand Augered		PAGE 1 OF 2

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070423 0850 8-7-93	N/A	6.0	Very Soft (2.5Y 5/6) Lt. Olive Brown Sandy Silt w/ well-graded gravel and pebbles nonplastic (fine grained sand) DRY	ML	<.5	Bg = BG Microtip = 3.5 SPA = 764
0.5	070424 0853	N/A	6.0	SAA	SAA	SAA	Bg = BG Microtip = 6.2 SPA = 790
1.0	070425 0857	N/A	6.0	SAA	SAA	SAA	Bg = BG Microtip = 6.4 SPA = 771
1.5	070426 0859	N/A	6.0	SAA	SAA	SAA	Bg = 240 cpm Microtip = 5.4 SPA = 715
2.0	070427 0911	N/A	6.0	SAA	SAA	SAA	Bg = BG Microtip 0.0 SPA = 830
2.5	070428 0919	N/A	6.0	SAA	SAA	SAA	Bg = BG Microtip 0.0 SPA = 805
3.0							

NOTES

Hand Augered by Tyler Price and Robert Thomas

N/A = not applicable

* Sample collection per [illegible] standard operating procedure
* [illegible] shown [illegible] by the Fernald [illegible]

Background Bg: .00-1.00 pm

0198

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Cu 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #1141 E-3	COORDINATES	DATE 8-7-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-7-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED	
DRILLING METHODS Hand Augered		PAGE 2 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070430 0921	N/A	6.0	SAA	SAA	SAA	By - BG microtip = 0.0 ppm SPA = 775
3.5	070429 0930	N/A	6.0	SAA	SAA	SAA	By = BG microtip = 0.0 ppm SPA = 820
4.0	070431 0937	N/A	6.0	SAA	SAA	SAA	By - BG microtip = 0.0 ppm SPA = 785
4.5	070404 070409 DUP 0944 070414 070419	N/A	6.0	SAA	SAA	SAA	By - BG microtip = 0.0 ppm SPA = 803
5.0	070403 070408 0946 070413 070418	N/A	6.0	SAA	SAA	SAA	By - BG microtip = 0.0 ppm SPA - 841
5.5	070405 070410 0952 070416 070420	N/A	6.0	SAA	SAA	SAA	By - BG microtip = 0.0 ppm SPA - 786
6.0							

NOTES

Hand Augered by Tyrone Price and Robert Thurman

SAA = same as above
N/A - not applicable

[illegible] Penetrometer Test [illegible] by the [illegible] Sheet

Background By = [illegible] microtip = [illegible] ppm

0199

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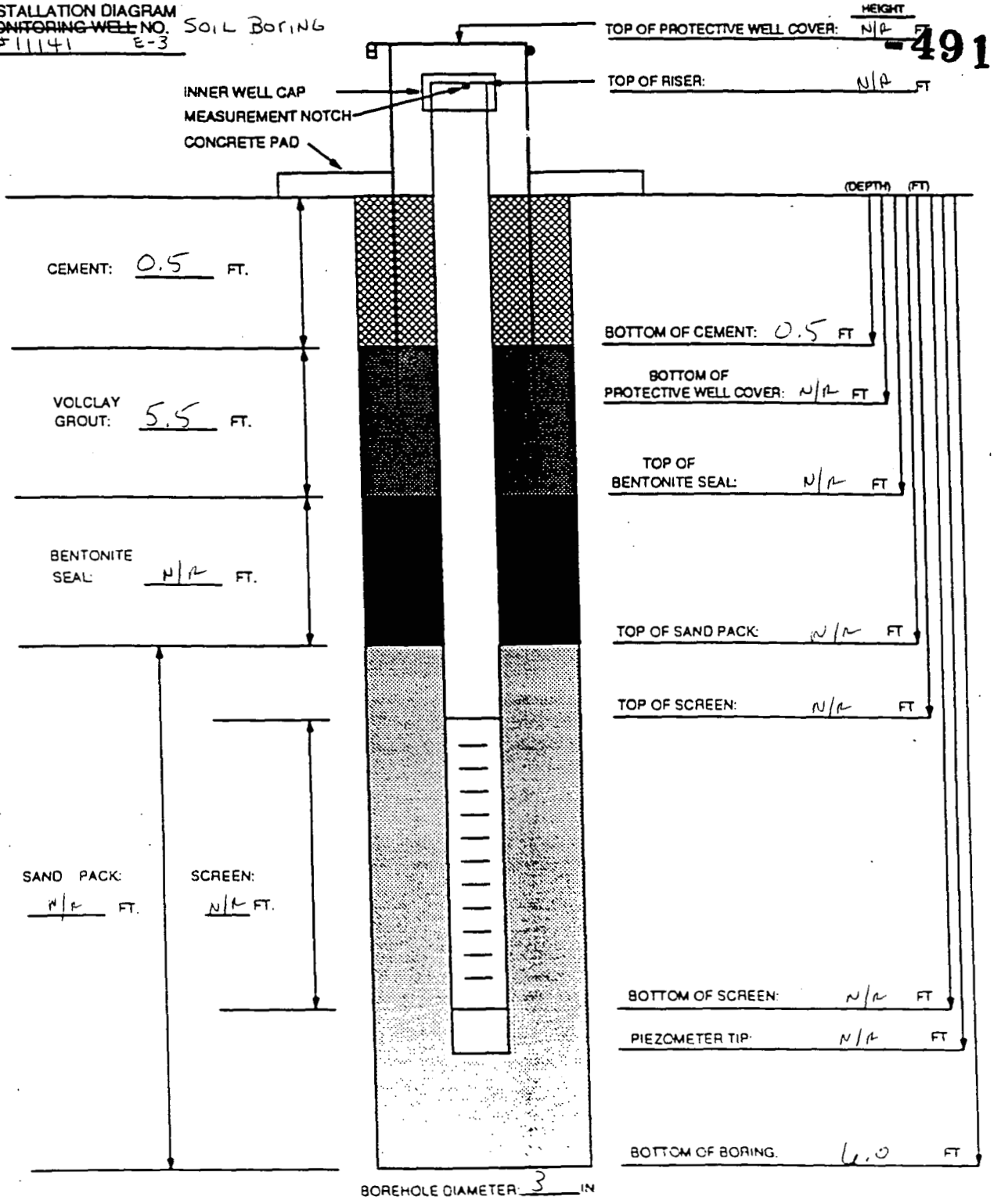
FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. SOIL BORING
#11141 E-3

INSTALLATION DATE: 8-7-93

-4916



MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT 5
AMOUNT OF CEMENT 1/2
AMOUNT OF WATER USED 10 gal
OTHER
TASK

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN ID 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST ENGINEER
4) WATER DEPTH AND DATE N/A FT. N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

ASI FORM 0157 REV

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KI/PO

SOIL BORING

~~PIEZOMETER~~ INSTALLATION SHEET

Cru 5 Surface and Subsurface

-4916

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Lagne DATE 8-7-93
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. #11141 E-3
PIEZOMETER NO. _____ DATE OF INSTALLATION 8-7-93

BOREHOLE DRILLING

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

~~TYPE OF BIT~~ _____
~~CASING SIZE (S) USED:~~ N/A
~~SIZE _____ FROM _____ TO _____~~
~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0201

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

Cu 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface & Subsurface Soil Sampling Investigation		
BORING NUMBER #11142 E-2	COORDINATES	DATE 8-6-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-6-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-6-93	
DRILLING METHODS Hand Augered		PAGE 1 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070432 [0915] 8-6-93	N/A	6.0	Very Soft (2.5Y 5/6) Lt. Olive Brown Clayey Sandy Silt w/ trace of well graded gravel nonplastic (fine grained sand) DRY	ML	<0.5	B_g = BG microtip = 4.6 ppm SPA 753
0.5	070433 [0922] 8-6-93	N/A	6.0	SAA	SAA	SAA	B_g = BG microtip = 2.8 ppm SPA Count = 782
1.0	070434 [0927] 8-6-93	N/A	6.0	SAA w/ well graded gravel	SAA	SAA	B_g = BG microtip = 0.0 ppm Appears to be "Fill" gravel SPA = 738
1.5	122273 122275 [0932] 122277 122279 8-6-93	N/A	6.0	SAA	SAA	SAA	B_g = BG microtip = 0.0 ppm SPA = 850
2.0	070435 [0941] 8-6-93	N/A	6.0	SAA	SAA	SAA	B_g = BG microtip = 0.0 ppm SPA = 755
2.5	070436 [1053] 8-6-93	N/A	6.0	Very Soft (10YR ~~4/6~~ 5/8 / ~~2.5Y~~ 8-6-93) Yellowish Brown Clayey Silt w/ some sand, well graded gravel Nonplastic DRY	ML	<.5	B_g = BG microtip = 0.0 ppm SPA = 818 "Fill" Gravel
3.0							

Hand Augered by Tyrone Price and Robert Thomas

SAA - Same As Above
N/A - Not Applicable

Background
B_g = 150-350 ppm
Microtip = 0.0 ppm

* Samples classified per ASTM Standard Penetration Test
* Soil Colors classified by the Munsell Color Chart

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Chu 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #1142 E-2	COORDINATES	DATE 8-6-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-6-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-6-93	
DRILLING METHODS Hand Augered		PAGE 2 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070437 1059 8-6-93	N/A	6.0	Soft (10YR 4/6) Dark Yellowish Brown Clayey Silt w/ some fine grained sand low plasticity, well graded gravel Slightly moist	ML	.5	P_g = BG Microtip = 0.0 ppm SPA = 829 "Fill" Gravel
3.5	070438 1105 8-6-93	N/A	6.0	Stiff (10YR 4/4) Dark Yellowish Brown Clayey Silt low plasticity, w/ some fine grained sand, well graded gravel, patches of silty clay Slightly Moist	ML	1.0	P_g = BG Microtip = 0.0 ppm SPA = 766
4.0	070439 1115 8-6-93	N/A	6.0	Stiff to Very Stiff (10YR 4/4) Dark Yellowish Brown Silty Clay w/ trace sand and well-graded gravel, low plasticity Slightly Moist	CL	1.0 to 2.5	P_g = BG Microtip = 0.0 ppm SPA = 775 "Fill Gravel"
4.5	070440 1120 8-6-93	N/A	6.0	SAA	SAA	1.5	P_g = BG Microtip = 0.0 ppm SPA = 828
5.0	070441 1124 8-6-93	N/A	6.0	SAA w/ clayey silt that's Dry	SAA	SAA	P_g = BG Microtip = 0.0 ppm SPA = 810
5.5	122274 122276 122278 122280 [1125] 8-6-93	N/A	6.0	Stiff (10YR 4/4) Dark yellowish Brown Silty Clay w/ some fine grained sand, well graded gravel Slightly Moist	SAA	SAA	P_g = BG Microtip = 0.0 ppm SPA 843
6.0							

NOTES

Hand Augered by Lyone Price and Robert Inman

SAA - Same as above
N/A Not applicable

* Samples collected per ASTM Standard Penetration Test
* Soil Color identified by the Munsell Color Chart

Background
P_g = .00-.24 ppm
Microtip = 0.0 ppm

0203

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FERNALD RI/FS

L-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Crew 5 Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER # 11142 E-2	COORDINATES	DATE 7-29-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 7-29-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 7-29-93	
DRILLING METHODS Hand Auger		PAGE 1 OF 2	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0930	N/A	6.0	Very Soft (2.5Y 5/6) Lt. Olive Brown Clayey Sandy Silt w/ trace gravel, non-plastic (fine-grained sand) SPA 878 Dry	ML	<.5	Bg = 140 cpm Microhp = 0.0 ppm SPA = 878
0.5	0941	N/A	6.0	SAA SPA 935	SAA	SAA	Bg = 120 cpm Microhp = 0.0 ppm SPA = 935
1.0	0944	N/A	6.0	Stiff (2.5Y 5/6) Lt. Olive Brown Silty Clay w/ some sand and trace gravel, low plasticity SPA 979 Slightly moist	ML and CL	2.5	Bg = 120 cpm Microhp = 0.0 ppm (Silt slough) SPA = SAA 979
1.5	0953	N/A	6.0	Very Soft to Stiff (2.5Y 5/6) Lt Olive Brown Silty Clay w/ trace sand, low plasticity, and slightly moist and Sandy Silt, (fine grained) Dry SPA 938	ML and CL	<.5 to 2.0	Bg = 80 cpm Microhp = 0.0 ppm SPA = 938 trace gravel pieces of weathered shale
2.0	0956	N/A	6.0	Very Soft (2.5Y 5/6) Lt Olive Brown, ~~Silt~~ Sandy Clayey Silt w/ well-graded gravel low plasticity SPA 943 Slightly moist	ML	<.5	Bg = 120 cpm Microhp = 0.0 ppm SPA = 943 Trace of "fine" gravel
2.5	1000	N/A	6.0	SAA SPA-980	SAA	SAA	Bg = 120 cpm Microhp = 0.0 ppm SPA 980
3.0							

NOTES

[illegible]

[illegible]

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

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PROJECT NUMBER 50.03.18	PROJECT NAME Ch 5 Surface & Subsurface Soil Sampling Investigation	
BORING NUMBER #1142 E-2	COORDINATES	DATE 7-29-93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 7-29-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 7-29-93
DRILLING METHODS Hand Auger		PAGE 2 OF 2

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0							
3.5	1520	N/A	6.0	Very Soft (2.54 5/4) Lt Olive Brown Clayey Silt w/ f. grained sand, well graded gravel SPA-916 DRY	ML	<.5	β_γ = 100 cpm Microrp - 0.0 ppm SPA=916 Fill: Gravel
4.0	1527	N/A	6.0	SAA SPA 949	SAA	SAA	β_γ - 140 cpm microrp = 0.0 ppm SPA - 949
4.5	1533	N/A	6.0	SAA SPA-937	SAA	SAA	β_γ = 140 cpm Microrp - 0.0 ppm SPA - 937
5.0	1601	N/A	6.0	SAA SPA 979	SAA	SAA	β_γ - 140 cpm microrp. 0.0 ppm SPA 979
5.5	[illegible]	N/A	6.0	SAA SPA 1010	SAA	SAA	β_γ = 140 cpm microrp - 0.0 SPA 1010
6.0	1612	N/A	6.0	SAA and pebbles SPA 1010 Silty clay w/ fine sand and fine gravel Increasing clay fraction [illegible]	SAA	SAA	β_γ - 100 cpm Microrp - 0.0 ppm [illegible]

NOTES

[illegible]

0205

127

FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Soil Boring

#11142 E-2

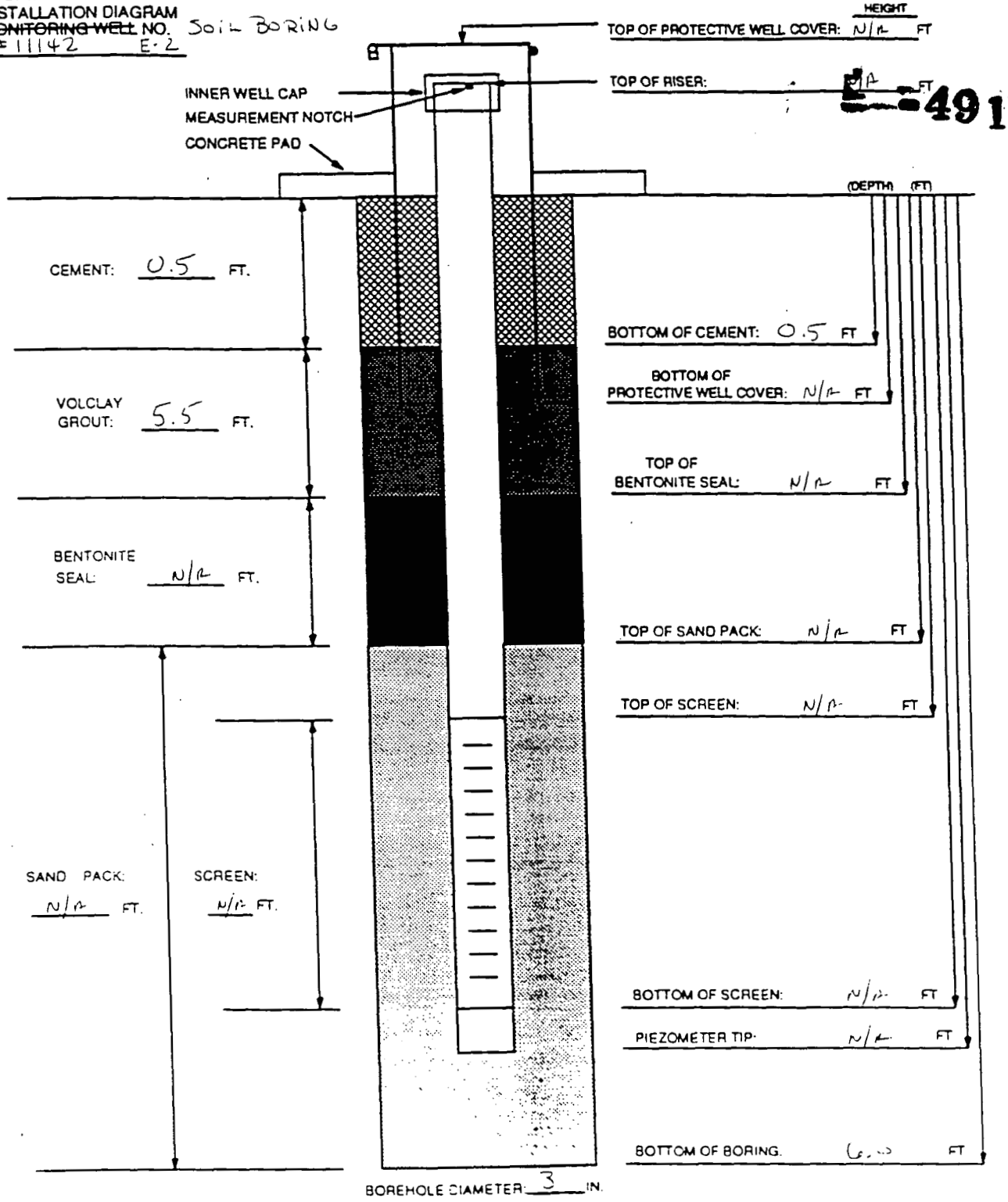
INSTALLATION DATE: 8-6-93

HEIGHT

TOP OF PROTECTIVE WELL COVER: N/A FT

TOP OF RISER: N/A FT

4916



MATERIALS USED

SAND TYPE AND QUANTITY: N/A

BENTONITE PELLETS (5-GALLON BUCKETS): N/A

BAGS OF VOLCLAY GROUT: 4

AMOUNT OF CEMENT: 3

AMOUNT OF WATER USED: [illegible]

OTHER:

TASK: [illegible]

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0.N/A IN. SLOTS

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP

GEOLOGIST/ENGINEER: [illegible]

4) WATER DEPTH AND DATE N/A FT. [illegible]

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

[illegible]

RI/FS

SOIL BORING

~~PIEZOMETER~~ INSTALLATION SHEET

Cru 5 Surface and Subsurface

-4916

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-6-93

PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____

BORING NO. #11142 E-2

PIEZOMETER NO. N/A DATE OF INSTALLATION 8-6-93

BOREHOLE DRILLING

DRILLING METHOD Hand Auger

DRILLING FLUID (S) USED:

FLUID N/A FROM N/A TO N/A

FLUID N/A FROM N/A TO N/A

~~TYPE OF BIT~~ _____

~~CASING SIZE (S) USED:~~ N/A

~~SIZE _____ FROM _____ TO _____~~

~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

~~TYPE~~ _____

~~DIAMETER OF PERFORATED SECTION~~ _____

~~PERFORATION TYPE:~~ N/A

~~SLOTS ☐ HOLES ☐ SCREEN ☐~~

~~AVERAGE SIZE OF PERFORATIONS~~ _____

~~TOTAL PERFORATED AREA~~ _____

~~RISER PIPE MATERIAL~~ _____

~~RISER PIPE DIAMETERS:~~

~~O.D.~~ N/A ~~I.D.~~ _____

~~LENGTH OF PIPE SECTIONS~~ _____

~~JOINING METHOD~~ _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A

PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP N/A	BOTTOM
SAND	TOP N/A	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

0207

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ N/A NO ☐

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ N/A NO ☐

REMARKS _____

1/54

RI/FS

VISUAL CLASSIFICATION OF SOILS 4916

PROJECT NUMBER: 50.03.15A	PROJECT NAME: Great Miami Riverbank		
BORING NUMBER: 1117	COORDINATES: —	DATE: 08-06-93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED 08-06-93	
ENGINEER/GEOLOGIST: Terry Kankin	Depth — Date/Time —	DATE COMPLETED 08-06-93	
DRILLING METHODS: HSA		PAGE 1 OF 1	

	DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9	1.5	125165 0925 08.06	44/44/37	15	med brown SILT, trace gravel, dry, 10 YR 4/4	ML	N/A	BΔ = 40
#10	3.0	125166 125167 0928 08.06	39/31/31	15	SAA	ML	N/A	BΔ = 30
1	4.5	125168 0940 08.06	17/16/10	18	SAA	ML	N/A	BΔ = 40
2	6.0	125171 1030 08.06	24/30/19	18	SAA	ML	N/A	BΔ = 20
3	7.5	125172 1040 08.06	7/10/16	18	SAA	ML	N/A	BΔ = 20
4	9.0	125173 1314 08.06	17/20/40	18	SAA	ML	N/A	BΔ = 20 MT = 0.0
5	10.5	125174 1329 08.06	24/31/36	18	SAA	ML	N/A	BΔ = 60 MT = 0.0
6	12.0	125175 1345 08.06	9/9/9	18	med brown SAND, fine, fr, vity well sorted, silty, slightly moist 10 YR 4/4	SM	N/A	BΔ = 40 MT = 1.5 ~~0.0~~
7	13.0	125176 1350 08.06		15	SAA, some coarse gravel	SM	N/A	BΔ = 20 MT = 0.0
					TD = 13.0' Backfill w/ grout.			

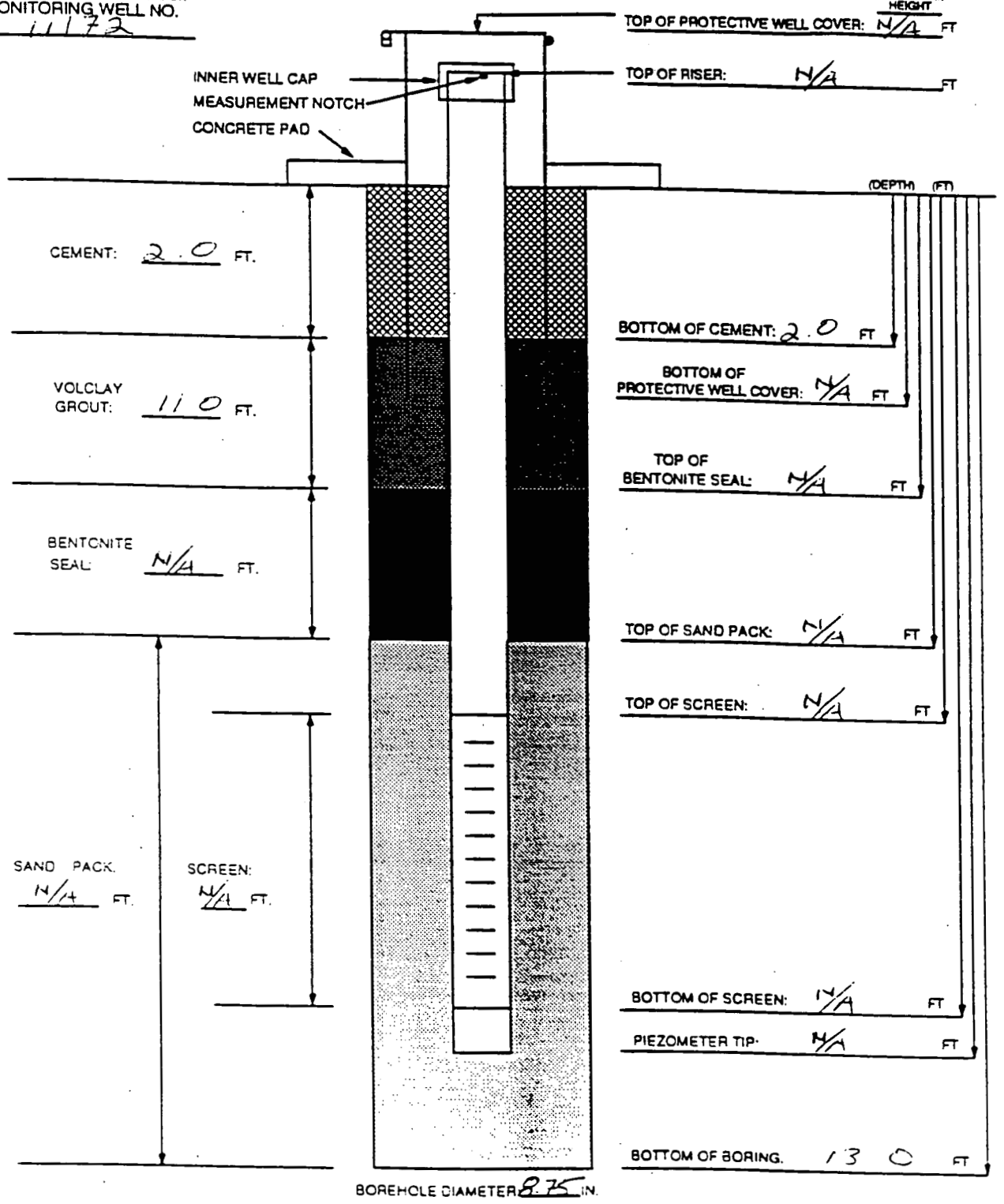
NOTES

dup @ 1.5-3.0 (125167)
rinsate @ 1.5-3.0 (125168, 125169)
full rad @ 9.0-10.5 (125177, 125178)

0208

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
BH 11172

INSTALLATION DATE: 4918 3



MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 1 bag
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 1 gal
OTHER: N/A
DATE: [illegible]

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER: Terry Konkin
4) WATER DEPTH AND DATE N/A FT [illegible]
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

-4916

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Great Miami Riverbank FIELD ENG./GEO. Terry Konkin DATE 08-10-93
PROJECT NO. 50-03-15A CHECKED BY _____ DATE _____
BORING NO. 11172
PIEZOMETER NO. N/A DATE OF INSTALLATION 08-06-93

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hollow stem augers
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0	BOTTOM 13.0	TOP N/A	BOTTOM N/A
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 2.0	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	13.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0210

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RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50-03-154	PROJECT NAME: Great Miami Riverbank		
BORING NUMBER: 11178	COORDINATES: —	DATE: 08-06-93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: 08-06-93	
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —	DATE COMPLETED: 08-06-9	
DRILLING METHODS: HSA		PAGE 1 OF 1	

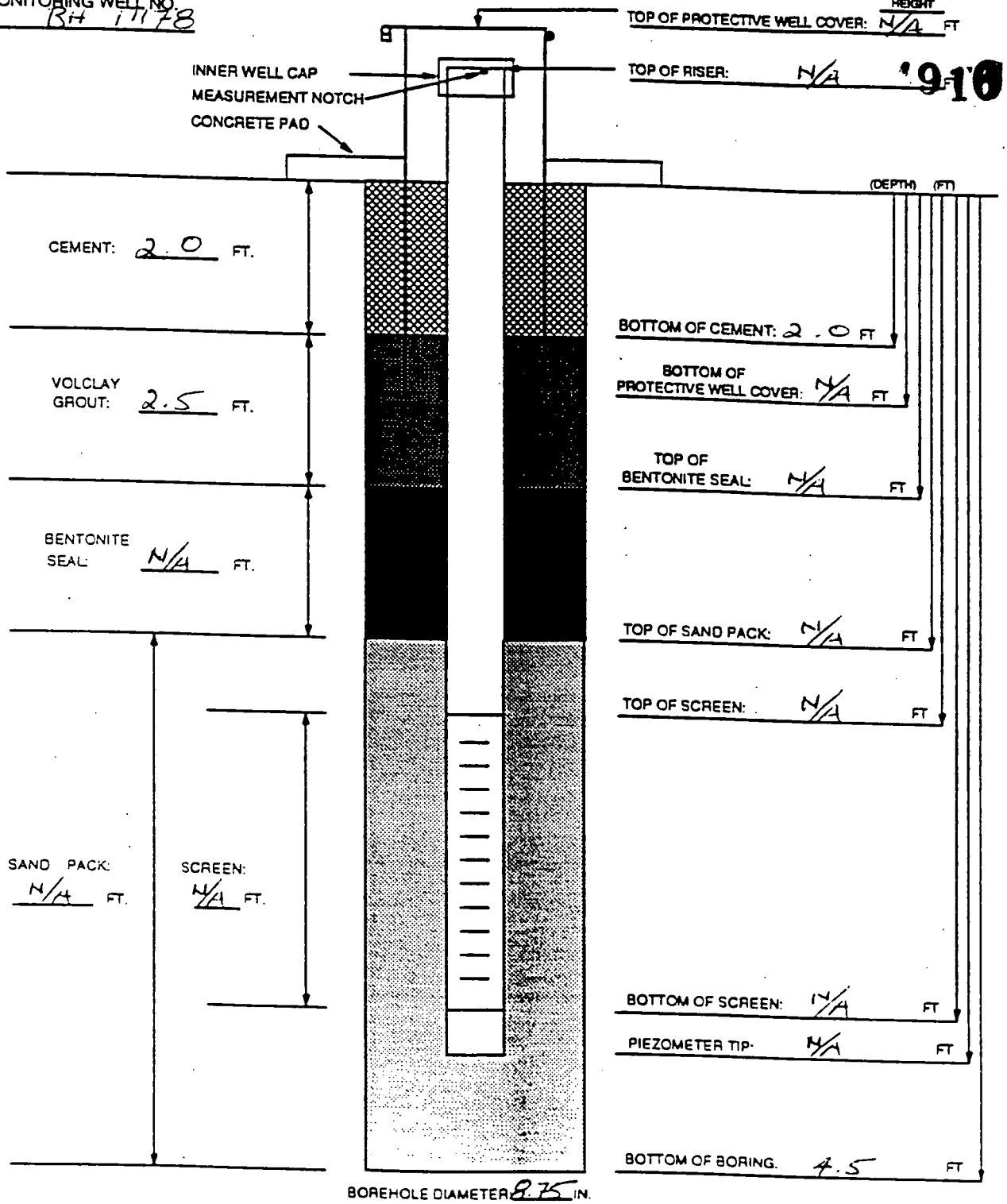
	DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6	1.5	125160 0820 0806	18/32/27	15	med brown SILT, dry 10YR 4/6	ML	N/A	BΣ = 20 MT = 4.0
7	3.0	125161 0827 0806	16/12/16	7	SAA	ML	N/A	BΣ = 20 MT = 3.0
8	4.5	125162 0835 0806	17/50 (4")	3	SAA, few pebbles, cobbles	ML	N/A	BΣ = 20 MT = 0.0
9	6.0	~~125163~~ ~~0806~~			auger refusal @ 4.5' backfill w/grout		N/A	BΣ = N/A MT = N/A
10	7.5							
	9.0							
	10.5							
	12.0							
	13.5							

NOTES

full rad @ 0-1.5 (125163)
gross α/β @ 0-1.5 (125164

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. RH 1178

INSTALLATION DATE: 08-06-93



MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT 21
AMOUNT OF CEMENT 21 bags
AMOUNT OF WATER USED 21 gal
OTHER N/A
TASK SC 03 15A

NOTES.

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER Terry Konkin

0212

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PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME Great Miami Riverbank FIELD ENG./GEO. Terry Konkin DATE 08·10·93
PROJECT NO. 50·03·15A CHECKED BY _____ DATE _____
BORING NO. 11178
PIEZOMETER NO. N/A DATE OF INSTALLATION 08·06·93

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hollow stem augers
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0	BOTTOM 4.5	TOP N/A	BOTTOM N/A
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 2.0	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	4.5		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0213

135

RI/FS

-4910

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50-03-54	PROJECT NAME: Great Miami River Bank		
BORING NUMBER: 11179	COORDINATES: —	DATE: 08-04-93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED 08-04-93	
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —	DATE COMPLETED 08-04-93	
DRILLING METHODS: H SA		PAGE 1 OF 1	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
Duplicate drop *	125125 125126 0930 0804		10	med brown SILT, few pebbles, dry 10YR 6/4	ML	N/A	Bγ=50 MT=0.0
1.5	125127 0935 08:04	33/31/17	18	SAA	ML	N/A	Bγ=50 MT=0.0
3.0	125128 0940 08:04	14/9/6	18	SAA moist	ML	N/A	Bγ=50 MT=0.0
4.5	125129 0943 08:04	8/9/12	10	SAA	ML	N/A	Bγ=50 MT=0.0
6.0	125130 0946 08:04	11/8/12	12	SAA	ML	N/A	Bγ=50 MT=0.0
7.5	125131 1003 08:04	17/16/23	18	SAA	ML	N/A	Bγ=80 MT=0.0
9.0	125132 1017 08:04	10/7/10	18	~~tan brown SAND, fine, silty, fairly well sorted, moist 10YR 4/4~~ SAA	SM	N/A	Bγ=30 MT=0.0
10.5	125133 1022 08:04	8/7/9	10	SAA med brown, SAND, fine-coarse, some silt, poorly sorted, moist. 10YR 5/4 some coarse gravel, cobbles (40mm)	SM	N/A	Bγ=50 MT=0.0
12.0	125134 1030 08:04	5/8	4	SAA		N/A	Bγ=50 MT=0.0
13.0				TD=13.0' abandon backfill hole w/ grout			

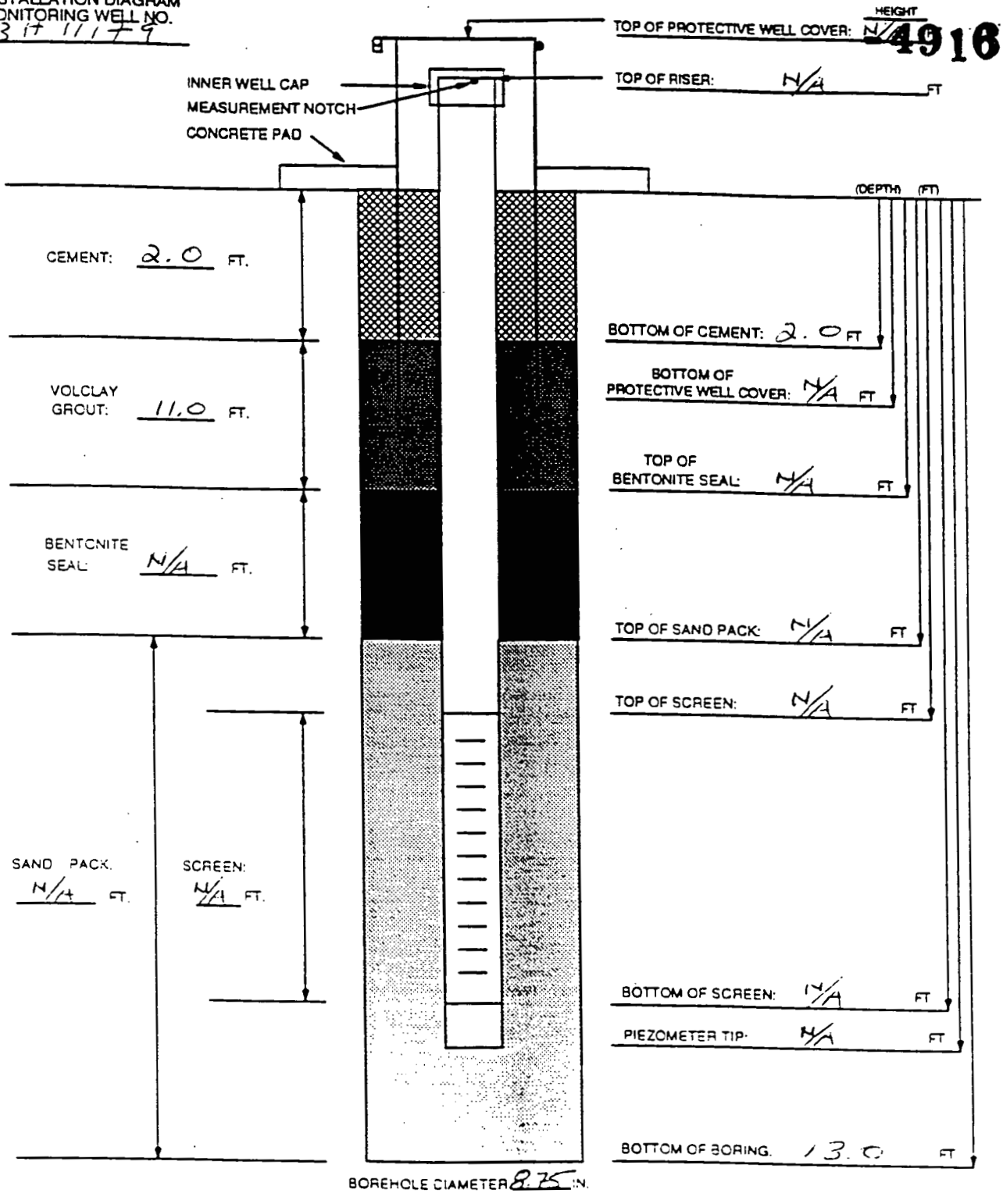
NOTES

duplicate @ 0-1.5' (125126)
full vol 7.5-9.0 (125135)
gross α/β " (125136)

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. B it 11/79

INSTALLATION DATE: 08-04-93

4916



MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT <1
AMOUNT OF CEMENT <1 bag
AMOUNT OF WATER USED <1 gal
OTHER N/A
TASK Co 13 15/A

NOTES

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER Terry Kenkin

4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
5) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
* WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0215

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-4916

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Great Miami Riverbank FIELD ENG./GEO. Terry Konkin DATE 08-10-93
PROJECT NO. 50-03-15A CHECKED BY _____ DATE _____
BORING NO. 11179
PIEZOMETER NO. N/A DATE OF INSTALLATION 08-04-93

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hollow stem augers
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP 2.0	BOTTOM 13.0	TOP N/A	BOTTOM N/A
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 2.0	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	13.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0216

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RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50.03.15A	PROJECT NAME: Great Miami River Bank		
BORING NUMBER: 11180	COORDINATES: —	DATE: 08.04.93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: 08.04.93	
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —	DATE COMPLETED: 08.04.93	
DRILLING METHODS: HSA		PAGE 1 OF 1	

	DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9	125137	125137 1315 0804	34/50(2")	2	med brown SILT, trace coarse sand, pebbles, dry 1042 4/3	ML	N/A	BΔ = 40 MT = 0.0
rinsate dup #	1.5	125138 125139 1333 08.04	7/14/20	18	SAA	ML	N/A	BΔ = 70 MT = 0.0
1	3.0	125140 1344 08.04	4/11/16	18	SAA	ML	N/A	BΔ = [illegible] MT = 0.0
2	4.5	125141 1357 08.04	4/13/14	18	SAA	ML	N/A	BΔ = 60 MT = 0.0
3	6.0	125142 1403 08.04	10/10/14	18	SAA	ML	N/A	BΔ = 50 MT = 0.0
4	7.5	125143 1412 08.04	20/11/12	18	SAA	ML	N/A	BΔ = 20 MT = 0.0
5	9.0	125144 1419 0804	6/9/11	18	SAA, some fine sand	ML	N/A	BΔ = 30 MT = 0.0
6	10.5	125145 1431 08.04	4/5/9	18	SAA	ML	N/A	BΔ = 20 MT = 0.0
7	12.0	125146 1436 08.04	7/8	18	SAA	ML		BΔ = 20 MT = 0.0
	13.0				TD = 13.0' Backfill w/ grout			

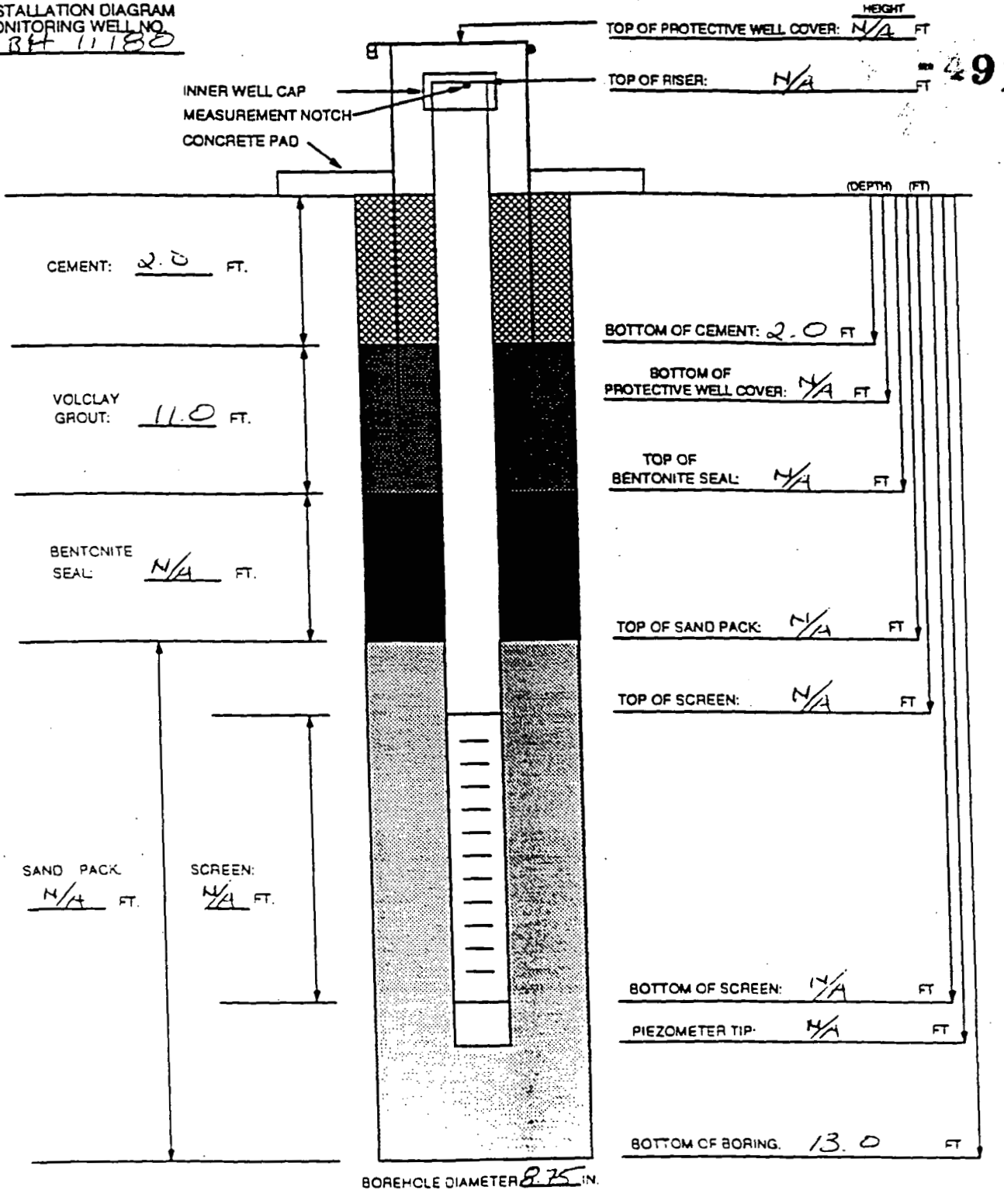
NOTES

- dup @ 1.5-3.0 (125139)
- rinsate @ 1.5-3.0 (
- field rad @ 3.0-4.5 125147
- gross α/β @ 3.0-4.5 125150

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. BH 11180

INSTALLATION DATE: 08-04-93

4916



MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS). N/A
BAGS OF VOLCLAY GROUT <1
AMOUNT OF CEMENT <1 bag
AMOUNT OF WATER USED <1 gal
OTHER N/A
TASK SC 03 15/4

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST ENGINEER Terry Konkus
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0218

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PIEZOMETER INSTALLATION SHEET

-4916

PROJECT NAME Great Miami Riverbank
PROJECT NO. 50-03-15A
BORING NO. 11180
PIEZOMETER NO. N/A

FIELD ENG./GEO. Terry Konkin DATE 08-10-93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 08-04-93

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hollow stem augers
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0	BOTTOM 13.0	TOP N/A	BOTTOM N/A
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 2.0	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	13.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0219

141

RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50-03-15A	PROJECT NAME: Great Miami River bank		
BORING NUMBER: 11181	COORDINATES: —	DATE: 08-05-93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: 08-05-93	
ENGINEER/GEOLOGIST: Terry Kankin	Depth — Date/Time —	DATE COMPLETED: 08-05-93	
DRILLING METHODS: HSA		PAGE 1 OF 1	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8 1.5	125151 0833 08-05	14/14/14	9	med brown SILT, clayey, trace coarse sand, slightly moist 10YR 4/3	ML		B.γ = 40 mT = 2.5
9 3.0	125152 0838 08-05	2/9/13	10	med brown CLAY, silty, trace coarse SAND, slightly moist 10YR 4/3	CL	0.75	Bγ = 40 mT = 0.5
10 4.5	125153 0848 08-05	10/14/10	18	med brown, SILT, slightly clayey moist 10YR 4/3	ML		Bγ = 30 mT = 0.5
6.0	125154 0905 08-05	9/10/17	16	SAA; some fine sand toward bottom	ML		Bγ = 20 mT = 1.3
7.5	125155 0912 08-05	8/11/17	15	med brown, SAND, fine, fairly well sorted, moist. 10YR 3/6	SW		Bγ = 20 mT = 0.1
9.0	125156 0914 08-05	42/50/57	6	med brown, SAND fine-coarse poorly sorted, some coarse gravel (40 mm), moist 10YR 5/6	SP		Bγ = 20 mT = 1.6
10.5				auger refusal @ 9.0' abandon boring.			
12.0							
13.0							

NOTES

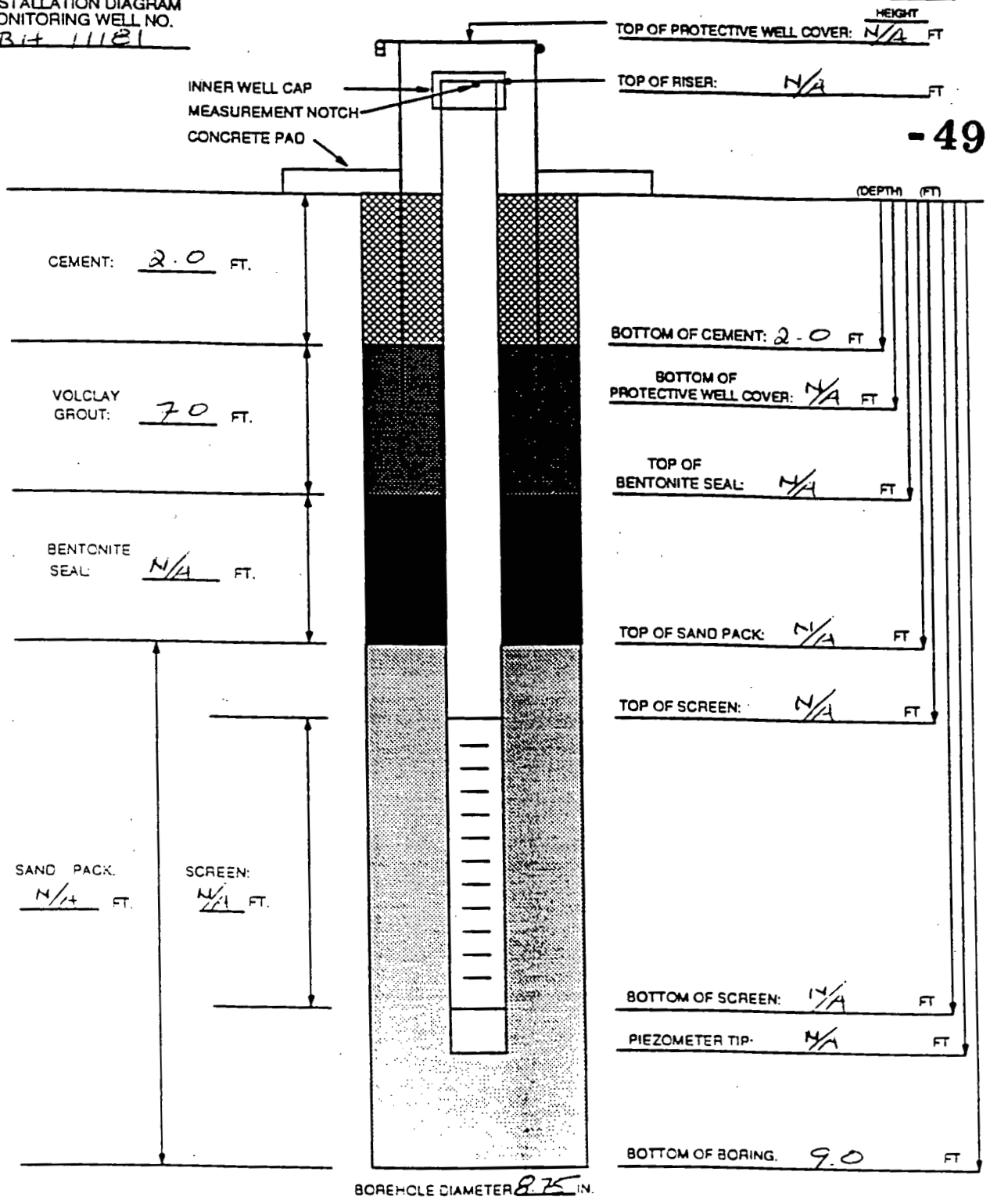
full vad 1.5-3.0 (125157)
gross α/β 1.5-3.0 (125158)
dup @ 1.5-3.0 (125159)

0220 142

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. B+ 1181

INSTALLATION DATE: 08-05-93

-4916



BOREHOLE DIAMETER 8.75 IN.

MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT <1
AMOUNT OF CEMENT <1 bag
AMOUNT OF WATER USED <1 gal
OTHER N/A
[illegible] [illegible]

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER Terry Konkin
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0221 143

PIEZOMETER INSTALLATION SHEET

916

PROJECT NAME Great Miami Riverbank FIELD ENG./GEO. Terry Konkin DATE 08-10-93
PROJECT NO. 50-03-15A CHECKED BY _____ DATE _____
BORING NO. 1181
PIEZOMETER NO. N/A DATE OF INSTALLATION 08-05-93

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hollow stem augers
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 2.0	BOTTOM 5.0	TOP N/A	BOTTOM N/A
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 2.0	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	9.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

0222

N/A

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.C3.18	PROJECT NAME		
BORING NUMBER 11202	COORDINATES		DATE 13-14 AUG 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 13 AUG 93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 14 AUG 93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	13 AUG 121522 121523 121524 121525	7	6	HARD (2.5Y, 4/4) OLIVE BROWN SILTY CLAY TRACE SAND, ORGANICS, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0.4 BY: 100 A
1	121526 121527	12	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SUBANGULAR GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARCHIVE
	121528 121529 1419 13 AUG	11	6	SAA	CL	>4.5	TIME 1419 A
2	121530	25	6	SAA	CL	>4.5	MT: 0.6 BY 80 ARCHIVE
	121531	31	6	SAA	CL	>4.5	ARCHIVE
3	121532 121533 121534 1454 13 AUG	41	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE ORANGE MOTTLES, SUBANGULAR GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	TIME 1454 A
	121535	45	6	HARD (2.5Y, 5/3) LIGHT OLIVE BROWN SILTY CLAY, TRACE YELLOW MOTTLES, SAND, GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0 BY: 70 ARCHIVE
4	121536	41	6	HARD (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY, TRACE GRAY MOTTLES, SAND, GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARCHIVE
	121537 1537	38	6	SAA	CL	>4.5	ARCHIVE TIME 1537
5	14 AUG 121538 121539 121540	25	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY TRACE SAND, GRAVEL, GRAY MOTTLES, MEDIUM PLASTICITY, MOIST	CL	>4.5	MT: 0 BY: 70 A
	121541 0835	35	6	SAA	CL	>4.5	ARCHIVE
				BOTTOM OF BORING			TIME 0835 14 AUG 93

DRILLING FIRM: PENN DRILL
DRILLERS: RON CARTER, TED BAIK
RIG: SIMCO

UNITS MEASURED
MICROTIP = PPM
BY = CPM
2. = CPM

BACKGROUND READINGS
MICROTIP 0.4 PPM
BY 80 CPM
2. — CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

THIN CLAUDE: 121542

RI/FS

PIEZOMETER INSTALLATION SHEET 4916

PROJECT NAME CRUS / PHASE II FIELD ENG./GEO. B.F. MULLER DATE 15 JUL
PROJECT NO. 50-03.18 CHECKED BY _____ DATE _____
BORING NO. 11202
PIEZOMETER NO. N/A DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD SPLIT SPOON	TYPE OF BIT SPLIT SPOON
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A	RISER PIPE MATERIAL N/A
DIAMETER OF PERFORATED SECTION N/A	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. N/A I.D. N/A
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS N/A
AVERAGE SIZE OF PERFORATIONS N/A	JOINING METHOD N/A
TOTAL PERFORATED AREA N/A	

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP ↓	BOTTOM ↓	TOP	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	5			
GWL AFTER INSTALLATION	N/A			

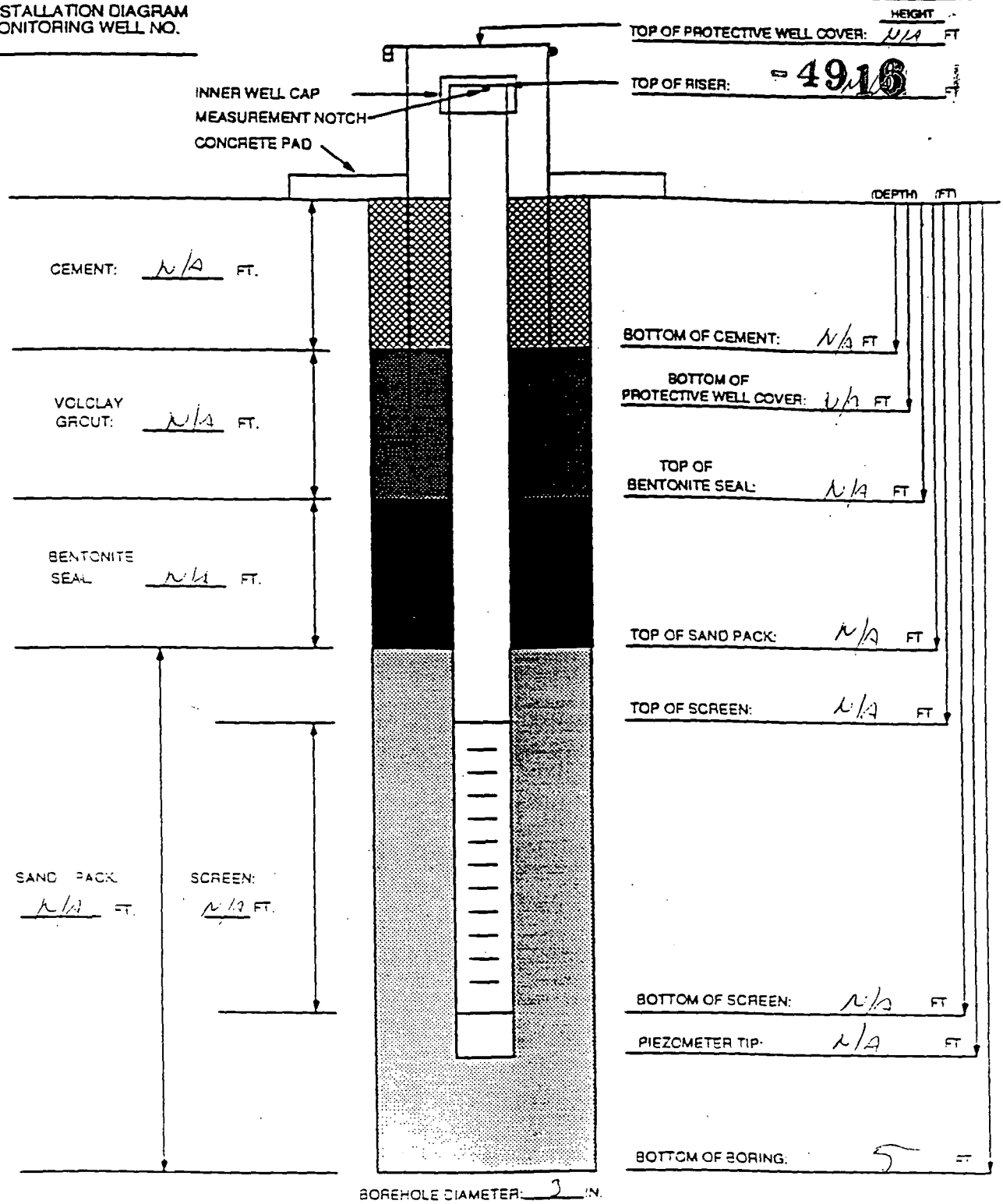
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS _____

0224 146

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

INSTALLATION DATE: 14 JUL 87



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: N/A
AMOUNT OF WATER USED: N/A
OTHER: FILLED WITH CUTTINGS
TASK: [illegible]

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: [illegible]

FERNALD RI/FS

4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRUS PHASE I	
BORING NUMBER: 11214	COORDINATES:	DATE: 8-11-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-11-93
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-23-93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 9

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	073201 0745 8-11-93	5	6	HARD, BROWNISH YELLOW (10YR 6/6) SILTY CLAY, WITH TRACE OF SAND AND FINE GRAVEL, LOW PLASTICITY, DRY	CL	>4.5	MICROTIP = 0.0 ppm BG = 60 cpm
1.0	073202 0745 8-11-93	12	6	SAA	CL	>4.5	
1.5	073203 0745 8-11-93	15	6	SAA	CL	>4.5	
2.0	073204 0755 8-11-93	12	6	HARD, LIGHT OLIVE BROWN (2.5Y 5/6) SILTY CLAY WITH TRACE OF SAND, AND LARGE IGNEOUS ERRATIC, MED. PLASTIC DRY.	CL	>4.5	MICROTIP = 0.0 ppm BG = 60 cpm
2.5	073205 0755 8-11-93	15	6	VERY STIFF, DARK YELLOWISH BROWN (10YR 4/6) ~~SAA~~ PL 8-11-93, SILTY CLAY, WITH SOME SAND AND FINE GRAVEL, MED. PLASTIC, DRY	CL	3.75	
3.0	073206 0755 8-11-93	17	6	STIFF SAA MOIST	CL	1.0	
3.5	073207 0800 8-11-93	12	6	~~VERY SOFT~~ STIFF 8/11/93 PL SAA	CL	1.0	MICROTIP = 0.0 ppm BG = 60 cpm
4.0	073208 0800 8-11-93	17	6	SOFT (VERY) SAA	CL	>0.5	
4.5	073209 0800 8-11-93	4	6	VERY SOFT, YELLOWISH BROWN (10YR 5/8) CLAYEY SAND, WITH SOME FINE GRAVEL, ~~MED TO LOW PLASTICITY~~, VERY MOIST (WELL GRADED) PL 8-11-93	SC	>0.5	
	073210 0810 8-11-93	4	6	VERY SOFT, DARK YELLOWISH BROWN (10YR 4/6) CLAYEY SAND, WITH SOME FINE GRAVEL, WET WELL GRADED	SC	NA	MICROTIP = 0.0 ppm BG = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: AUGER AUGER
Driller: JOE RAAB
Helper: JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
BG = 60 cpm
MT = 0.0 ppm

• Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: MW # 11214	COORDINATES:		DATE: 8-11-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8-11-93
ENGINEER/GEOLOGIST: RILEY	Depth	Date/Time	DATE COMPLETED: 8-23-93
DRILLING METHODS: HOLLOWSTEM AUGER			PAGE 2 OF 9

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	073211 ~~0845~~ 0810 8-11-93	4	6	SAA	SC	NA	SEE PREVIOUS PAGE
6.0	~~073212~~ NA ~~0845~~ 0810 8-11-93	4	0	No RECOVERY	NA	NA	
6.5	073213 0730 8-13-93	3	6	~~MT 8-13-93~~ ~~VERY~~ LOOSE, LIGHT OLIVE BROWN (2.5Y 5/6) WELL GRADED CLAYEY SAND WITH SOME FINE TO MED. GRAVEL, WET	SC	NA	MICROTIP = 0.0 PPM BY = 40 CPM
7.0	073214 0730 8-13-93	4	6	SAA	SC	NA	
7.5	073215 0730 8-13-93	3	6	SAA	SC	NA	
8.0	073216 0745 8-13-93	3	6	SAA	SC	NA	MICROTIP = ~~0.0~~ 0.7 PPM 8-13-93 BY = 40 CPM
8.5	073217 0745 8-13-93	3	6	SAA	SC	NA	
9.0	073218 0745 8-13-93	5	6	~~MT 8-13-93~~ ~~VERY~~ LOOSE, LIGHT OLIVE BROWN (2.5Y 5/6), WELL GRADED FINE SAND, WITH SOME FINES (CLAY & SILT), WET	SC	NA	
9.5	073219 0805 8-13-93	7	6	MEDIUM DENSE, OLIVE BROWN, (2.5Y 4/3) WELL GRADED SAND, WITH SOME FINE TO MED. GRAVEL AND SOME FINES (CLAY & SILT), WET	SC	NA	MICROTIP = PPM BY = CPM
	073220 0805 8-13-93	9	6	SAA	SC	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER ACKER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
BY = 60 cpm
MT = 0.0 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

0227

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER: 50.03.22	PROJECT NAME:		
BORING NUMBER: MW #1214	COORDINATES:		DATE: 8-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8-11-93
ENGINEER/GEOLOGIST: RILEY	Depth	Date/Time	DATE COMPLETED: 8-23-93
DRILLING METHODS: HOLLOWSTEM AUGER			PAGE 3 OF 9

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	073221 0805 8-13-93	14	6	SAA	SC	NA	SEE PREVIOUS PAGE
11.0	073222 0930 8-13-93	3	6	LOOSE SAA (WITH MARKED INCREASE IN FINES)	SC	NA	MICROTIP = 0.0 PPM BG = 30 CPM
11.5	073223 0830 8-13-93	3	6	~~LOOSE~~ SOFT, OLIVE YELLOW (2.5Y 6/6), CLAYEY SILT, WITH SOME SAND AND FINE GRAVEL, NON PLASTIC, WET	ML	2.5	
12.0	073224 0830 8-13-93	9	6	MEDIUM STIFF, OLIVE YELLOW (2.5Y 6/6) CLAYEY SILT, NON-PLASTIC, WET	ML	.75	
12.5	073225 0930 8-13-93	5	6	LOOSE, OLIVE BROWN (2.5Y 4/4) WELL GRADED FINE GRAVEL, WITH SOME FINES, WET	GM	NA	MICROTIP = 0.0 PPM BG = 40 CPM
13.0	073226 0930 8-13-93	7	6	SAA	GM	NA	
13.5	~~073227~~ NA 0930 8-13-93	12	0	NO RECOVERY	NA	NA	
14.0	073228 0945 8-13-93	9	6	SAME AS 12.5-13.0 FT	GM	NA	MICROTIP = 0.0 PPM BG = 40 CPM
14.5	073229 0945 8-13-93	7	6	LOOSE, LIGHT OLIVE BROWN (2.5Y 5/4) POORLY GRADED FINE SAND, WITH TRACE OF FINE GRAVEL, WET	SP	NA	
	073230 0945 8-13-93	10	6	SAA	SP	NA	

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Auger Acker
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background = BG : 60 CPM
MT : 0.0 PPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

0228

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FERNALD RI/FS

4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MN # 11214	COORDINATES:		DATE: 8-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 8-11-93
ENGINEER/GEOLOGIST: RILEY	Depth	Date/Time	DATE COMPLETED: 8-23-93
DRILLING METHODS: HOLLOWSTEM AUGER			PAGE 4 OF 9

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	073231 1000 8-13-93	10	6	SAA	SP	NA	MICROTIP = 0.0 ppm BG = 40 cpm
16.0	~~073232~~ NA 1000 8-13-93	6	0	No Recovery	NA	NA	
16.5	~~073233~~ NA 1000 8-13-93	5	0	No Recovery	NA	NA	
17.0	073234 1015 8-13-93	5	6	SAME AS 15.0-15.5 FT	SP	NA	MICROTIP = 0.0 ppm BG = 60 cpm
17.5	073235 1015 8-13-93	3	6	SAA	SP	NA	
18.0	~~073236~~ NA 1015 8-13-93	2	0	No Recovery	NA	NA	
18.5	073237 1030 8-13-93	3	6	SAME AS 17.0-17.5 FT	SP	NA	MICROTIP = 0.0 ppm BG = 60 cpm
19.0	073238 1030 8-13-93	3	6	SAA	SP	NA	
19.5	073239 1030 8-13-93	3	6	SAA SOFT, GRAY (2.5Y 6/1), SILTY CLAY WITH TRACE OF FINE SAND, MED. PLASTICITY, WET	SP CL	NA .5	
	073240 1330 8-13-93	2	6	STIFF SAA	CL	1.0	MICROTIP = 0.0 ppm BG = 60 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Auger Acker
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
BG : 60 cpm
MT : 0.0 ppm

- Samples collected per ASTM Standard Penetration Test.
- All colors identified by the Munsell Color Chart.

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MN # 11214	COORDINATES:	DATE: 8-13-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-11-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-23-93	
DRILLING METHODS: AUGER		PAGE 5 OF 9	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.5	073241 1330 8-13-93	4	6	SAA	CL	1.5	SEE PREVIOUS PAGE
21.0	NA 1330 8-13-93	5	0	NO RECOVERY	NA	NA	
21.5	073243 1350 8-13-93	4	6	LOOSE, OLIVE BROWN, (2.5Y 4/4), POORLY GRADED FINE SAND, WITH SOME CLAY, WET	SC	NA	MICROTIP = 0.0 PPM BG = 60 CPM
22.0	073244 1350 8-13-93	4	6	SAA	SC	NA	
22.5	~~073244~~ NA 1350 8-13-93	3	0	NO RECOVERY	NA	NA	
23.0	073245 1415 8-13-93	9	6	SAME AS 21.5 - 22.0 / MED STIFF, GRAY (2.5Y 6/1) SILTY CLAY WITH TRACE OF SAND, MED. PLASTIC, WET	SC / CL	NA / .75	MICROTIP = 0.0 PPM BG = 40 CPM
23.5	073246 1415 8-13-93	13	6	DENSE, OLIVE BROWN, (2.5Y 4/4) WELL GRADED FINE TO MED GRAVEL, WITH SOME SILT & CLAY, WET	GC	NA	
24.0	073247 1415 8-13-93	11	6	SAA	GC	NA	
24.5	073248 1430 8-13-93	4	6	MED. STIFF, GRAY (2.5Y 5/1), SILTY CLAY WITH TRACE OF FINE GRAVEL AND SAND, MED. PLASTIC, MOIST, MOTTLED W/ LIGHT OLIVE BROWN (2.5Y 5/6)	CL	.5	MICROTIP = 0.0 PPM BG = 40 CPM
	073249 1430 8-13-93	6	6	SAA NON-MOTTLED	CL	.75	

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: AUGER
Driller: JOE RAAB
Helper: JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background = MICROTIP = 0.0 PPM, BG = 40 cpm

- Samples collected per ASTM Standard Penetration Test.
- All colors identified by the Munsell Color Chart.

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: OU 5 PHASE I		
BORING NUMBER: MW # 1214	COORDINATES:	DATE: 8-13-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 8-11-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 8-23-93	
DRILLING METHODS: AUGER		PAGE 6 OF 9	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25.5	073250 1930 8-13-93	12	3	SAA	CL	1.5	SEE PREVIOUS PAGE
26.0	073232 1500 8-13-93	6	6	SOFT SAA	CL	<.5	MICROTIP = 0.0 PPM BG = 40 CPM
26.5	073233 1500 8-13-93	11	4	SAA	CL	<.5	
27.0	NA 1500 8-13-93	19	0	NO RECOVERY	NA	NA	
27.5	073212 1035 8-17-93	5	6	VERY STIFF, GRAY (2.5Y 5/1) SILTY CLAY WITH TRACE OF SAND AND FINE GRAVEL, MED PLASTIC., MOIST	CL	2.75	MICROTIP = 0.0 PPM BG = 40 CPM
28.0	073236 1035 8-17-93	15	6	SAA	CL	2.75	
28.5	NA 1035 8-17-93	22	0	NO RECOVERY	NA	NA	
29.0	073227 1045 8-17-93	7	6	SAME AS 27.5 TO 28.0	CL	2.5	MICROTIP = 0.0 PPM BG = 40 CPM
29.5	073242 1045 8-17-93	14	6	SAA	CL	2.75	
	073501 1045 8-17-93	49	3	HARD SAA LARGER LIMESTONE COBBLES SLIGHTLY MOIST	CL	4.5	

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: AUGER
Driller: JOE RAAB
Helper: JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
MICROTIP = 0.0 PPM
BETA GAMMA = 40 CPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MW # 11214	COORDINATES:	DATE: 8-17-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 8-11-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-23-93	
DRILLING METHODS: HOLLOWSTEM AUGER		PAGE 7 OF 9	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	073502 1055 8-17-93	8	6	SAA	CL	4.0	MICROTIP = 0.0 ppm BG = 40 cpm
31.0	073503 1055 8-17-93	14	6	SAA	CL	4.5	
31.5	073504 1055 8-17-93	60	3	SAA LARGE LIMESTONE COBBLES	CL	4.5	
32.0	073505 1300 8-17-93	8	6	VERY STIFF SAA	CL	3.0	MICROTIP = 0.0 ppm BG = 40 cpm
32.5	073506 1300 8-17-93	18	6	HARD SAA	CL	4.5	
33.0	073507 1300 8-17-93	35	2	SAA	CL	4.5	
33.5	073508 1345 8-17-93	17	6	SAA	CL	4.0	MICROTIP = 0.0 ppm BG = 40 cpm
34.0	073509 1345 8-17-93	31	6	SAA HARD, LIGHT OLIVE BROWN (2.5Y 5/6) SANDY SILT, IRON STAINED w/ YELLOWISH BROWN (10YR 5/6) NON PLASTIC	CL ML	4.0 4.5	
34.5	073510 1345 8-17-93	63	3	SAA	ML	4.5	
							MICROTIP = ppm BG = cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : ACKER AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background = MICROTIP = 0.0ppm BG = 40cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

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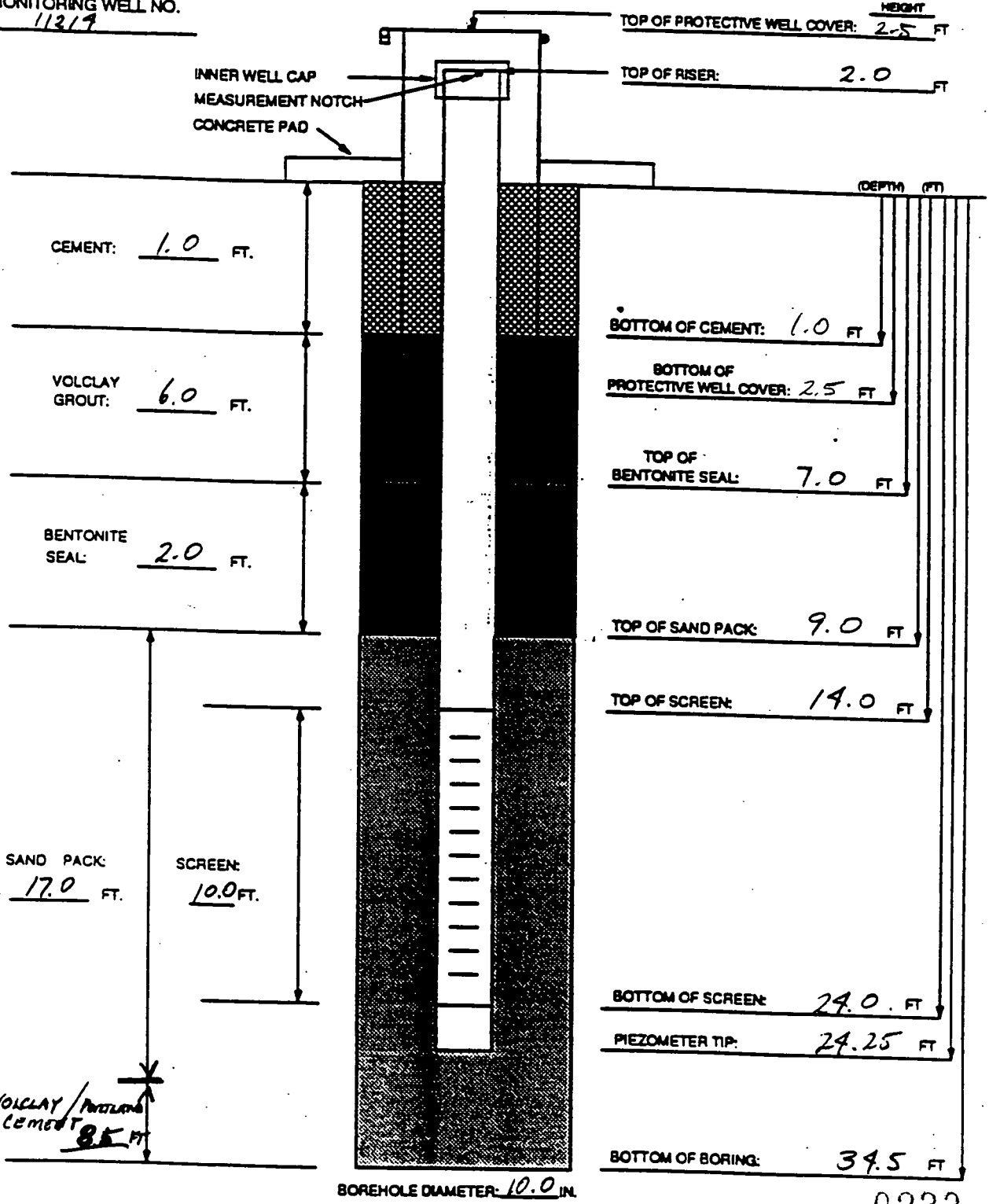
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1121 9

INSTALLATION DATE: 8-23-93



	HEIGHT	
TOP OF PROTECTIVE WELL COVER:	2.5	FT
TOP OF RISER:	2.0	FT

	(DEPTH) (FT)	
BOTTOM OF CEMENT:	1.0	FT
BOTTOM OF PROTECTIVE WELL COVER:	2.5	FT
TOP OF BENTONITE SEAL:	7.0	FT
TOP OF SAND PACK:	9.0	FT
TOP OF SCREEN:	14.0	FT
BOTTOM OF SCREEN:	24.0	FT
PIEZOMETER TIP:	24.25	FT
BOTTOM OF BORING:	34.5	FT

0233

MATERIALS USED

SAND TYPE AND QUANTITY: #7 15 BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 1 BUCKET
BAGS OF VOLCLAY GROUT: 2 BAGS
UNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER: 1-10 FT SCREEN 1-10 FT RISER, 1-6 FT RISER
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.10 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 8/24/93 FT/ 1.25 FT BS
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

ASI FORM 0157 REV. (0)

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 5 PHASE I FIELD ENG./GEO. RILEY DATE 8-23-
PROJECT NO. 50 03.22 CHECKED BY DATE
BORING NO. MW # 11214
PIEZOMETER NO. MW # 11214 DATE OF INSTALLATION 8-23-93

BOREHOLE DRILLING

DRILLING METHOD Auger TYPE OF BIT Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE 4.0 IN 316 STAINLESS MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 IN
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010
TOTAL PERFORATED AREA 10.0 FT
RISER PIPE MATERIAL 316 STAINLESS
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN.
LENGTH OF PIPE SECTIONS 1-10 FT, 1-6 FT
JOINING METHOD SCREW - TYPE FLUSH - JOI

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10.75 IN
OTHER PROTECTION HINGED WELL COVER WITH LOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 7.0	TOP	BOTTOM
BENTONITE	TOP 7.0	BOTTOM 9.0	TOP	BOTTOM
SAND	TOP 9.0	BOTTOM 26.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 14.0	BOTTOM 24.0	TOP	BOTTOM
PIEZOMETER TIP	24.25			
BOTTOM OF BOREHOLE	34.5			
GWL AFTER INSTALLATION	2.5 FT BELOW SURFACE			

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

REMARKS 26.5 TO 34.5 FT WAS FILLED WITH A MIXTURE OF VOLCLAY GROUT AND PORTLAND CEMENT AS PER BOB GALBRAITH

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth — Date/Time —	DATE STARTED:
ENGINEER/GEOLOGIST	Depth — Date/Time —	DATE COMPLETED:
DRILLING METHODS:		PAGE 1 OF 1

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
					CL		MICROTIP = ppm BS = cpm
					CL		
					CL		
					CL		MICROTIP = ppm BS = cpm
					CL		
					CL		
					CL		MICROTIP = ppm BS = cpm
					CL		
					CL		
					CL		MICROTIP = ppm BS = cpm

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment :
Driller :
Helper :

SAA = Same As Above
N/A = Not Applicable
Background = cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth — Date/Time —	DATE STARTED:
ENGINEER/GEOLOGIST	Depth — Date/Time —	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS & MODIFIER	MEASURED CONSISTENCY (TSF)	REMARKS
							SEE PREVIOUS PAGE
							MICROTIP = BY = CPM
							MICROTIP = BY = CPM
							MICROTIP = BY = CPM

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment :
Driller :
Helper :

SAA = Same As Above
N/A = Not Applicable
Background =

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:		
BORING NUMBER:	COORDINATES:		DATE:
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST	Depth	Date/Time	DATE COMPLETED:
DRILLING METHODS:			PAGE OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (CSI)	REMARKS
							SEE PREVIOUS PAGE
							MICROTIP = ppm BZ = ppm
							MICROTIP = ppm BZ = ppm
							MICROTIP = ppm BZ = ppm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment :
Driller :
Helper :

SAA = Same As Above
N/A = Not Applicable
Background = ppm

- Samples collected per ASTM Standard Penetration Test.
- All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]	
BORING NUMBER: [illegible]	COORDINATES: —	DATE: [illegible]
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: [illegible]
ENGINEER/GEOLOGIST: [illegible]	Depth — Date/Time —	DATE COMPLETED: [illegible]
DRILLING METHODS: [illegible]		PAGE [illegible] OF [illegible]

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	MICROTIP = [illegible] ppm; BZ = [illegible] cpm
[illegible]	[illegible]	6	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	2	[illegible]	SAA	[illegible]	[illegible]	
[illegible]	[illegible]	2	[illegible]	SAA	[illegible]	[illegible]	MICROTIP = [illegible] ppm; BZ = 80 cpm
[illegible]	[illegible]	3	[illegible]	SAA	[illegible]	[illegible]	
[illegible]	[illegible]	6	[illegible]	SAA	[illegible]	[illegible]	
[illegible]	[illegible]	2	[illegible]	SAA	[illegible]	[illegible]	MICROTIP = [illegible] ppm; BZ = [illegible] cpm
[illegible]	[illegible]	2	[illegible]	SAA	[illegible]	[illegible]	
[illegible]	[illegible]	2	[illegible]	SAA	[illegible]	[illegible]	
[illegible]	[illegible]	3	[illegible]	SAA	[illegible]	[illegible]	MICROTIP = [illegible] ppm; BZ = [illegible] cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : [illegible]
Driller : [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = [illegible] cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]	
BORING NUMBER: [illegible]	COORDINATES: —	DATE: [illegible]
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: [illegible]
ENGINEER/GEOLOGIST [illegible]	Depth — Date/Time —	DATE COMPLETED: [illegible]
DRILLING METHODS: [illegible]		PAGE [illegible] OF [illegible]

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	[illegible]	3	6	[illegible]	CL	[illegible]	SEE PREVIOUS PAGE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CL	[illegible]	
[illegible]	[illegible]	8	6	SAA, [illegible]	CL	[illegible]	MICROTIP = [illegible] ppm BY = 36 cpm
[illegible]	[illegible]	11	6	SAA	CL	[illegible]	
[illegible]	[illegible]	5	6	SAA	CL	[illegible]	
[illegible]	[illegible]	5	6	SAA	CL	[illegible]	MICROTIP = [illegible] ppm BY = 60 cpm
[illegible]	[illegible]	[illegible]	6	SAA	CL	[illegible]	
[illegible]	[illegible]	[illegible]	6	SAA	CL	[illegible]	
[illegible]	[illegible]	[illegible]	6	SAA	CL	[illegible]	MICROTIP = [illegible] ppm BY = 60 cpm
[illegible]	[illegible]	5	6	SAA	CL	[illegible]	

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: [illegible]
Driller: [illegible]
Helper: [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 60 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]		
BORING NUMBER: 11215	COORDINATES: —		DATE: 08-13-93
ELEVATION: —	GWL: Depth — Date/Time —		DATE STARTED: 08-10-93
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —		DATE COMPLETED: 08-18-93
DRILLING METHODS: HSA			PAGE 6 OF 7

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
[illegible]	[illegible]	9	6	[illegible]	CL	<0.5	SEE PREVIOUS PAGE
255	[illegible]	4	6	Soft, [illegible]	CL	<0.5	MICROTIP = 0.0 ppm; BZ = [illegible] cpm
260	[illegible]	5	6	SAA	CL	<0.5	
265	[illegible]	9	6	SAA	CL	<0.5	
270	[illegible]	14	6	~~[illegible]~~ SAA	CL	<0.5	MICROTIP = 0.0 ppm; BZ = [illegible] cpm
275	[illegible]	31	6	SAA	CL	<0.5	
280	[illegible]	50	6	Soft, [illegible]	CL	[illegible]	
285	[illegible]	[illegible]		[illegible]	CL	[illegible]	MICROTIP = 0.0 ppm; BZ = [illegible] cpm
290	[illegible]	32		[illegible]	CL	[illegible]	
295	[illegible]	[illegible]		SAA	[illegible]	[illegible]	

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : [illegible]
Driller : [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = [illegible] ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

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FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 5003-22	PROJECT NAME: Aquifer Add'l w/o installation	
BORING NUMBER: 11215	COORDINATES: —	DATE: 08-17-93
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: 08-10-93
ENGINEER/GEOLOGIST: Terry Foulds	Depth — Date/Time —	DATE COMPLETED: 08-19-93
DRILLING METHODS: HSA		PAGE 1 OF 5

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	1020	24	5	SAA, med gray, SILT, CLAY, some well-coarse gravel, 25 YR 5/1, moist hard	CL	>4.5	MICROTIP = 0.0 ppm; BZ = 40 cpm
31.0	1029	40	6	SAA	CL	>4.5	
31.5	1034	50 (5")	5	SAA	CL	>4.5	
32.0	1425	12	6	SAA	CL	>4.5	MICROTIP = 0.0 ppm; BZ = 50 cpm
32.5	1435	26	5	SAA	CL	>4.5	
33.0	1445	50	5	SAA	CL	>4.5	
[illegible]	[illegible]	15	[illegible]	SAA	CL	>4.5	MICROTIP = [illegible] ppm; BZ = 50 cpm
[illegible]	[illegible]	50	5	[illegible]	SM	—	
[illegible]	[illegible]	50	6	[illegible]	CL	>4.5	
[illegible]	[illegible]	26	2	SAA — [illegible]	CL	[illegible]	MICROTIP = [illegible] ppm; BZ = 50 cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : [illegible]
Driller : [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = [illegible] cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

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PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]		
BORING NUMBER: [illegible]	COORDINATES: —	DATE: [illegible]	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: [illegible]	
ENGINEER/GEOLOGIST: [illegible]	Depth — Date/Time —	DATE COMPLETED: [illegible]	
DRILLING METHODS: HSA		PAGE [illegible] OF [illegible]	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35.0	[illegible] 1010 0818	27	3	[illegible]	CL	1.0	SEE PREVIOUS PAGE
36.0	1010 0818	50	3	NO RECOVERY	N/A	N/A	
36.5	[illegible] 1020 0818	10	6 (37) 7	[illegible] well sorted, slightly [illegible]	CL	1.0 N/A	MICROTIP = 0.0 PPM BY = N/A CPM
37.0	970826 1020 0818	15	6	↓	SM	N/A	
37.5	970827 1040 0818	24	3	SAA	SM	N/A	
38.0	[illegible] 1100 0818	24	6	SAA	SM	N/A	MICROTIP = 0.0 PPM BY = 20 CPM
38.5	970829 1100 0818	40	6	SAA	SM	N/A	
39.0	[illegible] 1100 0818	40	6	medium brown, some silt, SAND fine - coarse, poorly sorted (some coarse gravel cobbles) [illegible]	SP	N/A	
39.5	[illegible] 1110 0818	10	6	SAA	SP	N/A	MICROTIP = 0.0 PPM BY = 40 CPM
40.0	[illegible] 1110 0818	44	6	SAA	SP	N/A	

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Mobile B61
Driller : [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 30 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]	
BORING NUMBER: [illegible]	COORDINATES: —	DATE: [illegible]
ELEVATION: —	GWL: Depth Date/Time —	DATE STARTED: [illegible]
ENGINEER/GEOLOGIST [illegible]	Depth Date/Time —	DATE COMPLETED: [illegible]
DRILLING METHODS: [illegible]		PAGE 4 OF 4

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	[illegible]	[illegible]	[illegible]	[illegible]	SP	N/A	SEE PREVIOUS PAGE
[illegible]	[illegible]	[illegible]	[illegible]	SAA	SP	N/A	MICROTIP = [illegible] ppm BG = [illegible] cpm
4.5	[illegible]	50/[illegible]	[illegible]	SAA	SP	N/A	—
4.5				TD = 4.5' backfill w/ [illegible] to 2.0' 2 cap w/ [illegible]			
4.0							MICROTIP = ppm BG = cpm
							MICROTIP = ppm BG = cpm

NOTES

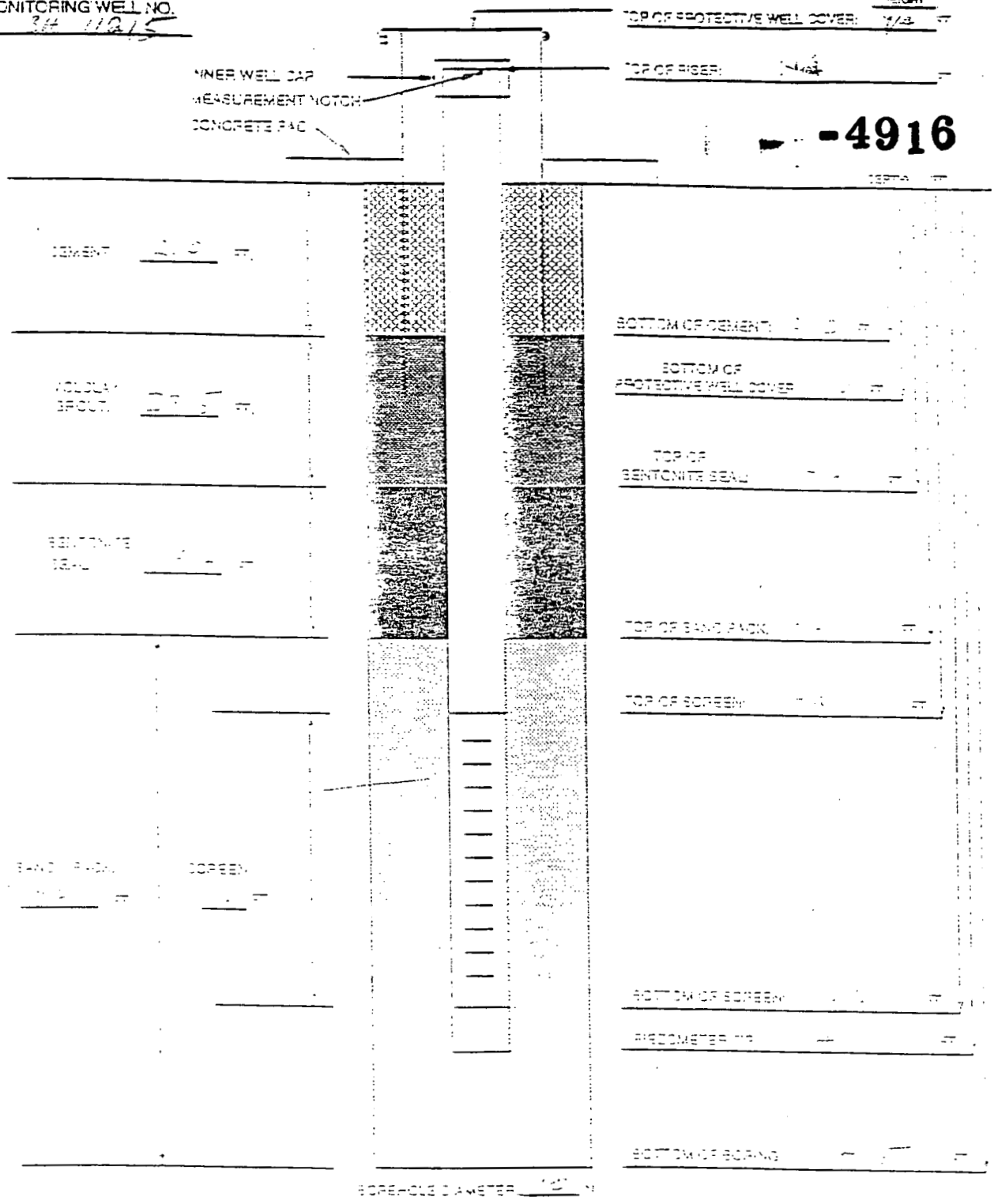
Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Mobile [illegible]
Driller : Mike [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 20 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

INSTALLATION DATE: 08.10.93



0244

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FERRALL
RI/FS

-4916

PIEZOMETER INSTALLATION SHEET

PROJECT NAME _____ FIELD ENG. SEC. _____ DATE _____
PROJECT NO. _____ CHECKED BY _____ DATE _____
BORING NO. _____
PIEZOMETER NO. _____ DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD _____ TYPE OF BIT _____
DRILLING FLUID(S) USED: CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____ SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____ SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____ RISER PIPE MATERIAL _____
DIAMETER OF PERFORATED SECTION _____ RISER PIPE DIAMETERS:
PERFORATION TYPE O.D. _____ I.D. _____
SLOTS ☐ HOLES ☐ SCREEN ☐ LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS _____ JOINING METHOD _____
TOTAL PERFORATED AREA _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____ OTHER PROTECTION _____
PROTECTIVE PIPE O.D. _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION	
TOP OF RISER PIPE				
GROUND SURFACE				
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT SLURRY	TOP	BOTTOM	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE				
SWL AFTER INSTALLATION				

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

0245

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 SO.03.18.22	PROJECT NAME. CRU-5	
BORING NUMBER. 112/6	COORDINATES.	DATE 8-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-17-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED. 8-14-93
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
8-17 * 0.5	1300 073301	4	6	VERY STIFF (10YR, 3/1) VERY DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY. Some root fragments	CL	2.5	MT = 0.0 ppm; Bg = 60 cpm
1.0	1300	20	6	SAA - 1 inch of coarse gravel pebbles, fill-type material.	CL	2.5	MT = 0.0 ppm; Bg = 60 cpm
1.5	1300	20	6	HARD (10YR, 4/2) DARK GRAYISH BROWN, SILTY CLAY, LOW PLASTICITY, DRY. Hard but breaks into dust when it breaks. SP 1	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070302~~ -A -073302
2.0	1306	30	6	SAA	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070303~~ -A -073303
073305 ~~070305~~ CPC 8-24-93 * 2.5	1306	27	6	SAA	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070304~~ -A -073304
3.0	1306	30	6	SAA SP 2	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070306~~ -A -073306
3.5	1309	17	6	HARD (10YR, 4/6) DARK yellowish brown, SILTY CLAY, Some pea size and smaller gravel. MOTTLED APPEARANCE, low plasticity, DRY	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070307~~ -A -073307
4.0	1309	25	6	SAA	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070308~~ -A -073308
4.5	1309	30	6	SAA SP 3	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070309~~ -A -073309
5.0	1345	14	6	SAA	CL	3.0	MT = 0.0 ppm; Bg = 60 cpm; CPC 8-24-93 ~~070310~~ -A -073310

NOTES

SAA - Same As Above

Driller - Penn Drill Contractor

Driller - J. Zuchinn.

Helper -

Rig

Background

MT = 0.0 ppm

Bg = 60 cpm

* Torn with Sample 250ml

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CEU-5 50.03.08 22	PROJECT NAME. CEU-5	
BORING NUMBER. 11216	COORDINATES.	DATE 8-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-17-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED. 8-19-
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
8-17 ↓ * 5.5	1345 OPC 8-24-93 ~~070311~~ 073311	12	6	SAA very STIFF	CL	2.5	MT = 0.0 ppm; Bg = 60 cpm
6.0	1345	12	6	SAA STIFF SP 7	CL	1.5	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070312~~-A ; 073312
6.5	1350	7	6	STIFF (10YR,4/4) DARK YELLOWISH BROWN, SILTY CLAY, low to medium plasticity. Some large GRAVEL cobbles, some small.	CL	1.5	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070313~~-A -073313
7.0	1350	12	6	SAA	CL	2.0	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070314~~-A -0733
7.5	1350	14	6	SAA (HARD) SP 5	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070315~~-A -0733
8.0	1433	10	6	HARD (2.5Y,4/4) Olive Brown, SILTY CLAY, Low to medium plasticity, Dry. Some large Gravel cobbles scattered throughout.	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070316~~-A -0733
8.5	1433	17	6	SAA	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070317~~-A -0733
9.0	1433	23	6	SAA SP 6	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070318~~-A -0733
9.5	1446	13	6	HARD (10YR,4/4) DARK yellowish brown, SILTY CLAY, MEDIUM PLASTICITY, Dry. Small gravel pebbles.	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070319~~-A -0733
10.0	1446	17	6	SAA	CL	4.0+	MT = 0.0 ppm; Bg = 60 cpm; OPC 8-24-93 ~~070320~~-A -073

NOTES

SAA - Same As Above

Driller - Rexon Drill
Contractor

Driller - J. Zuchinni
Helper -

Background
MT = 0.0
Bg = 60

Rio

VISUAL CLASSIFICATION OF SOILS 916

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11216	COORDINATES.	DATE 8-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-17-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED. 8-19-93
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-17 10.0							
10.5	1446	35	0.	SAA-NR - NO RECOVERY SP 7	CL	4.0+	MT = 0.0 ppm Bg = 60 cpm
11.0	1501 CPC 8-24-93 ~~070321~~ 070321	17	6	HARD (10YR, 4/4) DARK yellowish BROWN, SILTY CLAY, SMALL gravel throughout, low PLASTICITY, DRY	CL	4.0+	MT = 0.0 ppm Bg = 60 cpm
11.5	1501	23	6	HARD (2.5Y, 4/3) OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY	CL	4.0+	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm ~~070322~~ -A - 07332
12.0	1501	42	6	HARD (10YR, 4/6) DARK yellowish BROWN SILTY CLAY, some very large gravel cobbles, medium PLASTICITY, MOIST SP 8	CL	4.0+	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm ~~070323~~ -A - 07332
12.5	1502	20	6	DENSE (2.5Y, 4/4) OLIVE BROWN, FINE TO MEDIUM GRAINED SAND, some small gravel pebbles, WET poorly graded.	SC	NA	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm 070324-A - 07332
13.0	1502	27	6	SAA Fining upward HARD OPC 8-17-93	SC	NA	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm ~~070325~~ -A - 07332
13.5	1509	22	6	~~Very Dense~~ (2.5Y, 3/2) very DARK GRAYISH BROWN. SILTY CLAY, LOTS OF SILT, some GRAVEL pebbles, low to medium PLASTICITY, MOIST SP 9	CL	4.0+	MT = 0.0 ppm Bg = 60 cpm ~~070326~~ -A - 07332
14.0	1609	20	6	HARD (2.5Y, 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, lots of SMALL gravel pebbles and some very large cobbles, MEDIUM PLASTICITY, MOIST	CL	4.0+	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm 070327-A - 07332
14.5	1609	22	6	SAA	CL	4.0+	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm ~~070328~~ A - 07332
15.0	1609	24	6	SAA SP 10	CL	4.0+	MT = 0.0 ppm Bg = 60 CPC 8-24-93 cpm ~~070329~~ -A - 07332

NOTES

SAA - Same As Above

Driller - Penn Drill Contractor

Driller - J. Zochian

Helper -

Rig

Otherground MT = 0.0 Bg = 60

4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11216	COORDINATES.	DATE
ELEVATION:	GWL: Depth Date/Time	DATE STARTED
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow Stem Auger		PAGE 4 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0							
15.5	1620 OPC 8-24-93 ~~070330~~ 073330	17	6	SAA MOIST	CL	4.0+	HLT = 0.0 ppm Bg = 60 cpm
16.0	1620	19	6	SAA	CL	4.0+	HLT = 0.0 ppm Bg = 60 cpm OPC ~~070331~~ - A - 073331
16.5	1620	19	6	SAA SP.1.1	CL	4.0+	HLT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070332~~ - A - 07333
17.0	1627	13	6	SAA	CL	4.0+	HLT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070333~~ - A - 073
17.5	1627	17	6	SAA	CL	4.0+	HLT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070334~~ - A - 733
18.0	1627	19	0	NO RECOVERY SP.1.2	NA	NA	HLT = NA ppm Bg = NA cpm
18.5	1646	5	6	SAA STIFF	CL S	1.5	HLT = 0.0 ppm Bg = 60 073335 cpm OPC 8-24-93 ~~070335~~ - A - 073
19.0	1646	7	6	MEDIUM DENSE (2.54, 3.12) VERY DARK GRAYISH BROWN, MEDIUM GRAINED SAND, ~~WELL SORTED~~, WET Poorly graded	SC	NA	HLT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070336~~ - A - 073
19.5	1646	7	6	SAA SP.3.1	SC	NA	HLT = 0.0 ppm 073337 Bg = 60 cpm OPC 8-24-93 ~~070337~~ A -
20.0	1646	8	6	SAA	SC	MT	HLT = 0.0 ppm 073338 Bg = 60 cpm OPC 8-24-93 ~~070338~~ A -

8-17

8-17

NOTES

SAA - Same As Above

Driller - Perry Drill Contractor

Driller - J. Zuchowski

Helper -

Rig

Background

HLT = 0.0

Bg = 60

0249

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LOCATION:

ENGINEER/GEOLOGIST:

DRILLING METHODS: Hollow Stem Auger

DATE COMPLETED:

PAGE: OF

DEPTH (FEET)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (FEET)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.0	NA			[illegible]			MT = [illegible] ppm Bg = [illegible] cpm
21.0	1512 OPC 8-24-93 ~~070339~~ ~~075339~~	4	6	MEDIUM DENSE (2.54, 312) VERY DARK GRAYISH BROWN, MEDIUM GRAINED SAND, [illegible], WET			MT = [illegible] ppm Bg = 60 cpm
21.5	1512	7	6	SAA			MT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070340~~-A → 0733
22.0	1512	8	6	SAA SP. 4'	SC	NA	MT = 0.0 ppm Bg = 60 OPC 8-24-93 cpm ~~070341~~-A → 07334
22.5	1525	5	6	SAA	SC	NA	MT = 0.0 pp Bg = 60 OPC 8-24-93 cp ~~070342~~-A → 0733
23.0	1525	10	6	MEDIUM DENSE (2.54, 312) VERY DARK GRAYISH BROWN, MEDIUM TO COARSE GRAINED SAND, poorly graded, WET	SC	NA	MT = 0.0 pp Bg = 60 OPC 8-24-93 cp ~~070343~~-A → 073
23.5	1525	10	0	NO RECOVERY SP. 5'	NA	NA	MT = NA pp Bg = NA cp
24.0	1549	5	6	MEDIUM DENSE (2.54, 312) VERY DARK GRAYISH BROWN, COARSE GRAINED SAND with some gravel; poorly graded, wet.	SC	NA	MT = 0.0 pp Bg = 60 OPC 8-24-93 cp ~~070344~~-A → 0733
24.5	1549	7	6	MEDIUM DENSE (2.54, N31) VERY DARK GRAY, CLAYEY SAND, medium grained, no gravel, WET.	SC	NA	MT = 0.0 pp Bg = 60 OPC 8-24-93 cp ~~070345~~-A → 073
25.0	1549	8	0	NO RECOVERY SP. 6'	NA	NA	MT = NA p Bg = NA cp

NOTES

Driller - Penn Drill
Contractor

Driller - J. Zuchinni
Helper -

Rig

Background
MT = 0.0
Bg = 60

ELEVATION:

ENGINEER/GEOLOGIST: [illegible]

DRILLING METHODS: Hollow Stem Auger

PAGE [illegible] OF

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	25.0							
8-18 ↓ *	25.5	1604 OPC 8-14-93 070346 C13346			MEDIUM DENSE (2.5Y 3/2) GRAY BROWN CLAY BY SILTY, POORLY GRADED, WET			MT = [illegible] PPm Bg = 60 CPm 070345-A-8-18-9
	26.0	1604	46	6	HARD (5Y 3/2) DARK [illegible] SANDY CLAY, SOME [illegible] HETEROGENEOUS SIZED GRAVEL [illegible] COBBLES, MEDIUM PLASTICITY, MOIST.		4.0+	MT = 0.0 PPm Bg = 60 OPC 8-24-93 CPm 070348-A-0733
8-18 ↑ 8-19 ↓	26.5	1604	52	6	SAA SP 19		4.0+	MT = 0.0 PPm Bg = 60 CPm 070349-A-073
	27.0	0815	55	6	VERY STIFF (5Y 3/2) DARK ~~OLIVE~~ GRAY, SILTY CLAY, MEDIUM plasticity, ~~WET~~.	CL	2.5	MT = 0.0 PPm Bg = 60 OPC 8-24-93 CPm 070349-A-0733
	27.5	0815	25	6	VERY DENSE (2.5Y, N3/) VERY DARK GRAY, MEDIUM GRAINED SAND, poorly graded, wet	SC	NA	MT = 0.0 PP. Bg = 60 OPC 8-24-93 CP. 070350-A-073.
	28.0	0815	50/6	6	VERY DENSE (2.5Y, N3/) VERY DARK GRAY, COARSE GRAINED SAND. WITH SOME GRAVEL COBBLES, well graded, WET OPC-8-19-93 SP 18	SC	NA	MT = 0.0 PP. Bg = 60 OPC 8-24-93 CP. 070351-A-073
	28.5	0909	30	6	~~SAA~~ VERY DENSE (2.5Y, N3/) VERY DARK GRAY, fine grained GRAVEL, Poorly graded, WET (SAND CONTACT) CLAYEY SILT	GP ~~SC~~ OPC 8-19-93	NA	MT = 0.0 PP Bg = 60 OPC 8-24-93 CP. 070352-A-073
	29.0	0909	60	6	HARD (2.5Y, N4/) DARK GRAY, ~~SILTY CLAY~~, ~~MEDIUM PLASTICITY~~, MOIST. OPC 8-19-93 OPC-8-19-93	ML CL OPC 8-19-93	4.0+	MT = 0.0 PP Bg = 60 OPC 8-24-93 CP 070353-A 073
	29.5	0909	57	6	SAA SP 19	ML CL OPC-8-19-93	4.0+	MT = 0.0 PP Bg = 60 OPC 8-24-93 CP 070354-A 073
	30.0	0933	25	6	HARD (5Y, 3/2) DARK OLIVE GRAY, SILTY CLAY, some small gravel inclusions, medium plasticity, MOIST.	CL	4.0+	MT = 0.0 P Bg = 60 OPC 8-24-93 CP 070355-A 073

NOTES

Driller - Penn Drill
Contractor

Driller - J. Zuckinn.

Helper -

Rig

Background
MT = 0.0

Bg = 60

FERRALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 50.03.22	PROJECT NAME. CRU-5	
BORING NUMBER 11216	COORDINATES.	DATE 8-19-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-17-93
ENGINEER/GEOLOGIST O. Castello	Depth Date/Time	DATE COMPLETED 8-19-93
DRILLING METHODS Hollow Stem Auger		PAGE 7 OF 7

DEPTH (FT) 30.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	0933 OPC 8-24-93 ~~073356~~ 073356	27	6	HARD (5Y, 3/2) DARK OLIVE GRAY, SILTY CLAY, some small gravel inclusions, medium plasticity, moist	CL	4.0+	HTIP - 0.0 ppm Bg - 60 cpm
Total Depth Auger 31.0	0933	29	0	NO RECOVERY SP20 ↑	NA	NA	HTIP - NA Bg - NA
31.5	0959	30	0	NO RECOVERY	NA	NA	HTIP - NA Bg - NA
.0	0959	55	0	NO RECOVERY SP22 ↓	NA	NA	HTIP - NA Bg - NA
32.5	1015	60	6	HARD (5Y, 3/2) DARK OLIVE GRAY, SILTY CLAY, some small gravel, medium plasticity, MOIST. (NO RECOVERY FIRST SPOON → SP 21 ↑)	CL	4.0+	HTIP - 0.0 ppm Bg - 60 cpm OPC 8-24-93 ~~073357~~ - A 073357
33.0	1015	60	6	SAA SP22 ↑	CL	4.0+	HTIP - 0.0 ppm Bg - 60 cpm OPC 8-24-93 ~~073358~~ A 073358
33.5	1027	55	6	SAA	CL	4.0+	HTIP - 0.0 ppm Bg - 60 cpm OPC 8-24-93 ~~073359~~ - A - 073359
34.0	1027	60	0	NO RECOVERY Dense 2 spoons, no recovery. ↓↓	NA	NA	NA NA
34.5	1027	90	0	NO RECOVERY	NA	NA	NA NA
35.0	1027	88	0	NO RECOVERY SP24 ↑ SP23 ↑	NA	NA	NA NA 073360 -

NOTES

Total Depth Spoons - 35.0 ft

~~073360~~ Rinsate OPC 8-24-93 073361 - Sieve Analysis

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Red Acker

Driller J. Zuchini

SAA - Same as above

NA - Not Applicable

Background HTIP - 0.0 ppm Bg = 60 cpm

Samples collected per ASTM standard practice

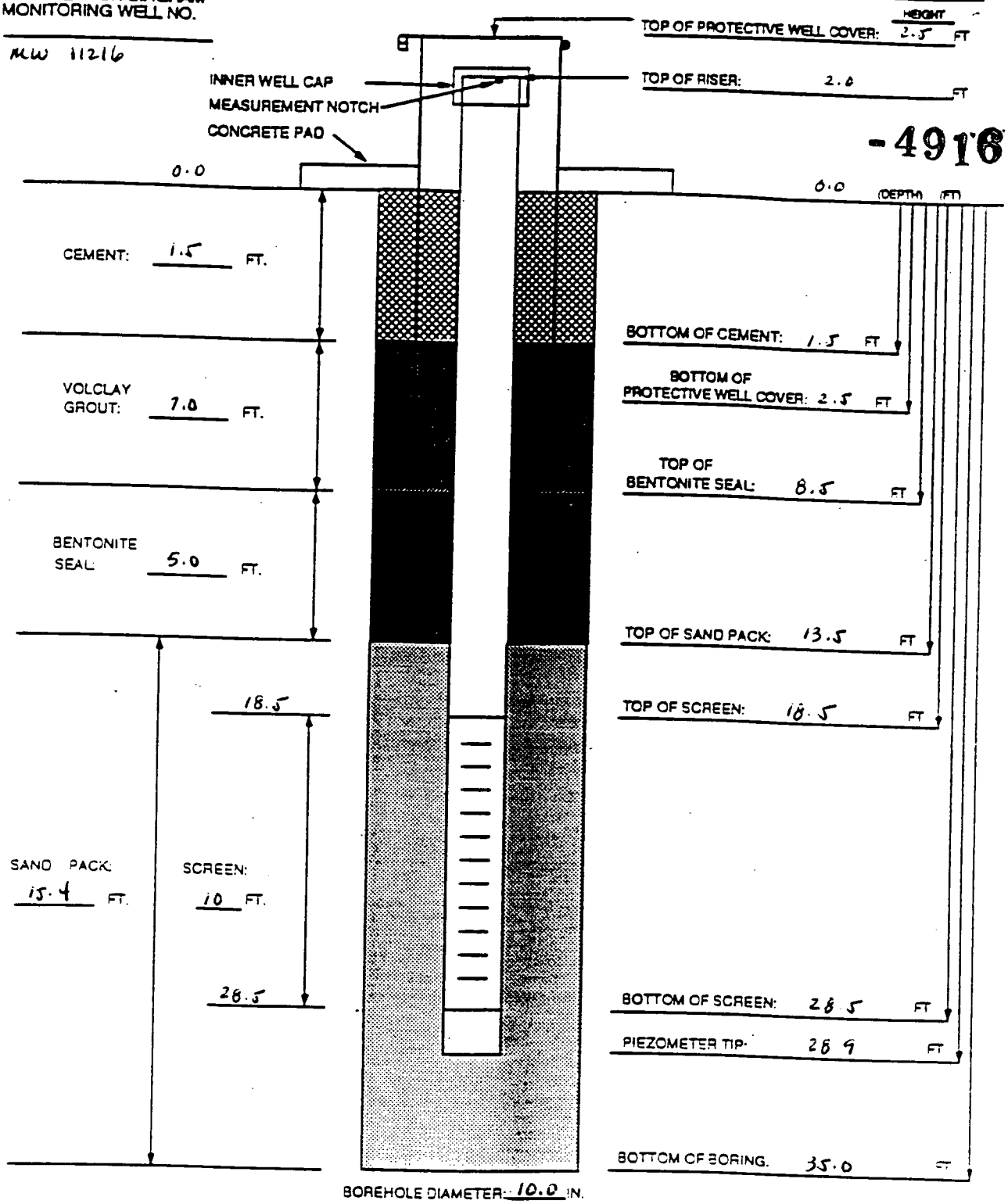
Colors identified using Munsell Color Chart

0252 14

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

MW 11216

INSTALLATION DATE: 8-24-93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 13 BAGS #7
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 3 SACKS
AMOUNT OF WATER USED: ≈ 30 GALLONS
OTHER: Drums - Alkonox (1)
Soil (5) 50.03.22

NOTES:

1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE NA — NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: D. Costello

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET 4916

PROJECT NAME CRU-5 FIELD ENG./GEO. O. Costello DATE 8-24-
PROJECT NO. 50.03.22 CHECKED BY _____ DATE _____
BORING NO. B 11216
PIEZOMETER NO. 11216 DATE OF INSTALLATION 8-24-93

BOREHOLE DRILLING

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

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE 10in OD FROM ~~NA~~ 0.0 (OPC 8-24-93) TO 35.0
SIZE NA FROM NA TO _____

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4in
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in.
TOTAL PERFORATED AREA 10 ft.

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

PROTECTION SYSTEM

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

OTHER PROTECTION Hinged cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	+2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.5	TOP	BOTTOM
BENTONITE	TOP 1.5	BOTTOM 8.5	TOP	BOTTOM
SAND	TOP 8.5	BOTTOM 13.5	TOP	BOTTOM
GRAVEL	TOP 13.5	BOTTOM 28.9	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 18.5	BOTTOM 28.5	TOP	BOTTOM
BOTTOM OF BOREHOLE	28.9			
GWL AFTER INSTALLATION	35.0			
	To be checked after development			

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

0254

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 04.27	PROJECT NAME: FCAA Phase II	
BORING NUMBER: 3[illegible]17	COORDINATES:	DATE: 5-10-93
ELEVATION:	GWL: Depth 40.90' Date/Time 5-[illegible]-93/[illegible]	DATE STARTED: 5-10-93
ENGINEER/GEOLOGIST: Ken Dreher	Depth 97.95 Date/Time 5-[illegible]-93/[illegible]	DATE COMPLETED: 5-25-93
DRILLING METHODS: Cable Tool		PAGE 1 OF 4

DEPTH (Ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For description see Log for Boring 3435 0.0' – 152.0'			
152.0							

NOTES

[illegible]

[illegible]

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER [illegible]	PROJECT NAME. [illegible] Phase I	
RING NUMBER. [illegible]	COORDINATES.	DATE 9-15-93
ELEVATION:	GWL: Depth [illegible] Date/Time 9-20-93/930	DATE STARTED: 9-[illegible]-93
ENGINEER/GEOLOGIST [illegible]	Depth [illegible] Date/Time 9-30-93/550	DATE COMPLETED: 9-25-93
DRILLING METHODS [illegible]		PAGE 3 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	104751 1100 9-15-93	36 50/2	7	Very Dense, Dark Brown (2.5Y 4/1) Well Graded Sand with Some Gravel, wet	SW	NA	mT = 0 ppm BZ = 60 cpm
1535	104752 1120 9-15-93	[illegible] 50/3	6	Very Dense, Dark [illegible] (2.5Y, 4/1) Poorly Graded Fine Sand with a Trace of Gravel, wet	SP	NA	mT = 0 ppm BZ = 60 cpm
1540	104753 1455 9-15-93	15 20 50/3	7	Very Dense, Dark [illegible] (2.5Y, 4/1) Well Graded Sand with Some Gravel, wet	SW	NA	mT = 0 ppm BZ = 60 cpm
1550	104754 1535 9-15-93	47 50/3	7	Very Dense, Dark [illegible] (2.5Y, 4/1) Well Graded Sand with Some Gravel, wet	SW	NA	mT = 0 ppm BZ = 60 cpm
1555	104755 1605 9-15-93	50/4	4	Very Dense, Dark [illegible] (2.5Y, 4/1) Well Graded Sand with Some Gravel and a Trace of [illegible], wet	SW	NA	mT = 0 ppm BZ = 60-70 cpm
1560	104756 0905 9-16-93	50/4	4	Very Dense, Dark [illegible] (2.5Y, 4/1) Well Graded Sand with Some Gravel and a Trace of [illegible], wet	SW	NA	mT = 0 ppm BZ = 60-70 cpm
1565	104757 [illegible] 9-16-93	[illegible] 50/[illegible]	[illegible]	[illegible], Dark [illegible] (2.5Y, 4/1) Poorly Graded Coarse Sand with Some Gravel, wet	SP	NA	mT = 0 ppm BZ = 60-70 cpm
				Boring [illegible] at TD [illegible]			Sample [illegible] = 104758

[illegible]

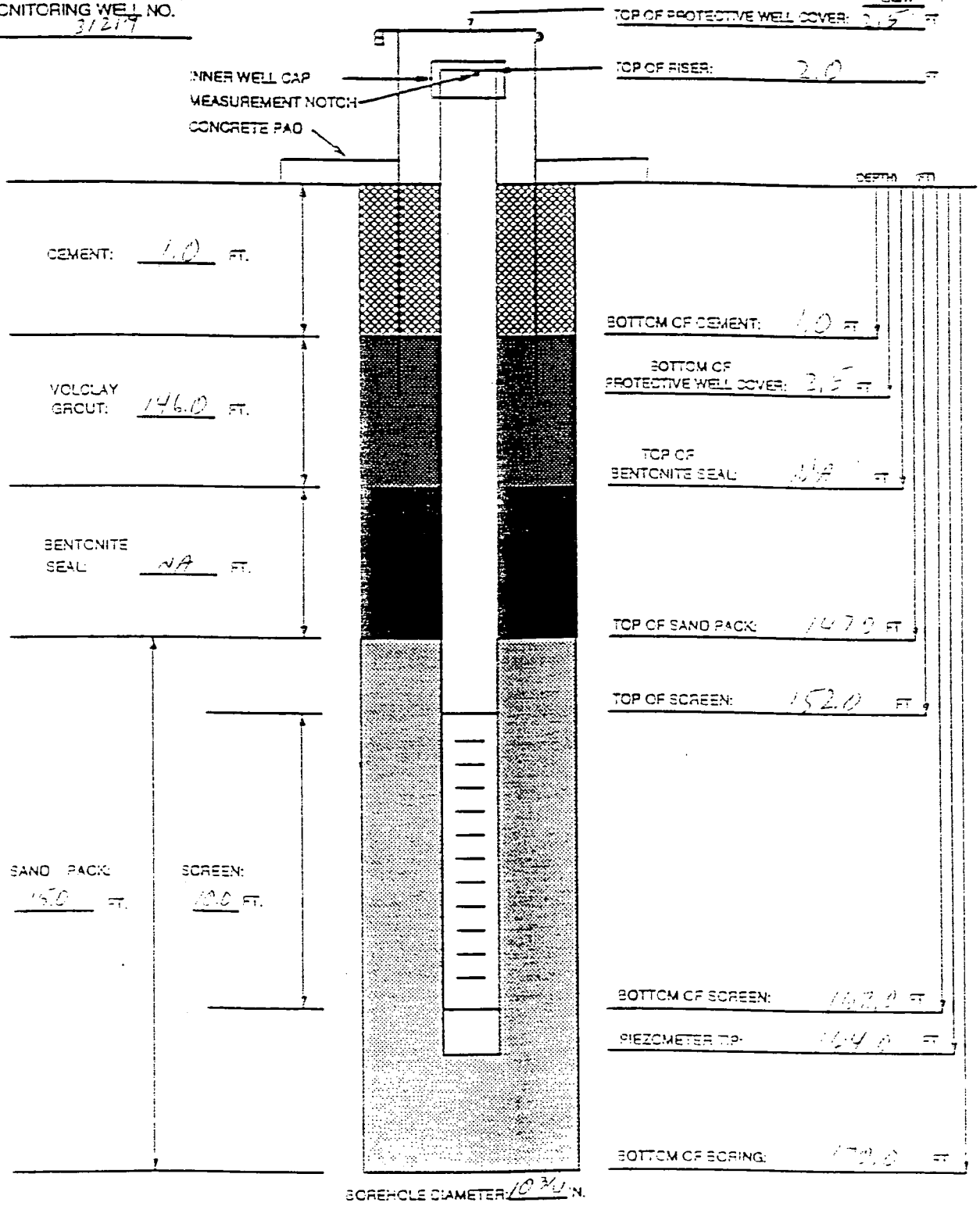
See Continuation [illegible]

mT = 0 ppm
BZ = 60-70 cpm

4916

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3/2119

INSTALLATION DATE: 5-25-93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: [illegible] 21 bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 26 bags
AMOUNT OF CEMENT: [illegible]
AMOUNT OF WATER USED: [illegible]
OTHER: [illegible]
TASK: 14 27

NOTES:

1) RISER PIPE IS 4.0 IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2.0 IN. I.D. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST ENGINEER: [illegible]

4) WATER DEPTH AND DATE: [illegible]
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

RI/FS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME RCRA Phase I
PROJECT NO. 84 29
BORING NO. 2-21
PIEZOMETER NO. 2-21

FIELD ENG./GEO. Ken Geiger DATE
CHECKED BY DATE
DATE OF INSTALLATION 8-25-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0' TO 50.0'
FLUID NA FROM NA TO NA

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10" FROM 0.0' TO 170.0'
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 12.0

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8" I.D. 4.0"
LENGTH OF PIPE SECTIONS 15' Threaded with Flush Joint Threaded
JOINING METHOD Screw Type Flush Joint Threaded

PROTECTION SYSTEM

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

OTHER PROTECTION Hinged well guard with Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
CONCRETE GROUT/SLURRY	TOP 2.0	BOTTOM 1.0		
BENTONITE	TOP 1.5	BOTTOM 45.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP 147.0	BOTTOM 164.0	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 152.0	BOTTOM 162.0	TOP	BOTTOM
PIEZOMETER TIP	170.0			
BOTTOM OF BOREHOLE	170.0			
SWL AFTER INSTALLATION	32.41'			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS well showed to leakage from 90' to 100' sand filled from

0258

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Cm 5 Surface-Subsurface Soil Sampling Investigation	
BORING NUMBER # 11218	COORDINATES	DATE 8-9-93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED
DRILLING METHODS Hand Auger		PAGE 1 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070610 0915 070609 070606	N/A	6.0	Very Soft (10YR 4/4) Dark Yellowish Brown Clayey Silt w/ some sand, well graded gravel, nonplastic DRY	ML	<.5	Rg = 300 Microkp = 0.0 ppm SPA - 3030
0.5	070622 0925	N/A	6.0	SAA but (10 YR 4/6) Dark Yellowish Brown but trace gravel Slightly moist	SAA	SAA	Rg = BG Microkp = 0.0 ppm SPA = 2150
1.0	070623 0928	N/A	6.0	SAA but (10 YR 3/6) Dark Yellowish Brown but trace gravel Slightly moist			Rg = BG Microkp = 0.0 ppm SPA 1180
1.5	070624 0936	N/A	6.0	SAA but (10YR 4/6) Dark Yellowish Brown but trace gravel Slightly moist			Rg = BG Microkp = 0.0 ppm SPA = 876
2.0	070625 0939	N/A	6.0	SAA ~~but (10 YR 4/6~~ TL 8-9-93 DRY			Rg = BG Microkp = 0.0 ppm SPA - 1020
2.5	070626 0942	N/A	6.0	SAA DRY			Rg = BG Microkp = 0.0 ppm SPA 1071
3.0							

NOTES Hand Augered by Tyrone Klein

SAA - Same as above
N/A - Not applicable

0259

* Samples collected per ASTM Standard Penetration Test
* Color determined by the Munsell color chart

Cont. page

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Chr 5 Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #11214	COORDINATES	DATE 8-9-93	
ELEVATION	GWL: Depth / Date/Time	DATE STARTED 8-9-93	
ENGINEER/GEOLOGIST T. Layne	Depth / Date/Time	DATE COMPLETED	
DRILLING METHODS Hand Auger		PAGE 2 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070627 0947	N/A	6.0	Very Soft (10YR 3/4) Dark Yellowish Brown Clayey Silt w/ some fine grained sand, trace of well-graded gravel, nonplastic Slightly moist	ML	<.5	By = BG microtip = 0.0 ppm SPA 1160
3.5	070628 0948	N/A	6.0	SAA	SAA	SAA	By = BG microtip = 0.0 ppm SPA 916
4.0	070629 0950	N/A	6.0	SAA DRY	SAA	SAA	By = BG microtip = 0.0 ppm SPA 984
4.5	070630 0953	N/A	6.0	SAA DRY	SAA	SAA	By = BG microtip = 0.0 ppm SPA = [illegible]
5.0	070631 0957	N/A	6.0	SAA Slightly Moist	SAA	SAA	By = BG microtip = 0.0 ppm PA = [illegible]
5.5	070601 1000 070604 070605	N/A	6.0	SAA	SAA	SAA	By = BG microtip = 0.0 ppm PA = [illegible]
6.0							

NOTES: Hand augered [illegible]

SAA = Same as above
N/A = Not applicable

* Sampler [illegible] per ASTM Standard Penetration Test
* [illegible]

Background
By = BG
microtip = 0.0 ppm

0260

[illegible]

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FERNALD RI/FS

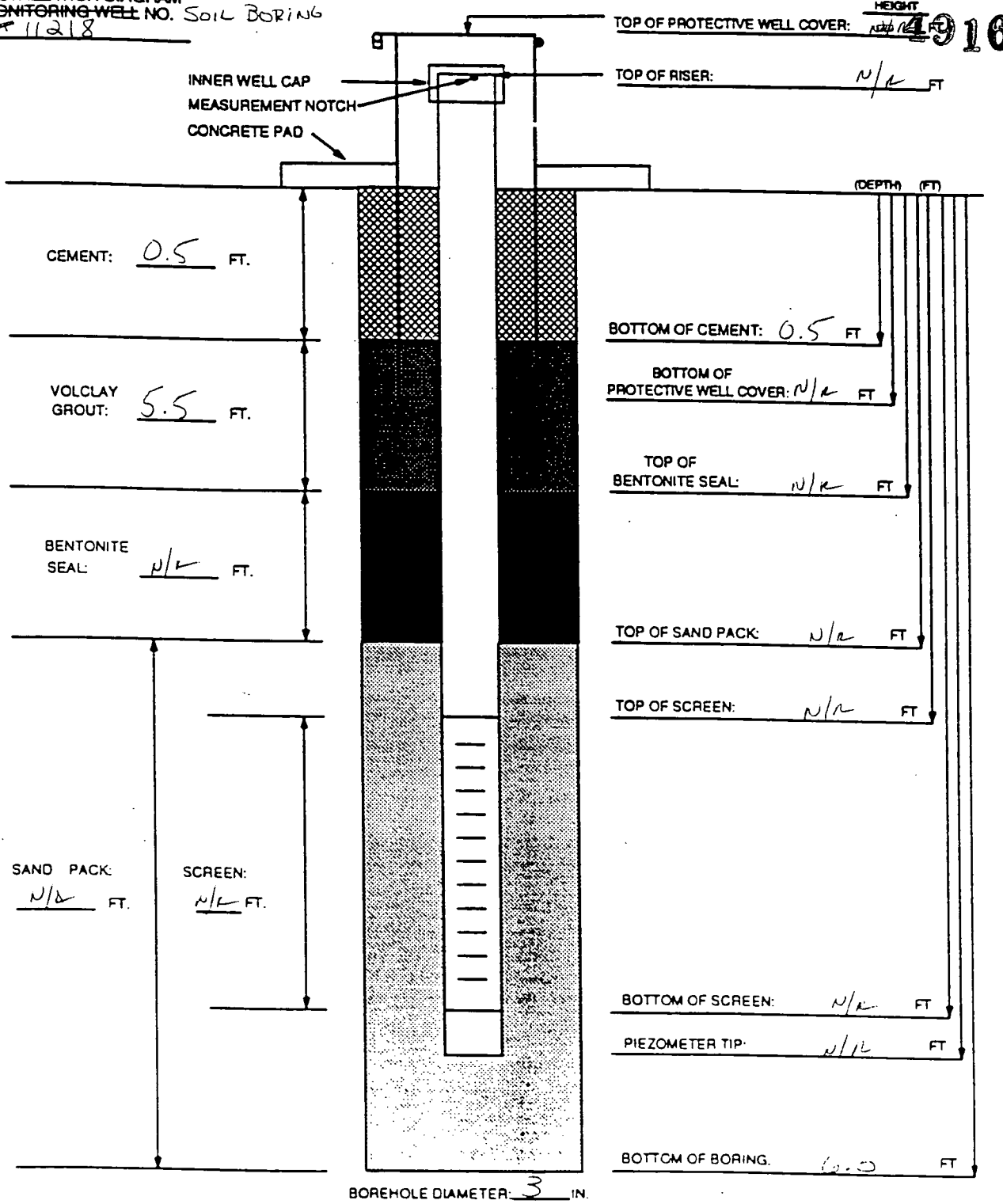
INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Soil Boring #11218

INSTALLATION DATE: 8-9-93

TOP OF PROTECTIVE WELL COVER: HEIGHT N/A FT

TOP OF RISER: N/A FT



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A

BENTONITE PELLETS (5-GALLON BUCKETS): N/A

BAGS OF VOLCLAY GROUT: 5

AMOUNT OF CEMENT: [illegible]

AMOUNT OF WATER USED: [illegible] gal

OTHER

TASK: [illegible]

NOTES

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP

GEOLOGIST/ENGINEER [illegible]

4) WATER DEPTH AND DATE N/A FT/ N/A

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

ASI FORM 0157 REV. 0)

RI/FS

Soil Boring

~~PIEZOMETER~~ INSTALLATION SHEET

-4916

Crus Surface and

PROJECT NAME Subsurface Soil Sampling FIELD ENG./GEO. T. Layne DATE 8-10-93

PROJECT NO. 50.03.18 Investigation CHECKED BY _____ DATE _____

BORING NO. #11218

PIEZOMETER NO. N/A DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD Hand Auger

DRILLING FLUID (S) USED:

FLUID N/A FROM N/A TO N/A

FLUID N/A FROM N/A TO N/A

~~TYPE OF BIT~~ _____

~~CASING SIZE (S) USED:~~ N/A

~~SIZE _____ FROM _____ TO _____~~

~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

~~TYPE~~ _____

~~DIAMETER OF PERFORATED SECTION~~ _____

~~PERFORATION TYPE:~~ N/A

~~SLOTS ☐ HOLES ☐ SCREEN ☐~~

~~AVERAGE SIZE OF PERFORATIONS~~ _____

~~TOTAL PERFORATED AREA~~ _____

~~RISER PIPE MATERIAL~~ _____

~~RISER PIPE DIAMETERS:~~

~~O.D.~~ N/A ~~I.D.~~ _____

~~LENGTH OF PIPE SECTIONS~~ _____

~~JOINING METHOD~~ _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A

PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP N/A	BOTTOM
SAND	TOP N/A	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ N/A NO ☐

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ N/A NO ☐

REMARKS _____

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

Cm 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation	
BORING NUMBER # 11219	COORDINATES	DATE 8-9-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-9-93
DRILLING METHODS Hand Auger		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070613 1007 8-9-93	N/A	6.0	Very Soft (10YR 3/4) Dark yellowish Brown Clayey Silt w/ some fine grained sand, well graded gravel, nonplastic DRY	ML	<.5	Bg = 700 cpm microrp = 0.0 ppm SPA - 5460
0.5	070604 070608 1011 070612	N/A	6.0	SAA	SAA	SAA	Bg = 700 cpm microrp = 0.0 ppm SPA = 5680
1.0	070614 1013 8-9-93	N/A	6.0	SAA Slightly Moist	SAA	SAA	Bg = 300 cpm microrp = 0.0 ppm SPA = 2000
1.5	070615 1015 8-9-93	N/A	6.0	SAA	SAA	SAA	Bg = 300 cpm microrp = 0.0 ppm SPA . 1660
2.0	070616 1017 8-9-93	N/A	6.0	SAA	SAA	SAA	Bg = 250 cpm microrp = 0.0 ppm SPA = 1360
2.5	070632 1219	N/A	6.0	SAA Slightly moist ~~DRY~~	SAA	SAA	Bg = 36 microrp = 0.0 ppm SPA = 1500
3.0							

NOTES Hand Augered by Tyson Rice

SAA = Same As Above
N/A = Not Applicable

* Samples collected per ASTM Standard Practice
* Soil Colors were identified by the Munsell Color Chart

Background
Bg = 140 - 240 cpm
microrp = 0.0 ppm

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FERNALD RI/FS

-49[illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Surface Subsurface Soil Sampling Investigation		
BORING NUMBER #11219	COORDINATES		DATE 8-9-93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 8-9-93
ENGINEER/GEOLOGIST T. Layne	Depth	Date/Time	DATE COMPLETED 8-9-93
DRILLING METHODS Hand Auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070617 1024 8-9-93	N/R	6.0	Very Soft (10 YR 4/4) Dark Yellowish Brown, Clayey Silt w/ some fine grained sand, small poorly graded gravel Nonplastic Slightly Moist	ML	0.5	Bg = 36 Minitip = 0.0 ppm SPA = 1480
3.5	070618 1026	N/R	6.0	SAA	SAA	SAA	Bg = 36 Minitip = 0.0 ppm SPA = 1030
4.0	070619 1029	N/R	6.0	SAA	SAA	SAA	Bg = 320 ppm Minitip = 0.0 ppm SPA = 905
4.5	070620 1035	N/R	6.0	SAA	SAA	SAA	Bg = 36 Minitip = [illegible] ppm SPA = 700
5.0	070621 1037	N/R	[illegible]	SAA	SAA	SAA	Bg = 36 Minitip = [illegible] ppm SPA = [illegible]
5.5	070603 070607 070611 1039	N/R	[illegible]	SAA	SAA	SAA	Bg = [illegible] Minitip = [illegible] ppm SPA = [illegible]

NOTES

[illegible]

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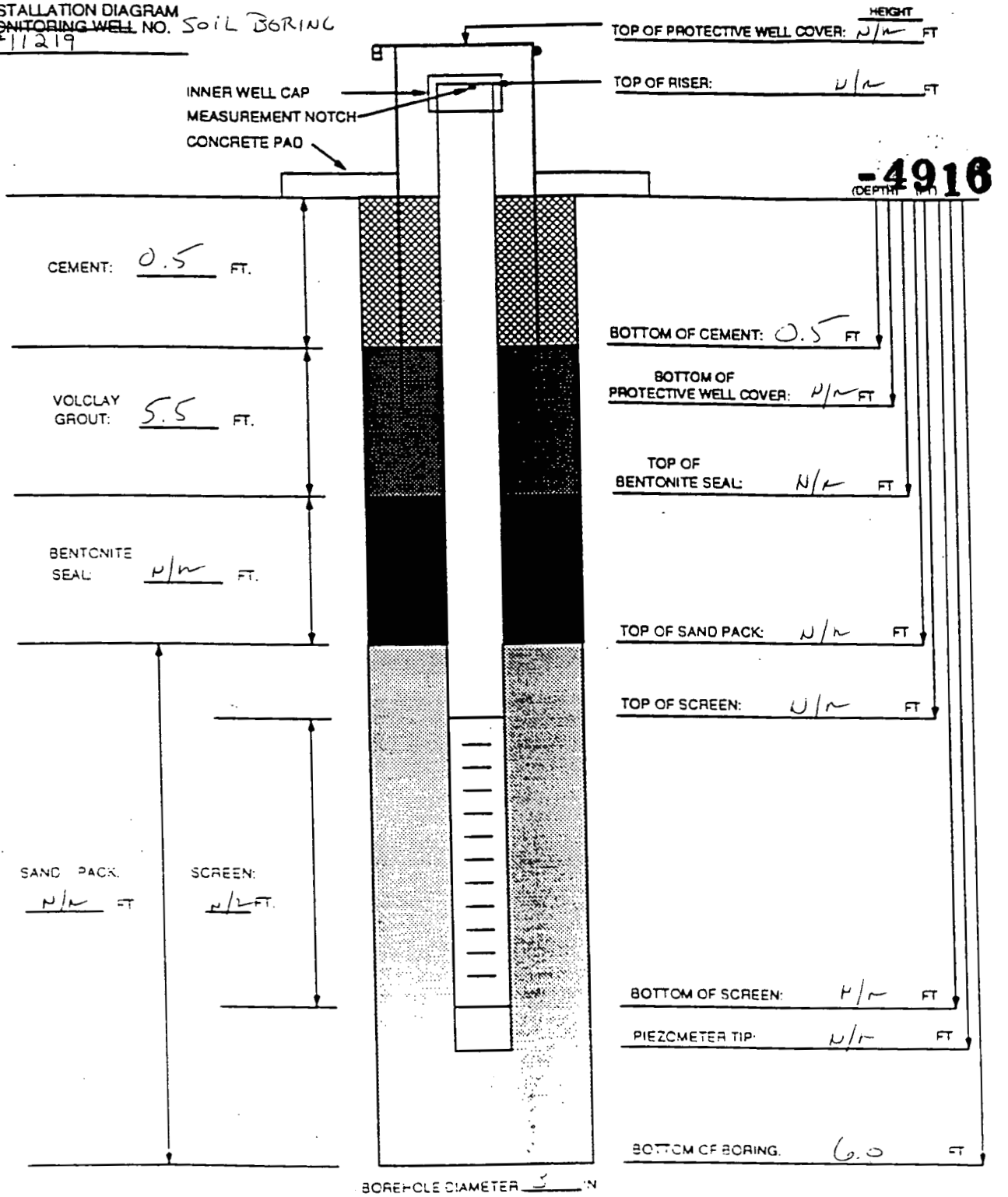
FERNALD RI/FS

INSTALLATION DIAGRAM

~~MONITORING WELL~~ NO. Soil Boring #11219

INSTALLATION DATE: 8-9-93



MATERIAL USED

SAND TYPE AND QUANTITY: N/A

BENTONITE PELLETS (GALLON BUCKETS): N/A

TYPE OF VOLCLAY GROUT: [illegible]

AMOUNT OF CEMENT: [illegible]

AMOUNT OF WATER USED: [illegible]

TYPE: [illegible]

TIME: [illegible]

NOTES

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS

2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH N/A IN. SLOTS

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG

4) WATER DEPTH AND DATE N/A FT N/A

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL WAS NOT HAND AUGERED, DOWN TO THE [illegible]

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RI/FS -4916

Soil Boring

~~PIEZOMETER~~ INSTALLATION SHEET

Crus Surface and Subsurface

PROJECT NAME Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-9-93
PROJECT NO. 50.03-18 CHECKED BY _____ DATE _____
BORING NO. # 11219
PIEZOMETER NO. N/A DATE OF INSTALLATION 8-9-93

BOREHOLE DRILLING

~~Hollow Stem~~ TL 8-13-93

DRILLING METHOD Hand Auger	~~TYPE OF BIT~~
DRILLING FLUID (S) USED:	~~CASING SIZE (S) USED:~~
FLUID N/A FROM N/A TO N/A	~~SIZE ____ FROM ____ TO ____~~
FLUID N/A FROM N/A TO N/A	~~SIZE ____ FROM ____ TO ____~~

PIEZOMETER DESCRIPTION

~~TYPE~~	~~RISER PIPE MATERIAL~~
~~DIAMETER OF PERFORATED SECTION~~	~~RISER PIPE DIAMETERS:~~
~~PERFORATION TYPE:~~	~~O.D. ____ I.D. ____~~
~~SLOTS ☐ HOLES ☐ SCREEN ☐~~	~~LENGTH OF PIPE SECTIONS~~
~~AVERAGE SIZE OF PERFORATIONS~~	~~JOINING METHOD~~
~~TOTAL PERFORATED AREA~~	

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP N/A	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Crus Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #11220	COORDINATES	DATE 8-10-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-10-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-10-93	
DRILLING METHODS Hand Auger		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070645 1015	N/A	6.0	Very Soft (10YR 4/3) Brown Clayey Silt w/ trace fine-grained sand, trace gravel, nonplastic DRY	ML	<.5	Rγ = 240 cpm microRp = 0.0 ppm SPA = 1870
0.5	1014 070633 070637 070641	N/A	6.0	SAA	SAA	SAA	Rγ = 180 cpm microRp = 0.0 ppm SPA = 2040
1.0	070648 1020	N/A	6.0	SAA	SAA	SAA	Rγ = 160 ppm microRp = 0.0 ppm SPA 1050
1.5	070646 1022	N/A	6.0	SAA	SAA	SAA	Rγ = 140 cpm microRp = 0.0 ppm SPA 1170
2.0	070647 102.	N/A	6.0	SAA	SAA	SAA	Rγ = 160 ppm microRp = 0.0 ppm SPA 1150
2.5	070649 1028	N/A	6.0	SAA but (10YR 5/3) Brown	SAA	SAA	Rγ = 150 ppm microRp = 0 ppm SPA 1400
3.0							

NOTES

Hand Augered to Trench Floor

Unit: Same as above

Not applicable

* All samples sieved per ASTM Standard Penetration Test

* All samples handpicked to remove rocks and debris

0267

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER # 11220	COORDINATES	DATE 8-10-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-10-93	
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-10-93	
DRILLING METHODS Hand Auger		PAGE 2 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070650 1029	N/A	6.0	SAA	SAA	SAA	$\beta\gamma$ = 170 cpm microrip = 0.0 ppm SPA - 1150
3.5	070751 1030	N/A	6.0	SAA	SAA	SAA	$\beta\gamma$ = 160 cpm microrip = 0.0 ppm SPA = 998
4.0	070752 1033	N/A	6.0	SAA	SAA	SAA	$\beta\gamma$ = BG microrip 0.0 ppm SPA - 988
4.5	070753 1036	N/A	6.0	SAA	SAA	SAA	$\beta\gamma$ = BG microrip = 0.0 ppm SPA: 961
5.0	070754 1039	N/A	6.0	STIFF (10YR 3/6) Dark yellowish brown Clayey Silt w/trace sand, low plas. Moist	ML	2.0	$\beta\gamma$ = BG microrip 0.0 ppm SPA 1120
5.5	070755 1041	N/A	6.0	SAA	SAA	SAA	$\beta\gamma$ = BG microrip = ppm SPA - 1230
6.0							

NOTES

SAA - Same As Above
N/A - not applicable

0268

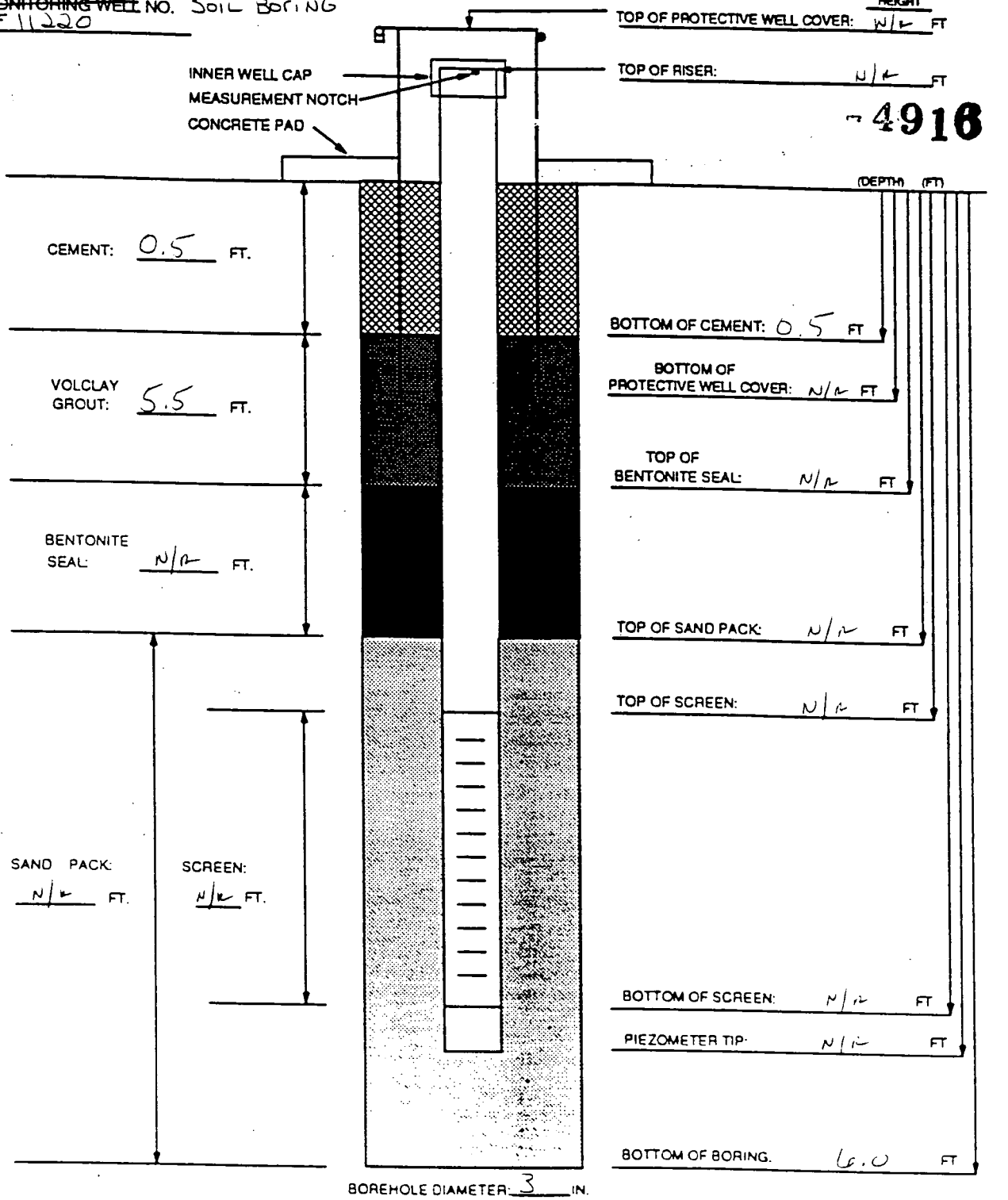
FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. Soil Boring
11220

INSTALLATION DATE: 8-10-93

TOP OF PROTECTIVE WELL COVER: HEIGHT N/A FT

TOP OF RISER: N/A FT

4916



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT 1/2
AMOUNT OF CEMENT 1/2
AMOUNT OF WATER USED 10 gal
OTHER
TASK 50.03.01

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN ID 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST/ENGINEER T. L. G. INC.
4) WATER DEPTH AND DATE N/A FT; N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

ASI FORM 157 REV. 2

(A)

RI/FS

Soil Boring

~~PIEZOMETER~~ INSTALLATION SHEET

-4916

PROJECT NAME Cru 5 Surface and Subsurface Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-10-9

PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____

BORING NO. #11220

PIEZOMETER NO. N/A DATE OF INSTALLATION 8-10-93

BOREHOLE DRILLING

DRILLING METHOD Hand Auger

DRILLING FLUID (S) USED:

FLUID N/A FROM N/A TO N/A

FLUID N/A FROM N/A TO N/A

~~TYPE OF BIT~~ _____

~~CASING SIZE (S) USED:~~ N/A

~~SIZE _____ FROM _____ TO _____~~

~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

~~TYPE~~ _____

~~DIAMETER OF PERFORATED SECTION~~ _____

~~PERFORATION TYPE:~~

~~SLOTS ☐ HOLES ☐ SCREEN ☐~~ N/A

~~AVERAGE SIZE OF PERFORATIONS~~ _____

~~TOTAL PERFORATED AREA~~ _____

~~RISER PIPE MATERIAL~~ _____

~~RISER PIPE DIAMETERS:~~

~~O.D. _____ I.D. _____~~

~~LENGTH OF PIPE SECTIONS~~ N/A

~~JOINING METHOD~~ _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A

PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP N/A	BOTTOM
SAND	TOP N/A	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ N/A NO ☐

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ N/A NO ☐

REMARKS _____

0270

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

Chu 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface + Subsurface Soil Sampling Investigation		
BORING NUMBER #11221	COORDINATES	DATE 8-10-93	
ELEVATION	GWL: Depth / Date/Time	DATE STARTED 8-10-93	
ENGINEER/GEOLOGIST T. Layne	Depth / Date/Time	DATE COMPLETED	
DRILLING METHODS Hand Auger		PAGE 1 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	070635 070639 [0915] 070643	N/A	6.0	Very Soft (10 YR 3/4) Dark Yellowish Brown ~~Silty~~ Clayey Silt w/ trace of fine grained sand, trace of gravel Nonplastic DRY	ML	<.5	By = BG microtip: 0.0 ppm SPA = ~~855~~ 1,290
0.5	070755 [0920]	N/A	6.0	~~Very Soft (~~ SAA	SAA	SAA	By = BG microtip: 0.0 ppm SPA = ~~913~~ 982
1.0	070756 [09231]	N/A	6.0	Very Soft (10 YR 4/6) Dark Yellowish Brown Clayey Silt w/ some fine grained sand, trace of gravel (water). nonplastic to low plasticity Slightly Moist	ML	<.5	By = BG microtip: 0.0 ppm SPA = ~~881~~ 885
1.5	070757 [09-]	N/A	6.0	SAA but DRY	ML	<.5	By = BG microtip: 0.0 ppm SPA = ~~823~~ 867
2.0	070755 [0935]	N/A	6.0	~~Very~~ Soft (10YR 5/4) Yellowish Brown clayey Silt w/ some sand (fine grained), nonplastic DRY	ML	<.5	By = BG microtip: 0.0 ppm SPA = ~~874~~ 847
2.5	070759 [0942]	N/A	6.0	SAA	SAA	SAA	By = microtip - SPA = ~~[illegible]~~ [illegible]
3.0							

Notes: Hand Augered by Jerome Rice

Units: N/A - Not applicable

* Consistency based on Modified Standard Penetration Test
* Consistency based on Modified Dolan Test

Reviewed by: [illegible]

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

Cim 5

PROJECT NUMBER 50.03.18	PROJECT NAME Surface & Subsurface Soil Sampling Investigation	
BORING NUMBER # 11221	COORDINATES	DATE 8-10-93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-10-93
ENGINEER/GEOLOGIST T. Layne	Depth Date/Time	DATE COMPLETED 8-10-93
DRILLING METHODS Hand Auger		PAGE 2 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	070760 0957	N/A	6.0	Very Soft (10YR 5/3) ~~Clayey~~ Brown Clayey Silt w some fine grained sand, nonplastic - low trace gravel DRY	ML	<.5	Rg = BG Microtip = 0.0 ppm SPA - ~~1,290~~ 855
3.5	070761 0959	N/A	6.0	SAA	SAA	SAA	Rg = BG Microtip = 0.0 ppm SPA = ~~982~~ 913
4.0	070762 1002	N/A	6.0	SAA			Rg = BG Microtip = 0.0 ppm SPA = ~~885~~ 871
4.5	070763 1005	N/A	6.0	SAA	SAA	SAA	Rg = BG Microtip = 0.0 ppm SPA = ~~867~~ 823
5.0	070764 1007	N/A	6.0	SAA out Slightly moist	SAA	SAA	Rg = BG Microtip = 0.0 ppm SPA = ~~747~~ 874
5.5	070636 070640 1009 070644	N/A	6.0	SAA	SAA	SAA	Rg = BG Microtip = 0.0 ppm SPA = ~~[illegible]~~ [illegible]
6.0							

Hand Auger used by Tyler [illegible]

SAA = Same As Above
N/A = Not Applicable

* Sample [illegible] 0272
* [illegible]

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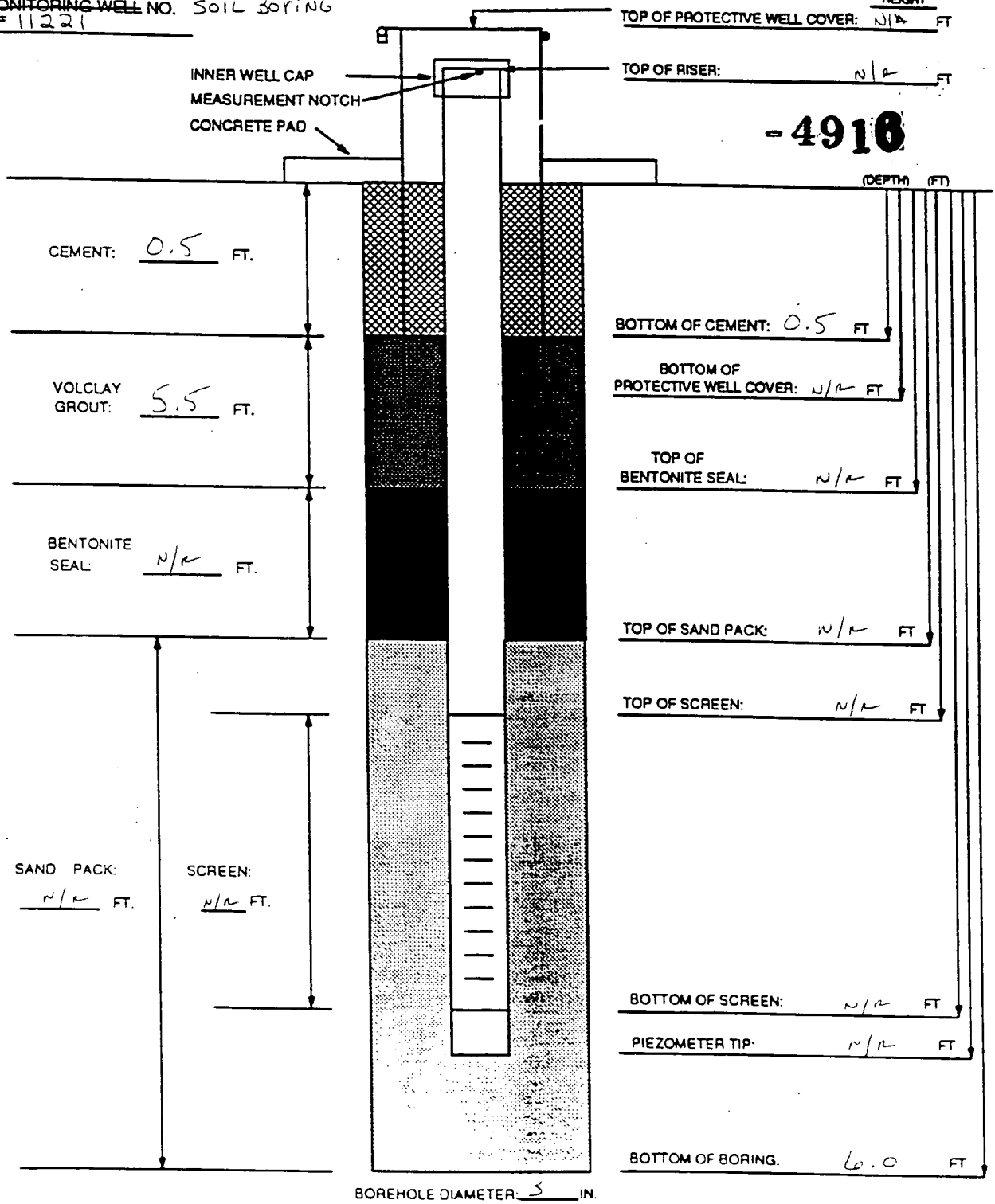
FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. Soil Boring #11221

INSTALLATION DATE: 8-10-93



HEIGHT

TOP OF PROTECTIVE WELL COVER: N/A FT

TOP OF RISER: N/A FT

BOTTOM OF CEMENT: 0.5 FT

BOTTOM OF PROTECTIVE WELL COVER: N/A FT

TOP OF BENTONITE SEAL: N/A FT

TOP OF SAND PACK: N/A FT

TOP OF SCREEN: N/A FT

BOTTOM OF SCREEN: N/A FT

PIEZOMETER TIP: N/A FT

BOTTOM OF BORING: 6.0 FT

MATERIALS USED

SAND TYPE AND QUANTITY N/A
BENTONITE PELLETS (5-GALLON BUCKETS) N/A
BAGS OF VOLCLAY GROUT 5
AMOUNT OF CEMENT 1
AMOUNT OF WATER USED [illegible]
OTHER
TASK [illegible]

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN ID. 316 STAINLESS STEEL PIPE WITH 0 N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST ENGINEER [illegible]
4) WATER DEPTH AND DATE N/A FT/ N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

ASD FORM 157 RF

0273

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RI/FS

SOIL BORING

-4916

~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME Cru 5 Surface and Subsurface Soil Sampling Investigation FIELD ENG./GEO. T. Layne DATE 8-10-93

PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____

BORING NO. # 11221

PIEZOMETER NO. N/A DATE OF INSTALLATION 8-10-93

BOREHOLE DRILLING

DRILLING METHOD Hand Augers

DRILLING FLUID (S) USED:

FLUID N/A FROM N/A TO N/A

FLUID N/A FROM N/A TO N/A

~~TYPE OF BIT~~ _____

~~CASING SIZE (S) USED:~~ N/A

~~SIZE _____ FROM _____ TO _____~~

~~SIZE _____ FROM _____ TO _____~~

PIEZOMETER DESCRIPTION

~~TYPE~~ _____

~~DIAMETER OF PERFORATED SECTION~~ _____

~~PERFORATION TYPE:~~ N/A

~~SLOTS ☐ HOLES ☐ SCREEN ☐~~

~~AVERAGE SIZE OF PERFORATIONS~~ _____

~~TOTAL PERFORATED AREA~~ _____

~~RISER PIPE MATERIAL~~ _____

~~RISER PIPE DIAMETERS:~~

~~O.D. _____ I.D. _____~~

~~LENGTH OF PIPE SECTIONS~~ _____

~~JOINING METHOD~~ _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A

PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:	CEMENT 0.0	CEMENT 0.5		
GROUT/SLURRY	TOP 0.5	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP N/A	BOTTOM
SAND	TOP N/A	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	6.0		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ N/A NO ☐

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ N/A NO ☐

REMARKS _____

0274 VL

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 40.03.07	PROJECT NAME C2V 4- Tumulus	
BORING NUMBER 11224	COORDINATES.	DATE 8-28-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Castello	Depth Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS Hollow stem Auger - 3 in spoons - 300 # hammer ; 4 1/4 in ID bit		PAGE 1 OF 8

DEPTH (FT) 0.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	(1) - sample jar #s DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS sample #s this column due to length
8-28 0.5	0854	6	6 (1)	HARD (10YR, 4/4) DARK yellowish brown, silty clay, low plasticity, dry. Grass and small roots.	CL	4.5+	MT - 0.0 ppm BG - 50 cpm 30828A11224-01
1.0	0854	7	6 (2)	SAA	CL	4.5+	SAA 30828A11224-02
1.5	0854	7	6 (3)	HARD (10YR, 4/6) DARK yellowish brown, SILTY CLAY, mottled, low PLASTICITY, DRY	CL	4.5+	SAA 30828A11224-03
2.0	0854	7	6 (4)	SAA SP, ↑	CL	4.5+	SAA 30828A11224-04
2.5	0858	10	6 (5)	HARD (10YR, 4/6) DARK yellowish brown, silty clay, low plasticity, dry. MOTTLED APPEARANCE.	CL	4.5+	MT - 0.0 ppm BG - 50 cpm 30828A11224-05
3.0	0858	13	6 (6)	SAA	CL	4.5+	SAA 30828A11224-06
3.5	0858	14	6 (7)	SAA	CL	4.5+	SAA 30828A11224-07
4.0	0858	20	6 (8)	SAA SP OCB-28-93 SP2 ↑	CL	4.5+	SAA 30828A11224-08
4.5	0917	2	6 (9)	HARD (10YR, 5/8) YELLOWISH BROWN, SILTY CLAY, LOW TO MEDIUM PLASTICITY, DRY. LOTS of small to medium sized gravel pebbles.	CL	4.5+	MT - 0.0 ppm BG - 50 cpm 30828A11224-09
5.0	0917	7	6 (10)	SAA	CL	4.5+	SAA 30828A11224-10

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Mob. L 80
Driller M. Bartley
R. Davis

SAA - Same as above
NA - Not Applicable

BACKGROUND - MT - 0 ppm BG - 50 cpm

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

OJECT NUMBER 40.03.07	PROJECT NAME. CSU-4 Tumulus	
BORING NUMBER 11224	COORDINATES.	DATE 8-28-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Castello	Depth Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS See p.1		PAGE 2 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
828 ↓ 5.5	0917	10	6 (11)	HARD (10YR, 5/8) yellowish brown, silty clay low to medium plasticity, Dry. Lots of small to medium sized gravel pebbles	CL	4.5+	HCT - 0.0 ppm BZ - 50 cpm 30828A11224-11
6.0	0917	15	6 (12)	SAA SP3 ↑	CL	4.5+	SAA 30828A11224-12
6.5	0920	7	6 (13)	VERY STIFF (10YR 5/6) yellowish brown, silty clay, medium plasticity, Dry. Some small to medium gravel, less than the interval above.	CL	3.5	HTIP - 0.0 ppm BZ - 50 cpm 30828A11224-13
[illegible]	0928	10	6 (14)	SAA	CL	3.5	SAA GRAINSIZE HYDROMETER BROWN CLAY 30828A11224-14
7.5	0928	12	6 (15)	SAA	CL	3.0	SAA OPC 8-3-93 30828A11224-15
8.0	0928	13	6 (16)	SAA SP4 ↑	CL	2.5	SAA 30828A11224-16
8.5	0939	4	6 (17)	HARD (10YR, 5/8) yellowish brown, silty clay, medium plasticity, Dry. Lots of gravel pebbles medium to large - Lots more gravel than previous spoon.	CL	4.5+	HCT - 0.0 ppm BZ - 50 cpm 30828A11224-17
9.0	0939	8	6 (18)	SAA	CL	4.5+	SAA 30828A11224-18
9.5	0939	9	6 (19)	SAA	CL	4.5+	SAA 30828A11224-19
10.0	0939	16	6 (20)	SAA SP5 ↑	CL	4.5+	SAA 30828A11224-20

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment See p.1
Driller See p.1

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard [illegible]
Colors identified using Munsell Color Chart

0276

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FERRALLOY
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER 40.07.03	PROJECT NAME. CPU-4 Tuxedo	
BORING NUMBER 11224	COORDINATES.	DATE 8-28-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS See P.1		PAGE 3 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-28 10.0							
10.5	0951	12	6 (21)	HARD (10YR, 5/6) YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, LOTS OF GRAVEL PEBBLES, MEDIUM TO LARGE, IN SOME PLACES, GRAVEL PEBBLES ARE MIXED WITH ONE ANOTHER; DRY.	CL	4.5+	MT- 0.0 PPM BZ- 50 cpm 30828A11224-21
11.0	0951	16	6 (22)	SAA	CL	4.5+	SAA 30828A11224-22
11.5	0951	19	6 (23)	SAA	CL	4.5+	SAA 30828A11224-23
0	0951	38	6 (24)	SAA SEE ↑	CL	4.5+	SAA 30828A11224-24
12.5	1020	6	6 (25)	HARD SAA	CL	4.5+	MT- 0.0 PPM BZ- 50 cpm 30828A11224-25
13.0	1020	11	6 (26)	SAA	CL	4.5+	SAA 30828A11224-26
13.5	1020	14	6 (27)	HARD (10YR, 5/1) CLAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. LOTS OF GRAVEL PEBBLES, MEDIUM TO LARGE. MIXED WITH (5YR, 4/3) REDDISH BROWN STAINING. THIS HAS SIMILAR PHYSICAL PROPERTIES TO THE	CL	4.5+	SAA 30828A11224-27
14.0	1020	9	6 (28)	ABOVE CLAY, BUT IS A DIFFERENT COLOR. SAA SEE ↑	CL	4.5+	SAA 30828A11224-28
14.5	1255	6	6 (29)	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. A 2 in. SANDY CLAY LAYER, SAME COLOR. LOTS OF GRAVEL.	CL	3.5	MT- 0.0 PPM BZ- 50 cpm 30828A11224-29 GRAIN SIZE HYDROMETER GRAY CLAY ON 9-3-93
15.0	1255	10	6 (30)	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. LOTS OF GRAVEL	CL	3.5	SAA 30828A11224-30

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment See P.1
Driller See P.1.

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard practice
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 40.07.03	PROJECT NAME. CRU-4 Tumulus		
BORING NUMBER 11224	COORDINATES.		DATE 8-28-93
ELEVATION: NA	GWL: Depth	Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS See p. 1			PAGE 4 OF 8

DEPTH (FT) 13.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)		DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-28 ↓ 15.5	1255	10	6 (31)		SAA	CL	3.5	SAA 30828A11224-31
16.0	1255	13	6 (32)		SAA SB↑	CL	3.5	SAA 30828A11224-32
16.5	1349	NA	6	(33)	VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. LOTS OF SMALL GRAVEL	CL	3.5	NA Shelby Tube #1 30828A11224-33
...0	1349	NA	6	16.0-19.0	NA	NA	NA	NA OPC 9-3-93
17.5	1349	NA	6	NO 1	NA	NA	NA	NA
18.0	1349	NA	6	TUBE	NA	NA	NA	NA
18.5	1349	NA	6	SHELBY	VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, MEDIUM TO HIGH PLASTICITY, MOIST. No gravel in small sample at bottom. Bottom 6 inches of Shelby tube look wet. Some small gravel.	CL	2.5	NA
19.0	1349	NA	0 NR OPC		NA	NA	NA	NA
19.5	1513	2	6 (34)		VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, NOTICEABLY MORE SILTY THAN BEFORE, MEDIUM PLASTICITY. Lots of small gravel, some large cobbles, MOIST BUT NOT WET. SILTY NOT WET.	CL	2.0	HTP 0.0 ppm Bz 50 cpm 30828A11224-34
20.0	1513	3	6 (35)		SAA	CL	2.0	SAA 30828A11224-35

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment See p. 1
Driller See p. 1

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0278 200

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 4916

PROJECT NUMBER 40.63.01	PROJECT NAME. OU-4 Tumulus	
BORING NUMBER 11224	COORDINATES.	DATE 8-28-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Castellos	Depth Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS See P.1		PAGE 5 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-28 20.0							
20.5	1513	5	6 (36)	SAA	CL	2.0	SAA 30828A11224-36
21.0	1513	7	6 (37)	SAA SP 9 ↑	CL	2.0	SAA 30828A11224-37
21.5	1528	5	6 (38)	VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, VERY SILTY BUT STILL SHEARS LIKE A CLAY, MEDIUM to high PLASTICITY, MOIST. Small gravel throughout	CL	2.0	MTR = 0.0 ppm BZ - 60 cpm 30828A11224-38
22.0	1528	4	6 (39)	SAA	CL	2.0	SAA 30828A11224-39
22.5	1528	5	6 (40)	SAA	CL	2.0	SAA 30828A11224-40
23.0	1528	6	6 (41)	SAA SP 10 ↑	CL	2.0	SAA 30828A11224-41
23.5	1545	2	6 (42)	SAA	CL	2.0	MTR - 0 cppm BZ - 50 cpm 30828A11224-42
24.0	1545	3	6 (43)	SAA	CL	2.0	SAA 30828A11224-43
24.5	1545	6	6 (44)	SAA	CL	2.0	SAA 30828A11224-44
25.0	1545	7	6 (45)	SAA SP 11 ↑	CL	2.0	SAA 30828A11224-45

NOTES:
Drilling Contractor Pennsylvania Drilling
Drilling Equipment See P.1
Driller See P.1

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER 40.03.07	PROJECT NAME. C2U-4		
BORING NUMBER 11224	COORDINATES.		DATE 8-29-93
ELEVATION: NA	GWL: Depth	Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Castello	Depth	Date/Time	DATE COMPLETED. 8-29-93
DRILLING METHODS see P1			PAGE 6 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)		DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25.0								
8-29 25.5	0805	3	6 (1)		STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, KEY SILTY, medium plasticity, moist. Some fine gravel. Outside of core wet, inside moist.	CL	1.0	HT-0.0 ppm Bg-70cpm 30829A11224-01
26.0	0805	5	6 (2)			CL	1.0	30829A11224-02
26.5	0805	6	NR			NA	NA	NA
27.0	0805	5	NR		Sr 121	NA	NA	NA
27.5	0830	NA	6		Couldn't reach this to sample it.	NA	NA	NA Shelby Tube #2-27.0-30.0 30829A11224-03 OVC 9-3-93
28.0	0830	NA	6	(2)		NA	NA	NA
28.5	0830	NA	6	27.0-30.0		NA	NA	NA
29.0	0830	NA	6	SHELBY TUBE #2		NA	NA	NA
29.5	0830	NA	4		KEY STIFF (7.5YR 4/N4/) DARK GRAY, SILTY CLAY, medium to high plasticity, moist.	CL	2.0	HT-0.0 ppm Bg-70cpm
30.0	0830	NA	0		NA - Because the top 6in of the Shelby were full of slough and sand, there was no room in the tube for this 6in. No recovery.	NA	NA	NA

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment see P.1
Driller see P1

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0280 202

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER ~~40.09.07~~ 40.03.07 (OPC 8-29-93)	PROJECT NAME. CRU-4	
BORING NUMBER 11224	COORDINATES.	DATE 8-29-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Castello	Depth Date/Time	DATE COMPLETED 8-29-93
DRILLING METHODS See P.1		PAGE 7 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8-29 30.0							
30.5	0949	5	6 (4)	VERY STIFF (7.5YR, 4/1N4/) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, MOIST. Lots of large to medium sized gravel cobbles. Refusal of last 6 in was probably on a cobble.	CL	2.0	MT- 0.0 ppm Bg- 70 cpm 30829A11224-04
31.0	0949	12	6 (5)	SAA	CL	2.0	SAA 30829A11224-05
31.5	0949	12	6 (6)	SAA	CL	2.0	SAA 30829A11224-06
	0949	50/4	6 (7)	SAA SP 131	CL	2.0	SAA 30829A11224-07
32.5	1014	29	6 (8)	HARD (5Y, 4/3) OLIVE, SILTY CLAY, low PLASTICITY, DRY. Very large gravel, gray quartzite cobbles limestone probably bigger than spoon.	CL	4.5+	MT- 0.0 Bg- 70 cpm 30829A11224-08
33.0	1014	25	6 (9)	HARD (5Y 3/1) VERY DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY. Lots of gravel small to medium. SHARP CONTACT	CL	4.5+	SAA 30829A11224-09
33.5	1014	50/5	6 (10)	VERY DENSE (7.5YR 3/N3/) VERY DARK GRAY, COARSE GRAINED SAND, well graded, dry. SP 141	SC	~~4.5+~~ NA	SAA 30829A11224-10
34.0	1101	10	6 (11)	SAA SHARP CONTACT	SC	NA	MT- 0.0 ppm Bg- 70 cpm 30829A11224-11
34.5	1101	16	6 (12)	VERY DENSE (5Y 4/1) DARK GRAY, SILT, MOIST. 4 in. SHARP CONTACT VERY DENSE (7.5YR 3/N3/) VERY DARK GRAY, COARSE-GRAINED SAND, POORLY GRADED, MOIST. SP 151	ML SC	NA NA	SAA 30829A11224-12
35.0	1308	26	6 (13)	VERY DENSE (7.5YR 3/N3/) VERY DARK GRAY, COARSE GRAINED SAND, some fine gravel, no clay, poorly graded, dry	SC	NA	MT/P- 0.0 ppm Bg- 70 cpm 30829A11224-13

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment See P1.
Driller See P1.

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard sampling procedures
Colors identified using Munsell Color Chart

FERRALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

OJECT NUMBER 40.03.07	PROJECT NAME. CQU-4	
BORING NUMBER 11224	COORDINATES.	DATE 8-29-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 8-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED. 8-29-93
DRILLING METHODS See P.1.		PAGE 8 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35.0							
8-29 ↓ 35.5	1308	27	6	SAA SP16 ↑	SC	NA	SAA GRAIN SIZE HYDROMETER - SAND - CRI 9-3-93 within 30829A11224 - 14 GRAY CLAY
	TOTAL Depth Auger (14)						
36.0	1319	20	6 (15)	Very Dense (7.5YR, 3/N3/) Very Dark Gray, coarse grained sand, well graded, dry, some large gravel clasts.	SC	NA	MT - 0.0 ppm Bg - 70 cpm 30829A11224 - 15
36.5	1319	19	6 (16)	Very dense (7.5YR, 3/N3/) Very Dark Gray, coarse grained sand, poorly graded, dry. SP17 ↑	SC	NA	SAA 30829A11224 - 16
0	1334	10	6 (17)	SAA SHARP CONTACT	SC	NA	MT - 0.0 ppm Bg - 70. cpm 30829A11224 - 17
37.5	1334	15	6 (18)	Very Dense (5Y, 4/1) Dark Gray, SILT, moist	ML	NA	SAA
				Very Dense (7.5YR, 3/N3/) Very Dark Gray, coarse to medium grained sand, poorly graded, dry.	SC	NA	30829A11224 - 18
38.0	1334	14	6 (19)	SAA SP18 ↑	SC	NA	SAA 30829A11224 - 19
				TOTAL DEPTH - 38.0			

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment See P.1
Driller See P.1

SAA - Same as above
NA - Not Applicable

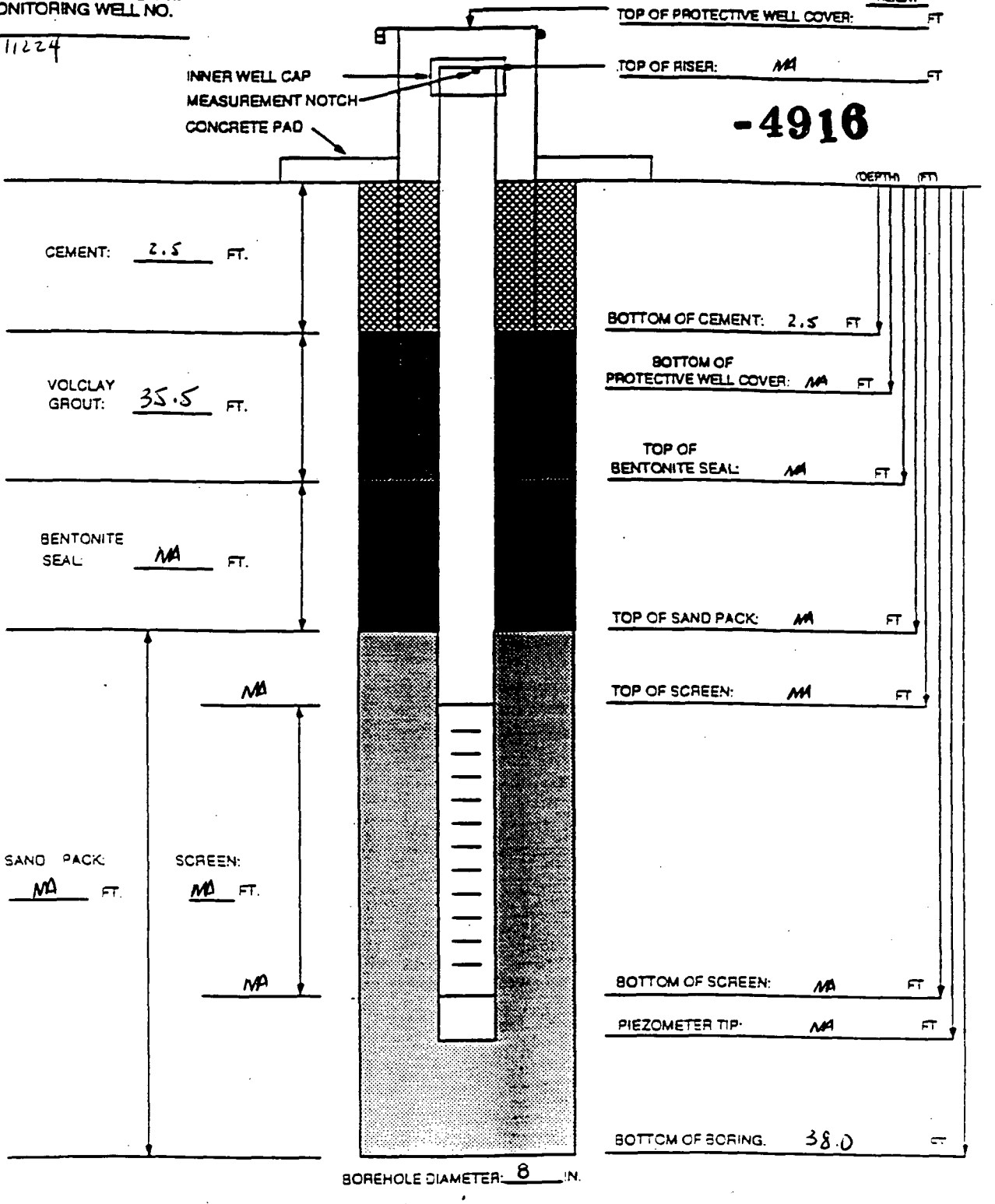
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

0282

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

11224

INSTALLATION DATE: 8-29-93



HEIGHT

TOP OF PROTECTIVE WELL COVER: _____ FT

TOP OF RISER: NA FT

BOTTOM OF CEMENT: 2.5 FT

BOTTOM OF PROTECTIVE WELL COVER: NA FT

TOP OF BENTONITE SEAL: NA FT

TOP OF SAND PACK: NA FT

TOP OF SCREEN: NA FT

BOTTOM OF SCREEN: NA FT

PIEZOMETER TIP: NA FT

BOTTOM OF BORING: 38.0 FT

BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 6

AMOUNT OF CEMENT: 2

AMOUNT OF WATER USED: 300 gal

OTHER: _____

TASK: _____

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP

GEOLOGIST/ENGINEER: D. Costello

4) WATER DEPTH AND DATE NA FT NA

5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

0283 205

FERNALD
RI/FS

-4916

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CW-4
PROJECT NO. 40.03.07
BORING NO. 11224
PIEZOMETER NO. 11224

FIELD ENG./GEO. O. Costello DATE 8-29-93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 8-29-93

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 2.5		
Cement GROUT/SLURRY	TOP 2.5	BOTTOM 38.0	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	38.0			
GWL AFTER INSTALLATION	NA			

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

0284 206

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#11218~~ 11229	COORDINATES	DATE 8-26-93	
ELEVATION	GWL: Depth Date/Time	DATE STARTED 8-26-93	
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth Date/Time	DATE COMPLETED 8-31-93	
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 9	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
	0919	8	2.0	Very Soft (10YR 4/2) Dark Grayish Brown Silty Clay, trace gravel MOIST	CL	<.5	By = BG Microtip = 0.0 ppm
			4.0	Dense (2.5Y 6/4) Lt. Yellowish Brown Gravelly Sand, poorly graded gravel, fine-med grained sand DRY	ML	N/A	
0.5		15	6.0	SAA	SAA	SAA	SAA
1.0		16	2.0	Dense (2.5Y 5/6) Lt. Olive Brown poorly graded Sandy gravel Slightly Moist			
			2.0	Hard (5YR 3/1) Very Dark Gray Silty Clay w/ (5YR 5/8) Yellowish red mottling, Med. Plasticity Slightly MOIST	CL	4.0	Trace Organics
1.5	0928	7	6.0 ~~N/A~~ TR 8-26-93	Stiff (2.5Y 5/5) Lt. Olive Brown Silty Clay w/ trace f fine Sand, medium plasticity MOIST			By = BG Microtip = 0.0 ppm Black Mottling Trace Organics
2.0		10	N/A	No Recovery	N/A	N/A	N/A
2.5		10	N/A	No Recovery	N/A	N/A	N/A
3.0							

NOTES

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TR 2
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0285

20

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS -4916

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#1218~~ 11229	COORDINATES		DATE 8-26-93
ELEVATION 8/3 9/93	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 2 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0							
3.5	0932	7	6.0	Medium Stiff (2.5 5/3) Lt. Olive Brown Silty Clay, trace of orange mottling, trace of fine sand MOIST	CL	1.25	By = BG Microtip = 0.0 ppm
4.0		9	3.0	Stiff (2.5 Y 6/1) Gray Silty Clay w/ trace of fine sand, small gravel, Medium plasticity MOIST	CL	1.75	Lt Olive Brown Mottling
4.5		9	N/A	No Recovery	N/A	N/A	N/A
5.0	0939	8	6.0	Very Stiff (2.5 Y 5/4) Lt. Olive Brown Silty Clay w/ mottling of (2.5 Y 6/1) Gray Silty Clay, trace fine sand, small gravel MOIST	CL	2.75	By = BG Microtip = 0.0 ppm
5.5		9	5.0	SAA	SAA	TL 8-26-97 ~~SAA~~ 3.0	SAA
6.0		9	N/A	No Recovery	N/A	N/A	N/A

OTIS

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TR 2
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0286

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#1218~~ 11329	COORDINATES		DATE 8-26-93
ELEVATION: CB 9/8/93	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 3 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6.0							
6.5	0945	5	6.0	Stiff (2.5 Y 4/4) Olive Brown Silty Clay, w/ trace coarse sand, trace small gravel Medium plasticity Moist	CL	1.5	By = BG Microtip: 0.0 ppm High Silt Content ~~Water in Spoon~~ 8-26-93
7.0		6	4.0	SAA	SAA	SAA	SAA
7.5		6	N/A	No Recovery	N/A	N/A	N/A
8.0	1020	4	6.0	Very Stiff (2.5 Y 5/4) Lt. Olive Brown Silty Clay w/ trace of fine grained sand Medium Plasticity Moist	CL	2.0	By = BG Microtip = 0.0 ppm
8.5		5	6.0	SAA but stiff	SAA	1.0	SAA
9.0		5	6.0	SAA but Very Stiff w/ trace of (10YR 5/8) yellowish brown mottling Moist	SAA	2.5	SAA

JTS

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TRZ
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0287

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#11218~~ 11229	COORDINATES		DATE 8-26-93
ELEVATION: CB 9/8/93	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 4 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0							
9.5	1031	11	6.0	Very Stiff (2.5Y 5/4) Lt Olive Brown w/ (10YR 5/8) Yellowish Brown mottling Silty Clay w/ trace of ~~fine~~ coarse sand and trace small gravel Moist	CL	2.75	By = BG microtip = 0.0 ppm Medium Plasticity
10.0		12	6.0	SAA	SAA	3.75	SAA
10.5		15	6.0	SAA but Hard Slightly Moist	SAA	74.5	Low Plasticity Increased Silt Content
11.0	1036	14	6.0	Very Stiff (2.5Y 5/4) Lt. Olive Brown w (10YR 5/8) Yellowish Brown mottling Silty Clay, trace small black gravel trace fine sand Moist	SAA	3.5	By = BG Microtip = 0.0 ppm Low Plasticity
11.5		17	6.0	SAA but Hard	SAA	74.5	SAA
12.0		20	6.0	Very Stiff (2.5Y 4/1) Dark Gray Silty Clay w/ trace small gravel Medium plasticity Moist	SAA	2.75	

DTLS

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TR2
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0288

FERNALD RI/FS

-- -4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER #~~11218~~ 11229	COORDINATES		DATE 8-26-93
ELEVATION: CB 9/8/93	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 5 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12.0							
12.5	1043	25	5.0	Very Stiff (2.5 Y 4/1) Dark Gray Silty Clay w/ trace of fine sand trace of small gravel Medium Plasticity Moist	CL	2.25	By = BG Microtip = 0.0 ppm 2 inch large rounded gravel Water in Spoon
13.0		22	N/A	No Recovery	N/A	N/A	N/A
13.5		24	N/A	No Recovery	N/A	N/A	N/A
14.0	1415	4	6.0	Very Stiff (10 YR 3/2) Very Dark Grayish Brown Silty Clay, trace fine sand organics Moist	CL	2.25	By = BG Microtip = 0.0 ppm
14.5		4	6.0	Very Stiff (10 YR 5/1) Gray w/ (10 YR 6/8) Brownish yellow mottling, trace of fine sand Silty Clay Moist	CL	2.0	
15.0		5	N/A	No Recovery	N/A	N/A	N/A

TLS

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TR2
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0289

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FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#1218~~ 11229	COORDINATES		DATE 8-26-93
ELEVATION: ~~08/18/93~~	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 6 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0				MED DENSE			
	1425	5	3.0	Angular Gravel w/ sand (fine-grained), well-graded gravel Organics WET		N/A	By = BG microtip = 0.0 ppm
15.5			3.0	Stiff (2.5 Y 4/1) Dark Gray Silty Clay w/ trace sand and trace gravel, Med. Plasticity VERY MOIST	CL	1.25	
		8	5.0	SAA	SAA	SAA	SAA
16.0	N/A	11	N/A	No Recovery	N/A	N/A	N/A
16.5	1445	5		Med Stiff (2.5 Y 3/1) Very Dark Gray Silty Clay w/ brownish yellow mottling, trace coarse sand, organics, med plasticity MOIST		.75	By = BG microtip = 0.0 ppm WET SEAM
17.0		7		Stiff (2.5 Y 5/1) Gray Silty Clay, trace fine gravel, trace med-coarse sand Med Plasticity MOIST		1.5	
17.5		11		Stiff (2.5 Y 3/1) Dark Gray Silty Clay w/ trace to small gravel, trace to fine sand High Plasticity MOIST		1.5	
18.0							

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TRZ
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0290

FERNALD RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME Additional Monitoring Well Installation		
BORING NUMBER ~~#11218~~ 11229	COORDINATES		DATE 8-26-93
ELEVATION: CB 4/7/93	GWL: Depth	Date/Time	DATE STARTED 8-26-93
ENGINEER/GEOLOGIST T. Layne, B. Mueller	Depth	Date/Time	DATE COMPLETED 8-31-93
DRILLING METHODS Hollow Stem Auger			PAGE 7 OF 9

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18.0							
18.5	1457	17	6.0	Stiff (2.5Y 5/1) Gray Silty Clay w/ trace of small gravel, trace of med-coarse sand, med plasticity, organics MOIST	CL	1.5	By = BG Microtip = 0.0 ppm
19.0		22	6.0	SAA	CL	1.5	SAA
19.5		25	6.0	SAA	CL	1.75	SAA
20.0			6.0	SAA	CL	1.5	SAA

OTHS

Drilling Contractor Penn Drill
Drilling Equipment Simco 4000 TR2
Driller Bobby Yost
Helper Ted Bais
* Samples collected per ASTM Standard Penetration Test
* All Colors identified by the Munsell Color Chart

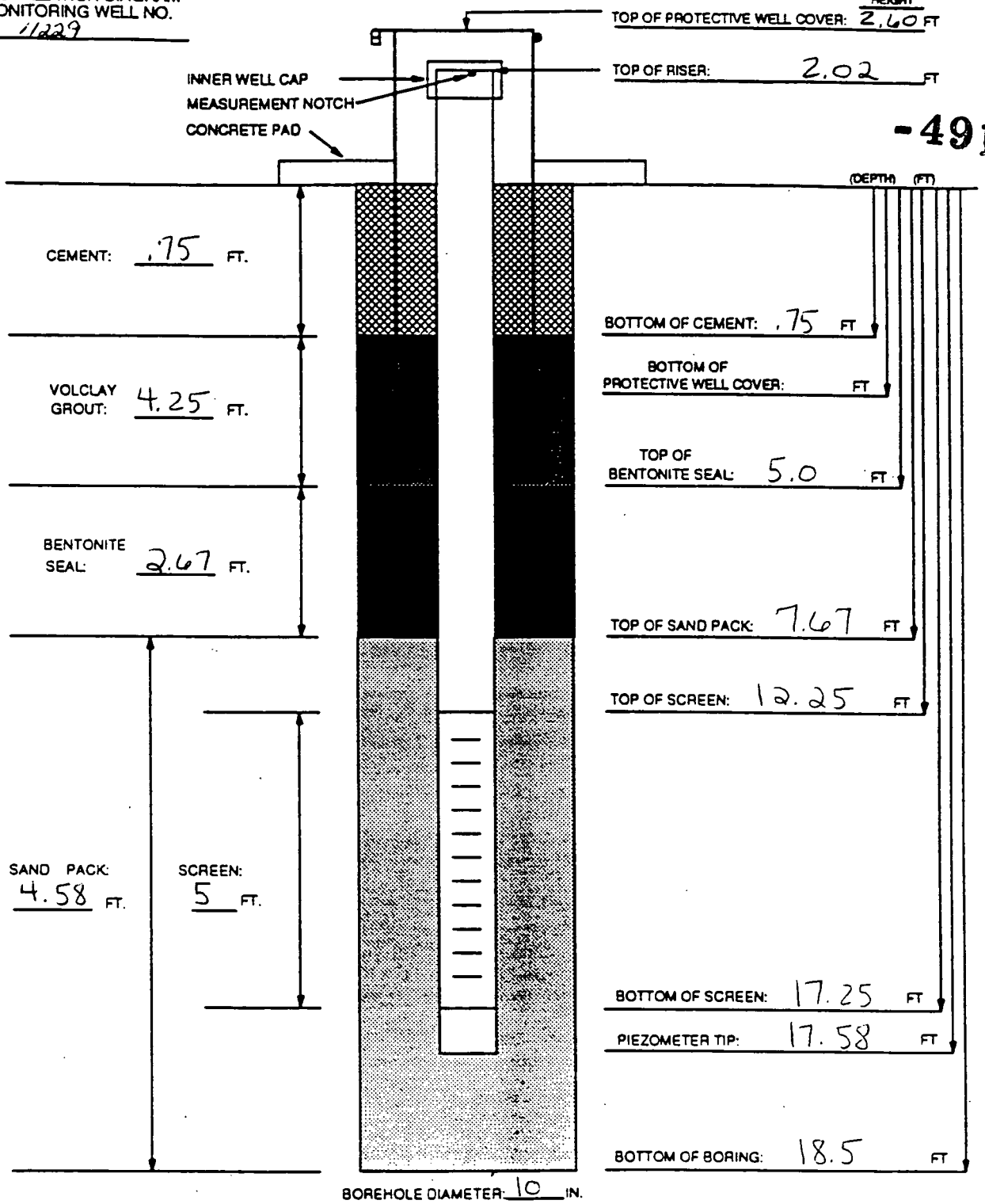
SAA = Same As Above
N/A = Not Applicable

Background
By = 80 cpm
Microtip = 0.0 ppm

0291

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1229

INSTALLATION DATE: 8-31-93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: #7 Sand 1½ bag
BENTONITE PELLETS (5-GALLON BUCKETS): 1 bucket
BAGS OF VOLCLAY GROUT: 2 bags
AMOUNT OF CEMENT: 8 Bags
AMOUNT OF WATER USED: 54 gallons
C[illegible]:
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 4.06 FT/ 9/1/93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: J. Layne

ASI FORM 0157 REV (0)

FERNALD RI/FS

Page 9 of 9

Monitoring Well

~~PIEZOMETER~~ INSTALLATION SHEET — 4916

Additional

PROJECT NAME Monitoring Well Installation FIELD ENG./GEO. T. Layne DATE 8-31-93

PROJECT NO. 50.03.22 CHECKED BY _____ DATE _____

BORING NO. ~~11218~~ 11229

~~PIEZOMETER~~ M.W. NO. ~~11218~~ 11229 DATE OF INSTALLATION 8-31-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Bulldog Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

~~PIEZOMETER~~ Monitoring Well DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL Stainless Steel
DIAMETER OF PERFORATED SECTION 4 in.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in. I.D. 4.0 in.
SLOTS ☒ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10', 2', 2'
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD threaded joint
TOTAL PERFORATED AREA 5 feet	screw-type

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 feet	OTHER PROTECTION Hinged locking cover
PROTECTIVE PIPE O.D. 10 3/4 inch	w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.02 ft			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.40 ~~3.05~~ ft 8-31-93			
BOREHOLE FILL MATERIALS:	CEMENT 0.0 ft	CEMENT .75 ft		
GROUT/SLURRY	TOP .75 ft	BOTTOM 5.0 ft	TOP N/A	BOTTOM
BENTONITE	TOP 5.0 ft	BOTTOM 7.67 ft	TOP	BOTTOM
SAND	TOP 7.67 ft	BOTTOM 17.58 ft	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 12.25 ft	BOTTOM 17.25 ft	TOP	BOTTOM
~~PIEZOMETER~~ TIP Sump	17.58 ft			
BOTTOM OF BOREHOLE	18.5 ft			
GWL AFTER INSTALLATION	4.06 ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ N/A NO ☐ 0293

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ N/A NO ☐

REMARKS Wooden Plug was used in auger bit to clean hole and prevent clay from packing in auger but after plug was disengaged sand packed into top auger and 0 auger had to be removed. Well was set open hole w/ natural sand pack

409-11 86

215

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MW # 7/2/5 9/4/93	COORDINATES:	DATE: 8-25-93	
ELEVATION: 11230	GWL: Depth Date/Time	DATE STARTED: 8-25-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-26-93	
DRILLING METHODS: AUGER HOLLOWSTEM		PAGE 1 OF 5	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	073513 0840 8-25-93	8	6	VERY STIFF, VERY DARK GRAYISH BROWN (10YR 3/2) SILTY CLAY WITH ROOTLETS, MED PLASTICITY, SOME MED. GRAVEL, MOIST	CL	3.0	MICROTIP = 0.0 ppm BZ = 280 cpm
1.0	073514 0840 8-25-93	9	6	VERY STIFF, DARK GRAYISH BROWN (10YR 4/2), SILTY CLAY WITH ROOTLETS AND TRACE OF MED GRAVEL, MED PLASTICITY MOIST	CL	4.0	
1.5	073515 0840 8-25-93	13	3	SAA	CL	1.5	
2.0	073516 0845 8-25-93	10	6	STIFF, DARK GRAY (2.5Y 4/1) SILTY CLAY WITH ROOTLETS, MOD PLASTICITY, SLIGHTLY MOIST	CL	1.25	MICROTIP = 0.0 ppm BZ = 150 cpm
2.5	073517 0845 8-25-93	15	6	SAA	CL	2.0	
3.0	073518 0845 8-25-93	15	6	STIFF, GRAY (2.5Y 5/1) SILTY CLAY WITH ROOTLETS AND TRACE OF SAND, MED. PLASTICITY, SLIGHTLY MOIST	CL	1.5	
3.5	073519 0855 8-25-93	10	6	SAA MOTTLED WITH (5Y 7/8) YELLOW	CL	1.5	MICROTIP = 0.0 ppm BZ = 120 cpm
4.0	073520 0855 8-25-93	10	6	STIFF, GRAY (2.5Y 5/1) SILTY CLAY WITH GASTROPODS, MED TO LOW PLASTIC SLIGHTLY MOIST	CL	1.0	
4.5	073521 0855 8-25-93	8	3	STIFF, GRAY (2.5Y 4/1) ~~CLAYEY SILT~~ SILTY CLAY WITH GASTROPODS, LOW PLASTICITY, SLIGHTLY MOIST, MOTTLED W/ LIGHT OLIVE BROWN (2.5Y 5/6) (FE STAIN)	ML ~~CL~~ CL	1.0	
	073522 0910 8-25-93	10	6	SAA	CL ~~ML~~	1.0	MICROTIP = 0.0 ppm BZ = 140 cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : ACKER AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable
Background =
MT = 0.0 ppm
BZ = 120 cpm

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

0284

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FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 5A 03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MW # 7124 4-1-93	COORDINATES:	DATE: 8-25-93	
ELEVATION: 11230	GWL: Depth Date/Time	DATE STARTED: 8-25-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-26-93	
DRILLING METHODS: AUGER (HOLLOWSTEM)		PAGE 2 OF 5	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	073523 0910 8-25-93	5	3	SAA	CL ~~MH~~ PR 8-25-93	1.0	SEE PREVIOUS PAGE
6.0	073524 NA 8-25-93	4	0	NO RECOVERY	NA	NA	
6.5	073525 0920 8-25-93	4	6	SAA	CL	1.25	MICROTIP = 0.0 PPM BG = 120 CPM
7.0	073526 0920 8-25-93	4	6	SAA	CL	1.25	
7.5	073527 0920 8-25-93	4	6	~~SOFT~~ PR 8-25-93 LOOSE, GRAY (2.5Y 5/1) SILTY SAND WITH SOME CLAY, TRACE OF MED. GRAVEL, WET	SM	NA	
8.0	073528 0940 8-25-93	7	6	SAA	SM	NA	MICROTIP = 0.0 PPM BG = 120 CPM
8.5	073529 0940 8-25-93	8	3	STIFF, LIGHT OLIVE BROWN (2.5Y 5/6) SAND CLAY WITH TRACE OF SILT, LOW PLASTICITY, MOIST	CL	1.25	
9.0	073530 0940 8-25-93	11	0	NO RECOVERY	NA	NA	
9.5	073531 0950 8-25-93	4	6	SAME AS 8.0-8.5 FT	CL	0.5	MICROTIP = 0.0 PPM BG = 120 CPM
	073532 0950 8-25-93	5	6	SAA VERY MOIST	CL	0.5	

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : ACKER AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
MT = 0.0 ppm
BG = 120 cpm

* Samples collected per ASTM Standard Penetration Test.
• All colors identified by the Munsell Color Chart.

402-11-86

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 PHASE I		
BORING NUMBER: MW# 11218 97-93	COORDINATES:	DATE: 8-25-93	
ELEVATION: 11230	GWL: Depth Date/Time	DATE STARTED: 8-25-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 8-26-93	
DRILLING METHODS: AUGER (HOLLOWSTEM)		PAGE 3 OF 5	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	073533 0950 8-25-93	5	4	LOOSE, LIGHT OLIVE BROWN (2.5Y 5/6) SILTY SAND, WITH SOME CLAY, (POORLY GRADED FINE SAND), DRY TO MOIST WET	SM	NA	SEE PREVIOUS PAGE
11.0	073534 0955 8-25-93	8	6	SAA SILT LAMINATIONS WET	SM	NA	MICROTIP = 0.0 PPM BG = 120 CPM
11.5	073535 0955 8-25-93	7	6	SAA WET	SM	NA	
12.0	073536 0955 8-25-93	6	4	SOFT, GRAY (2.5Y 6/1), SILTY CLAY WITH TRACE OF SAND, MED. PLASTIC, WET TO VERY MOIST	CL	0.5	
				(TOTAL DEPTH 12.0 FT)			MICROTIP = PPM BG = CPM
							MICROTIP = PPM BG = CPM

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: ACKER AUGER
Driller: JOE RAAB
Helper: JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background =
MT = 0.0 PPM
BG = 120 CPM

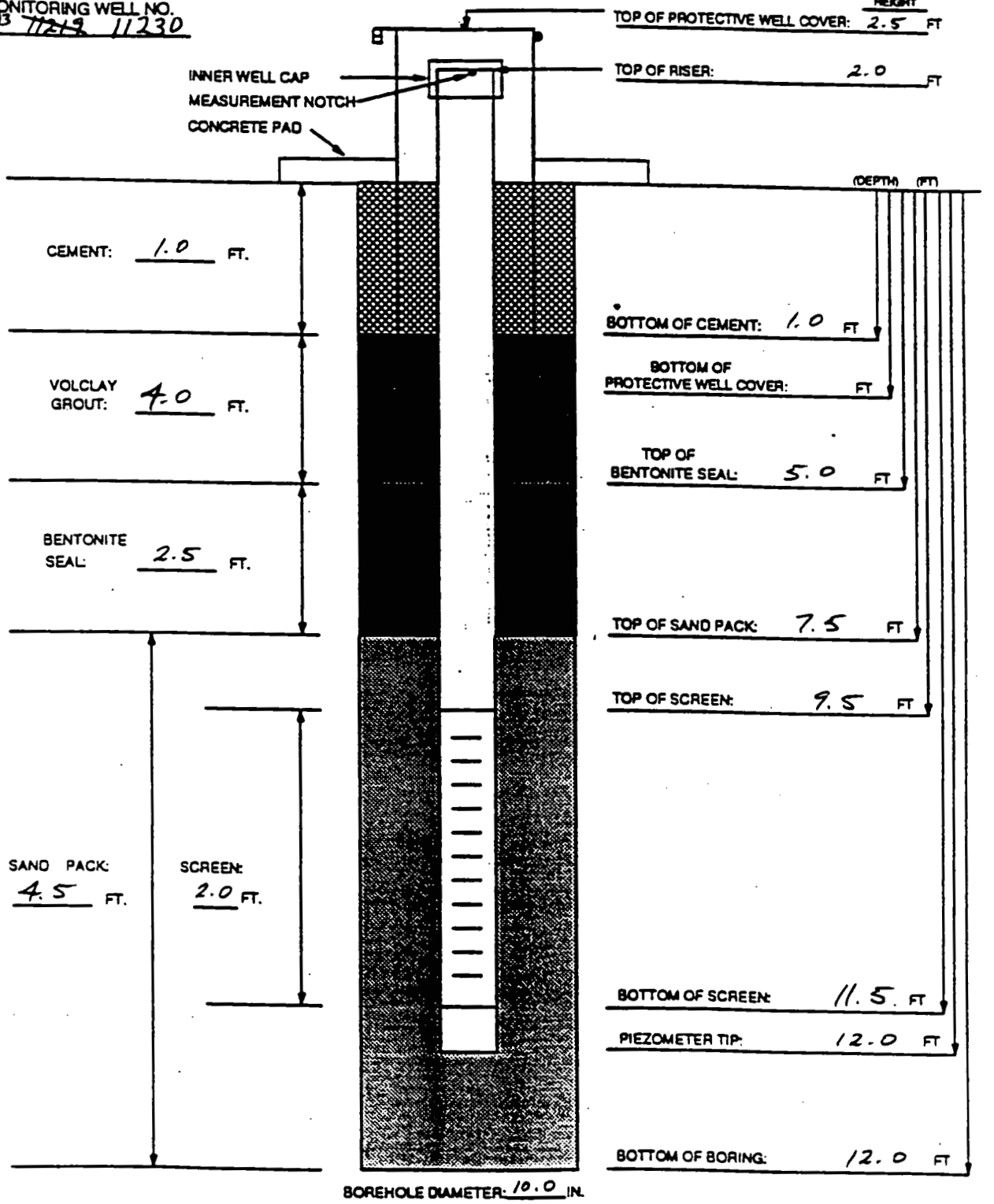
* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-66

-4916-

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4-1-93 11219 11230

INSTALLATION DATE: 8-26-93



MATERIALS USED

SAND TYPE AND QUANTITY: #7 5 BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 1 BUCKET
BAGS OF VOLCLAY GROUT: 1 BAG
AMOUNT OF CEMENT: 6 BAGS
AMOUNT OF WATER USED: 25 GALLONS
OTHER: 1-2FT SCREEN, 1-10FT RISER, 1-2FT RISER
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.10 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 8/26/93 FT/ 7.5 FT
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

0297

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2164

RI/FS

PIEZOMETER INSTALLATION SHEET

-4916

PROJECT NAME CRUS PHASE I
FIELD ENG./GEO. RILEY
DATE 8-26-
PROJECT NO. 50.03.22
CHECKED BY
DATE
BORING NO. ~~11219~~ 9-1-93 ~~AR~~ 11230
PIEZOMETER NO. ~~11219~~ 9-1-93 ~~AR~~ 11230
DATE OF INSTALLATION 8-26-93

BOREHOLE DRILLING

DRILLING METHOD AUGER (HOLLOWSTEM)
TYPE OF BIT AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 4.0 IN
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010
TOTAL PERFORATED AREA 2.0 FEET
RISER PIPE MATERIAL 316 STAINLESS
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 1-10 FT, 1-2 FT
JOINING METHOD SCREW-TYPE FLUSH JOINT

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 IN
OTHER PROTECTION HINGED WELL COVER WITH PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	+ 2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	- 2.5			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 5.0	TOP	BOTTOM
BENTONITE	TOP 5.0	BOTTOM 7.5	TOP	BOTTOM
SAND	TOP 7.5	BOTTOM 12.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 9.5	BOTTOM 11.5	TOP	BOTTOM
PIEZOMETER TIP	12.0			
BOTTOM OF BOREHOLE	12.0			
GWL AFTER INSTALLATION	7.5			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS 50.03.22, 1-2 FT SCREEN, 1-10 FT, 1-2 FT RISER

0298

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth — Date/Time —	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth — Date/Time —	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
							MICROTIP = ppm BZ = cpm
							MICROTIP = ppm BZ = cpm
							MICROTIP = ppm BZ = cpm
							MICROTIP = ppm BZ = cpm

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment :
Driller :
Helper :

SAA = Same As Above
N/A = Not Applicable

Background =

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

0299

221

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	[illegible]	[illegible]	[illegible]	[illegible]	CL	[illegible]	SEE PREVIOUS PAGE
	[illegible]	[illegible]	[illegible]	SAA	CL	[illegible]	
	[illegible]	[illegible]	[illegible]	SAA	CL	3.0	MICROTIP = [illegible] ppm BY = [illegible] ppm
	[illegible]	[illegible]	[illegible]	SAA	CL	3.0	
	[illegible]	[illegible]	[illegible]	SAA	CL	3.0	
	[illegible]		[illegible]	SAA	CL	2.0	MICROTIP = 0.0 ppm BY = 15 ppm
	[illegible]		[illegible]	SAA	CL	2.0	
				NO RECOVERY		2.0	
	[illegible]	[illegible]	[illegible]	SAA - [illegible]	CL	[illegible]	MICROTIP = 0.0 ppm BY = 150 ppm
	[illegible]	[illegible]	[illegible]	SAA	CL	2.5	

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: [illegible]
Driller: [illegible]
Helper: [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 150

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4916

PROJECT NUMBER:	PROJECT NAME:		
BORING NUMBER:	COORDINATES:		DATE:
ELEVATION:	GWL. Depth — Date/Time		DATE STARTED:
ENGINEER/GEOLOGIST	Depth — Date/Time		DATE COMPLETED:
DRILLING METHODS:			PAGE OF

DEPTH	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY	DESCRIPTION	USCS SYMBOL	PID/HNU CONTENTS (PPM)	REMARKS
							SEE PREVIOUS PAGE
				SAA			
				SAA			
				SAA some coarse gravel			
				SAA			
				SAA			
				SAA			
				SAA			

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Mobile B-61
Driller: [illegible]
Helper: [illegible]

SAA = Same As Above
N/A = Not Applicable
Background = 140

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

-4916

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: [illegible]	PROJECT NAME: [illegible]		
BORING NUMBER: [illegible]	COORDINATES:		DATE: [illegible]
ELEVATION: [illegible]	GWL: Depth [illegible]	Date/Time [illegible]	DATE STARTED: [illegible]
ENGINEER/GEOLOGIST [illegible]	Depth [illegible]	Date/Time [illegible]	DATE COMPLETED:
DRILLING METHODS [illegible]			PAGE [illegible] OF

DEPTH	SAMPLE	METHOD OF SAMPLE	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	MICROTIP = [illegible] ppm BZ = [illegible] cpm
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	
120	[illegible]	5	[illegible]	[illegible]	CL	1.0	MICROTIP = [illegible] ppm BZ = 150 cpm
125	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	
130	[illegible]	[illegible]		No recovery	CL	1.0	
135	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	MICROTIP = [illegible] ppm BZ = 150 cpm
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	
145	[illegible]	[illegible]	[illegible]	[illegible]	CL	1.0	
							MICROTIP = [illegible] ppm BZ = [illegible] cpm

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : [illegible]
Driller : [illegible]
Helper : [illegible]

SAA = Same As Above
N/A = Not Applicable

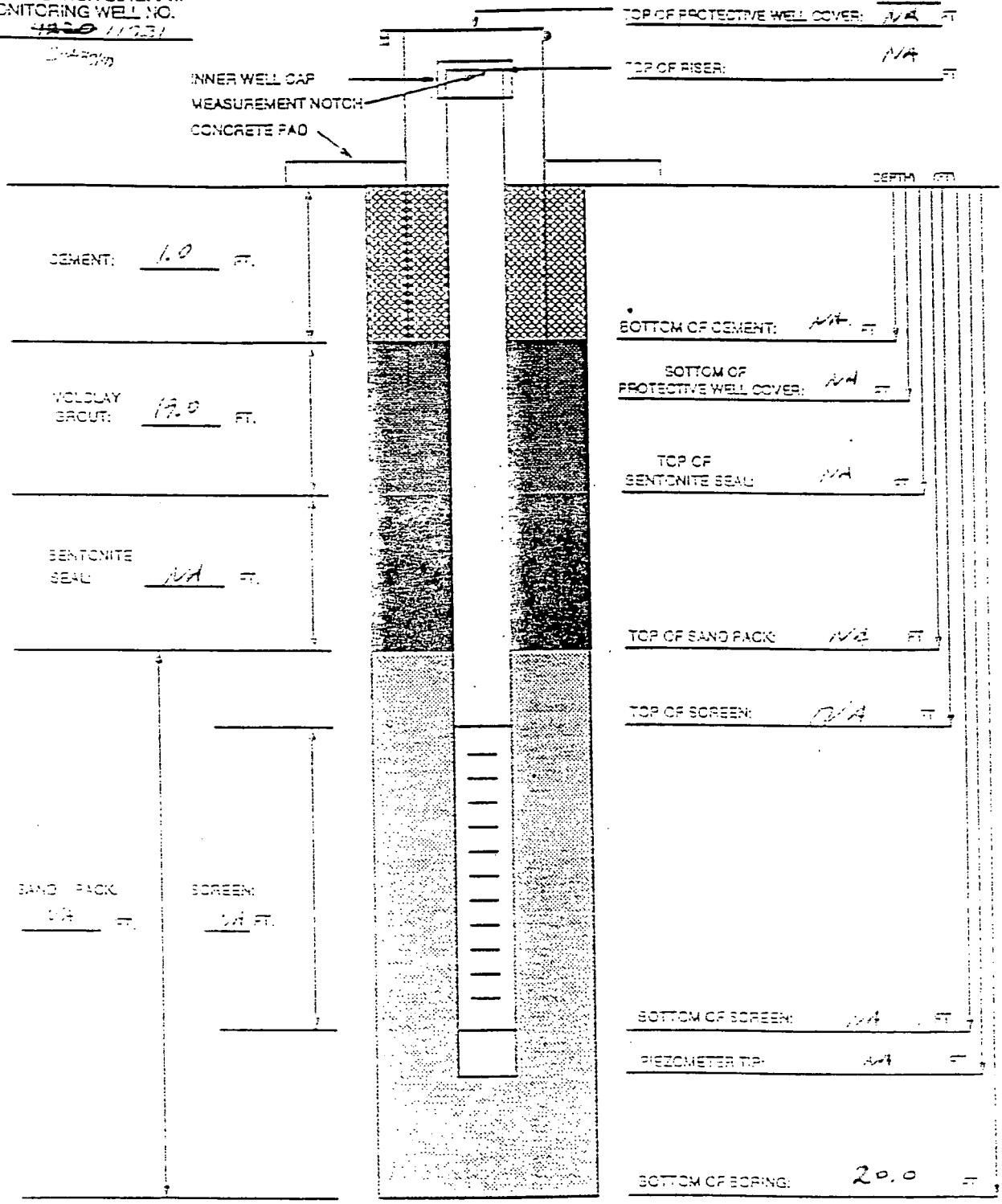
Background = 150 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4220 / 11231
Diagram

INSTALLATION DATE: 8-27-93

	HEIGHT
TOP OF PROTECTIVE WELL COVER:	NA FT
TOP OF RISER:	NA FT



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY:	NA
BENTONITE PELLETS (5-GALLON BUCKETS):	NA
BAGS OF HOLDLAY GROUT:	7 BAGS
AMOUNT OF CEMENT:	2 [illegible]
AMOUNT OF WATER USED:	25 GALLONS
DRILLER:	NA ~~[illegible]~~ 8-27-93
TASK:	50.03.22

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

0303

RMFS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME: CRU 5 ADDITIONAL WELLS
PROJECT NO.: 50.03.22
BORING NO.: [illegible]
PIEZOMETER NO.: NA
FIELD ENG./GEO.: RILEY FOR [illegible] DATE: 8-27-[illegible]
CHECKED BY: DATE:
DATE OF INSTALLATION: 8-27-93

BOREHOLE DRILLING

DRILLING METHOD: AUGER HOLLOW STEM
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT: AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION: GROUTED UP TO 1.0 FT
CONCRETE PLUG TO 0.0 FEET

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

THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
DENSITY/WATER TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

0304

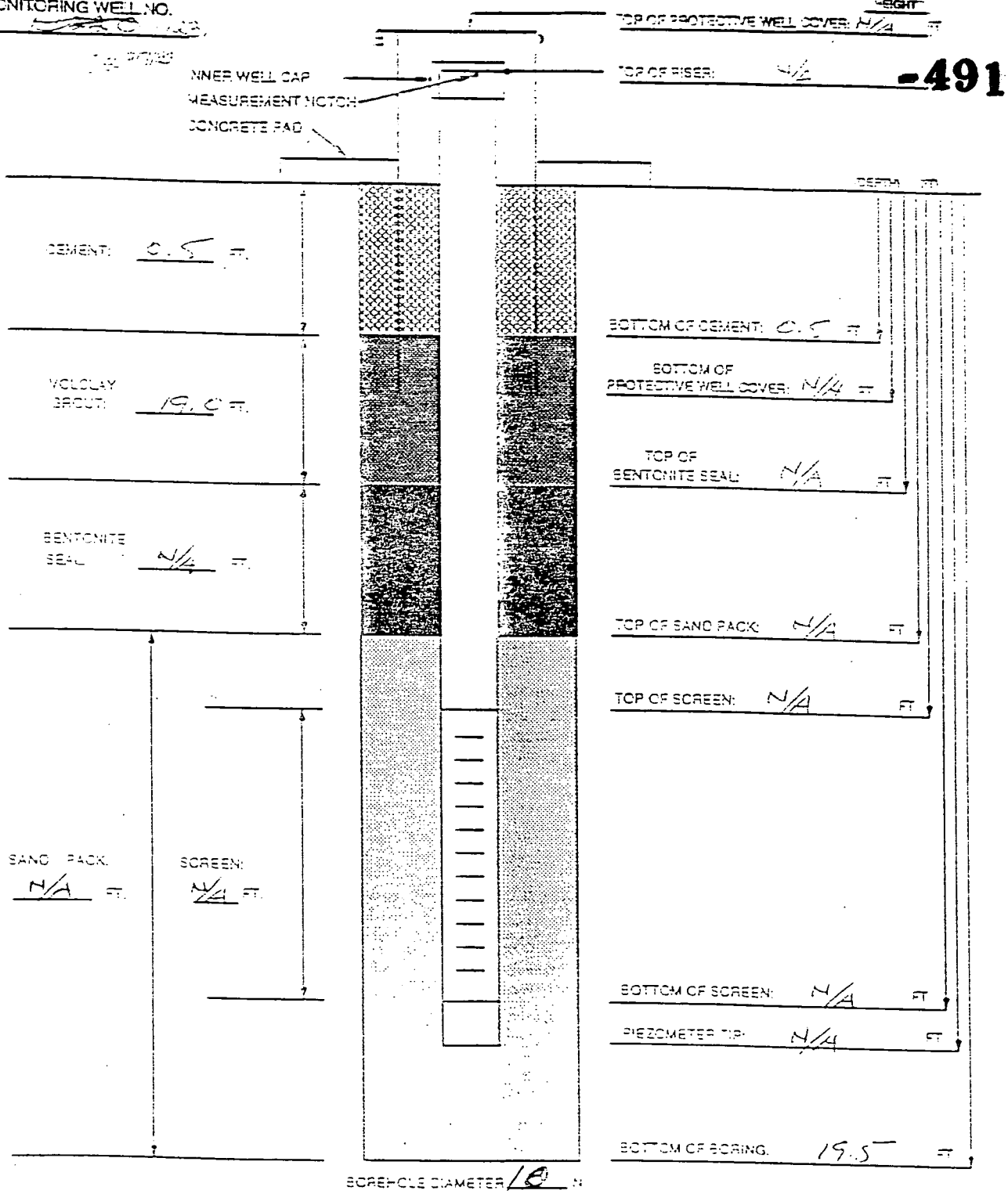
REMARKS:
GROUTED UP TO 1.0 FEET, CONCRETE PLUG TO 0.0 FEET
FOR BOB GALBRAITH
COMPLETED BY T. TONKIN

2/26

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

INSTALLATION DATE: 08-26-93

-4916



MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS OR GALLON EQUIVALENT: N/A
TYPE OF VOLCLAY GROUT: 4
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED:
OTHER: N/A
DATE: 08-03-93

NOTES

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS
2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH N/A IN. SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CAS NO HAS A PROTECTIVE COVER WITH PADLOCK

SEALED BY: Kenkin

RI/FS

PIEZOMETER INSTALLATION SHEET -4916

PROJECT NAME Miami River Aquifer Test well/piez installation FIELD ENG./GEO. Tony Kirk DATE [illegible]
PROJECT NO. 50.03 32 CHECKED BY DATE
BORING NO. [illegible] 1121
PIEZOMETER NO. N/A DATE OF INSTALLATION [illegible]

BOREHOLE DRILLING

DRILLING METHOD hollow stem auger TYPE OF BIT auger
DRILLING FLUID(S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A
RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (—)	
TOP OF RISER PIPE	N/A		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	N/A		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.5	BOTTOM 19.5	TOP N/A	BOTTOM N/A
~~BENTONITE~~ cement	TOP 0.0	BOTTOM 0.5	TOP N/A	BOTTOM N/A
SAND	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	N/A		N/A	
BOTTOM OF BOREHOLE	19.5		N/A	
GWL AFTER INSTALLATION	N/A		N/A	

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