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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 MAY 31, 1993

06/20/93

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REPORT

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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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 May 1 through May 31, 1993, and planned actions for the period June 1 through June 30, 1993.

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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 May 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
- RA No. 29, Temporary Nitrate Storage Tanks
- RA No. 30, Sewage Treatment Plant Incinerator

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REMOVAL ACTIONS

RA No. 1, Contaminated Water Under FEMP Buildings

Pumping at all Plants and treatment of perched groundwater was discontinued during May due to the Uranyl Nitrate Hexahydrate (UNH) incident of April 27 and the subsequent shutdown of all Plant 8 operations.

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

The Work Plan for Part 1, Alternate Water Supply for two industrial users (Albright & Wilson Americas [AWA] and Delta Steel) was approved by the U.S. EPA on January 3, 1991. Subsequently, Delta Steel was deleted from the current scope of the project with approval of the U.S. EPA and the Ohio EPA. The Delta Steel hookup will be delayed until the planned public water supply can service the facility. A revised Work Plan (Revision 1) was prepared and issued to the EPAs to reflect this and other changes which have occurred. A summary of the most recent and ongoing activities for Part 1 are listed below:

Construction and initial operability testing was completed in December 1992. The 60-day initial testing period began on March 24, 1993 and was completed on May 24, 1993. The system is operating satisfactorily. Provisions are being made to turn possession of the system over to AWA.

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)

Construction of the test well located at Recovery Well No. 4 and piezometers was completed. The South Plume step-down pump test was successfully performed on May 18. This test was important to establish the optimum pumping rate for the constant rate test. The step drawdown test was pumped at five successively higher rates: 200, 275, 350, 425 and 575 gpm. A subsequent 725 gpm rate caused pumping failure. The pumping rates were recorded in the test well, filter pack and primary observation wells using the pressure transducers linked to the hermit data logger. A seven-day background data collection period commenced after completion of the step drawdown test. DOE-FN, the Ohio EPA, the U.S. EPA (via teleconference), FERMCO and Parsons met on May 24 to discuss the rate for the constant rate pump test.

The South Plume pump test began on May 25, 1993, at a constant flow rate of 425 gpm. The pump test is necessary to set screened intervals of the recovery wells, for setting initial pumping rate for the recovery system and for recalibration of the groundwater flow model. The activities associated with this test are essential to meeting the August 28, 1993, hydraulic barrier pump and discharge system operation commitment required by the 1990 Amended Consent Agreement with the U.S. EPA. The pump test effluent was being routed through the recently installed aeration tank prior to being discharged by gravity into the Great Miami River. It was decided that the pumps and blowers would be turned on only if the concentration of dissolved oxygen in the total site effluent discharge was not adequate with respect to the NPDES standards. Throughout the drawdown test, the dissolved oxygen levels in combined effluent remained greater than 5 ppm and therefore the pumps and blower were not used. Dissolved oxygen was monitored at the partial flume located downstream of the aeration tank and tie-in of the MH 175 discharge.

Installation of the roadway and the 20" pipeline work continue toward Recovery Well No. 2. The control valve building for recovery wells is 85% complete. Construction on valve pit Recovery Well No. 5 continues.

Part 3

The Work Plan for Parts 2 and 3 was prepared as one document. The plan entails the installation and operation of 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

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REMOVAL ACTIONS

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

(IAWWT[SWRB]) 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 (IAWWT[BDN-ETS]) has a nominal capacity of 100 gpm. Current activities are described below.

IAWWT(SWRB) Unit

The resin beds experienced excessive headlosses due to surface plugging by suspended solids passing through the upstream filers. As a result, sluicing and recharging with fresh resin of the IAWWT(SWRB) was completed for two of the three ion exchange vessels in both the north trailer and subsequently the south trailers. Both the north and the south trailers were operated for a combined flow of 300 gpm for several hours before the filters plugged. The filter elements were subsequently changed out, and the system was restarted. The second set of filters lasted approximately three hours prior to plugging. Due to a lack of cartridge filter availability, both trailers were shut down on May 15. A decision was made to install sand filters upstream of the existing filters because of the problems experienced. This equipment will be installed in the building being planned for installation of the supplemental project discussed hereinafter.

IAWWT(BDN-ETS) Unit

Replacement ion exchangers were placed on order. Sand filter system to be placed on order the week of June 1. Construction is expected to start at the beginning of July.

Part 4

Part 4 of the South Groundwater Contamination Plume Removal Action Work Plan involves groundwater monitoring and institutional controls.

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

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REMOVAL ACTIONS

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

Part 5

Part 5 was added to the South Plume in order to address the relocation of the Part 2 well field. It includes groundwater modeling and geochemical investigation of the area south of the well field to determine if 20 ppb uranium concentration in groundwater is present downgradient of the Part 2 well field.

The South Plume Groundwater Modeling Report was revised to address the U.S. and Ohio EPA comments.

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; Phase II - two traverse lines of monitoring wells with corresponding hydropunch sampling north and south of the proposed recovery well field; Phase III - seven piezometers clustered near proposed extraction well R-4; and Phase IV - soil vapor sampling.

Phase I was completed on August 25, 1992. Only one hydropunch sample exceeded 20 ppb uranium.

Phase II, installation of the twelve wells, was started in late March 1993. Three 2000-series wells (the primary wells) and one 3000-series well were installed prior to the Part 2D Pump Test. The remaining wells continue to be installed.

Phase III: 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. Samples from these piezometers were taken to determine the vertical extent of the uranium contamination within the aquifer. During the pump test, data loggers obtained information to test the proposed well field's vertical pumping influence as proposed in the Design, Monitoring, and Evaluation Program Plan. After all uranium data is collected from Phases I, II, and III, a summary report of the 20 ppb isopleth will be prepared.

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REMOVAL ACTIONS

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. A meeting between DOE and EPA was held on January 7, 1993. Disapproval with comments was received from the U.S. EPA on February 12, 1993. The U.S. EPA comments are currently being addressed. 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

Removal of the liquid from the K-65 Decant Sump Tank was completed 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.

The tank has been accumulating liquid since it was emptied in 1991. Upon reaching approximately 80% of its capacity, repumping was required. On January 22, 1993, a maintenance action was initiated to pump the contents of the tank. On February 2, 1993, the action was completed with the removal of approximately 8,000 gallons of liquid from the tank. The liquid is presently awaiting the results of laboratory analysis, which will allow treatment and disposal of the liquid. On February 8, 1993, a measurement of the K-65 Decant Sump Tank was conducted. The results indicate that approximately three feet of sludge and liquid remains in the tank; this is approximately 500 gallons of liquid. Ongoing activities include monitoring the liquid level and implementing maintenance actions as required. Per requirements of the Work Plan, Operable Unit 4 will advise DOE-FN when pumping operations are to resume.

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 phases. Phase I, which implements the run-on/off control measures, is complete. Phase II addresses the installation of 80,000 square feet of a newly covered and controlled concrete storage pad. Phase III involves activities to upgrade the remaining 375,000 square feet of the existing Plant 1 storage pad. Phase 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, 22,000 square feet of the Phase III work area will be enclosed beneath a tension support structure.

Drum movements, which began in January 1993, continued and are due to be completed by July 20, 1993. The drum movements are required to clear areas for construction. The revised drawings and specifications have been reviewed and approved. The Certified for Construction bid package was sent out to prospective bidders on May 24, 1993. A pre-bid meeting with the contractors will be held June 3; bids will be due June 18, 1993.

KEY MILESTONES	STATUS	DUE DATE
Complete Phase III	Open, behind schedule	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 May 1993, 6,081 drum equivalents (DEs) of low-level waste (LLW) were dispositioned. Repackaging material has reduced volume shipped to the Nevada Test Site (NTS) by 2,931 DEs year-to-date. The FY1993 goal is to dispose of 67,000 DEs of LLW at the NTS and 50,000 DEs of LLW through subcontractors.

DOE-NV completed the review and approval of the SEG compaction process. Approval to ship residues from SEG to the NTS was received May 28, 1993. The first shipment of compacted residue from SEG to NTS was May 29, 1993.

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REMOVAL ACTIONS

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

Waste shipping activities for June will include residue shipments from the FEMP to the NTS direct and through SEG. DOE-NV review and approval of the SEG Addendum to the FEMP Application to Ship Waste to the Nevada Test Site, Revision 4.2. Two additional waste streams for thorium, one for asbestos containing material, and one for slag from SEG metal melt operations will be developed and submitted for DOE-NV approval as part of the FEMP Application to Ship Waste to the Nevada Test Site, Revision 5.

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

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 ongoing shutdown activities that will remove uranium and other process/raw materials from equipment and pipe lines in areas of formerly used processing equipment and will properly disposition the removed materials off site.

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

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

Equipment and Material Assessments (formerly Preliminary Assessments) are continuing. Field evaluations of Plants 1, 7, and 8 have been completed. The field evaluation of Plants 4 and 9 are in process.

The status of the capital and expense items in the equipment disposition program remains unchanged since last month. Efforts continue to be focused on developing a task order system to identify hold-up materials in equipment and track the removal of this material.

The following is the status of expense items: 2,878 expense items are currently in the data base; 1,411 have been field verified, 578 are on a "shopping list" to ascertain on-site use, 1,042 have been transferred to Maintenance, and 110 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 1,694 total number of items, 1,195 have been put on AC-563 Forms to be excessed, and 499 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 ten maintenance work orders to isolate and disconnect all utilities/energy sources from equipment not in use have been prepared. Of these, 155 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.

Negotiations between the Army and NTS on the permit application for the of 4A Metal Removal Project, Phase II (shipment of rolled scrap to the NTS) continued during May. An Army representative was on site May 12 for a program review; it was decided at that time to initiate a meeting with NTS early in June to discuss the options for disposition of this material (the Army continues to negotiate their own permit or FERMCO adds the rolled scrap as another waste stream on their permit). Meanwhile, prepackaging of the materials continued. To date, over 396 Nucfil vents have been installed and 178 white metal boxes packaged of the projected 328 total for the project. The availability of white metal boxes may impede the progress of this task. They have been ordered, but only small quantities have been received.

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REMOVAL ACTIONS

RA No. 12, Safe Shutdown (continued)

The Safety Assessment covering Safe Shutdown field activities was approved May 18, 1993. This will allow Safe Shutdown to begin processing task orders for implementation. Exempt from the Safety Assessment are the Plant 1 storage area of enriched materials greater than 2% U_{235} and Plants 2/3. These areas will be addressed by a separate Safety Assessment or an addendum to the approved one. The Risk Assessment was also approved May 18, and the Risk Management Plan is expected to be approved in June. Initial work on an Operational Readiness Review for the field activities was begun in May.

The Categorical Exclusion covering removal of hold-up materials and high-level cleaning was approved May 10, 1993, for a portion of the plants.

Requests for Proposals (RFP) SD-417 for the sale of normal and enriched uranium, continue to be reviewed by Westinghouse Hanford Company, which has assumed management of the sale. Bids on RFP for the sale of depleted uranium, SD-416, for depleted uranium, were received May 11 and evaluation is ongoing. Throughout the review process, the status of the evaluation cannot be discussed.

Planned activities for June include continuing packaging of the Army materials for off-site shipment as the availability of white metal boxes allows; continuing to follow the progress on the sale of uranium; continuing to issue work orders for utility isolation work; continuing reconciliation of the Safe Shutdown data base; pursuing completion of the Risk Management Plan and Operational Readiness Review; and commencing issuance of task orders to develop implementing plans for removal of hold-up inventories from process equipment.

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.

May activities included the removal of the catwalks from the top of the concrete silos; size reduction of the steel removed from the concrete silos will begin in June. The installation of cover over the UNH tanks began in May and will be completed in June.

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REMOVAL ACTIONS

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

The Size Reduction Building (SRB) arrived on site May 26, 1993. June activities will include initiating the installation of the SRB and the Gantry Crane.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, ahead of schedule.	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. 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, containerization, and storage/disposal of the materials.

The comment-responses were submitted to the EPAs on May 14. Removal of contaminated soil began north of the sewage treatment plant on March 1. Survey maps showing sample locations have been revised to include additional information and to present data in a more readable format. The initial 187 white metal boxes from Phase II have been sampled for RCRA determination. The sampling for Hazardous Substance List materials will be completed when lab capacity is available. A new license agreement with the property owner adjacent to the Sewage Treatment Plant was signed May 21. This will allow FEMP personnel access to the property for additional sampling, remediation of any discovered contamination, and restoration of the property.

June activities will include laying out grids for additional off-property sampling, sampling of the off-property soils and obtaining a RCRA determination for the 187 white metal boxes from Phase II.

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REMOVAL ACTIONS

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

KEY MILESTONES	STATUS	DUE DATE
Phase III - Completion of off-property excavation	Additional sampling to determine boundary of contamination	To Be Determined Based on Sampling Results
Phase IV - Submit Final Report	Open	To Be Determined

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 17.5 tons of non-ferrous metal has been shipped to Quadrex and 751 tons of ferrous metal has been shipped to SEG.

The pre-proposal meeting for the Phase IIB subcontract was held on March 18. The due date for bids is June 9, 1993.

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REMOVAL ACTIONS

RA No. 15, Scrap Metal Piles (continued)

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

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

The scope of this removal action is to collect the remaining stormwater runoff from the perimeter of the 136 acre former production area that currently discharges to Paddy's Run and divert it through the existing storm sewer system to the Storm Water Retention Basin. Construction is ongoing along the north perimeter fence; 1,932 linear feet of the 4,000 feet trench drain has been completed, plus 410 feet of bottom. Installation of catch basins 206 and 207 are complete.

Future work on this removal action includes continuation of construction work.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, on schedule	August 30, 1993

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REMOVAL ACTIONS

RA No. 17, Improved Storage of Soil and Debris

This removal action will include the management and appropriate 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. The activities in this Removal Action will include characterization, interim storage, and management of the contaminated soil and debris materials until final remediation under Operable Unit 3.

The sampling of the Third Street Dirt Pile for RCRA characterization was completed on April 26, 1993. May accomplishments included the approval of the Safety Assessment on May 11, 1993. Review comments were submitted to Parsons on the 90% design of all RA No. 17 Phase I structures on May 26, 1993.

June activities will include the resubmittal of the Request for Exemption for installing automatic fire protection systems in tension support structures. The Proposed Plan is scheduled to go to DOE-HQ on June 2; this document will include sections to provide an Environmental Assessment for the Central Storage Facility, which is part of RA No. 17 scope.

RA No. 18, Control Exposed Material in Pit 5

Removal of the exposed material was completed in December 1992. The design package and work plan called out for the existing Waste Pit 5 dikes to be raised in certain areas by 3 inches to meet the designed elevation of 590.25 feet. The addition of fill material and sodding was postponed until spring due to weather.

During the time frame from December until May, rainfall has been such that the existing grass cover on the dike has substantially increased. Visual inspections could not reveal the low spots due to the increased grass cover. A survey was performed to establish the affected areas. The areas needing the 3 inch fill were the most inaccessible.

Based on the survey data and the present grassed condition of the Waste Pit 5 berm, it was decided to accept the berm as is. All parties agreed more damage would be caused by the effort than results gained.

Monitoring of the berms will continue.

This Removal Action is now complete.

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REMOVAL ACTIONS

RA No. 19, Plant 7 Dismantling

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

The Removal Action Work Plan was submitted to the U.S. EPA on April 20. Ohio and U.S. EPA comments were received on May 19 and June 1, 1993, respectively.

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

Processing remains on hold pending a Class B investigation of an incident that occurred on April 27.

RA No. 21, Expedited Silo 3

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

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REMOVAL ACTIONS

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.

During May construction continued. FERMCO Engineering is providing Title III support for this project. Minor changes to the design package have been approved by Operable Unit 1 Engineering and documented by an internal Construction Change Notice. These changes will be reflected on the "as built" drawings. Ditches "B" and "D" are virtually complete with work progressing on Ditch "C," south of Waste Pit 4.

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 actively 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.

The eighth pump-out of the sump occurred on May 20, 1993, removing 190 gallons. To date, approximately 1,245 gallons have been removed. The final Removal Action Work Plan/Closure Plan Information and Data package was delivered to DOE-FN on April 6, 1993, for submittal to U.S. and Ohio EPA. Analytical reports for samples of the sump liquids taken thus far were submitted to DOE-FN on April 1, 1993. Analytical reports for subsequent sampling of pumped liquids should be available by mid-July.

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REMOVAL ACTIONS

RA No. 24, Pilot Plant Sump (continued)

The detailed schedule for the removal is being prepared. The removal is expected to occur between June and mid-July. Bids are being sought from contractors to perform the internal inspection of the drain line.

RA No. 25, Nitric Acid Tank Car and Area

The Nitric Acid Rail Car is 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 removal of residual contents from the tank car followed by decontamination and dispositioning of the tank car.

A revised Work Plan was submitted to the EPAs on January 28, 1993. Ohio EPA conditional approval was received on March 1 and U.S. EPA approval was received on March 8, 1993. The subcontractor prepared responses to EPA comments and revised affected pages to incorporate those comment-responses. A revised Removal Action Work Plan/Closure Plan Information and Data was submitted to the U.S. EPA and the Ohio EPA on April 16, 1993.

Field activities for the implementation of the removal action are scheduled to begin in June.

RA No. 26, Asbestos Removals (Asbestos Program)

This removal action documents ongoing 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.

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REMOVAL ACTIONS

RA No. 26, Asbestos Removals (Asbestos Program) (continued)

The April 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 will also provide generalizations of all abatement activities to date as well as planned abatement activities for the next year, including several large-scale abatement projects.

April activities included the submittal of the draft Work Procedures to DOE-FN on April 5 and the receipt of DOE-FN's comments on April 20. The Compendium is presently being reviewed by DOE-HQ. DOE-HQ comments are expected by June 11, 1993. June activities will include revision of the Work Procedures for submittal to the EPA. Field activities in asbestos material identification and abatement continue.

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

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

This removal action requires the submittal of the Engineering Evaluation/Cost Analysis (EE/CA) study to identify alternatives for managing contaminated structures; the documentation of the selection of a response(s) that will mitigate the potential threat to workers, the general public, and the environment associated with these structures; and addressing health and environmental impacts associated with the proposed action.

The Responsiveness Summary was completed and issued in March. This document included comments from the public received at the EE/CA Workshop held January 12, 1993, EPA comments, and responses to those comments.

The draft EE/CA was submitted to the EPAs on December 14, 1992. U.S. EPA conditional approval and comments were received January 19, 1993. Responses to EPA comments were submitted February 24. Revisions have been made to the EE/CA in accordance with comment responses. The final EE/CA will be re-issued to DOE by June 10, 1993.

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REMOVAL ACTIONS

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.

The Removal Site Evaluation for this removal action was completed in July 1992. Soil vapor testing was completed March 12, 1993.

The Removal Action Work Plan/Closure Plan Information and Data (RAWP/CPID) was submitted to DOE on April 20, 1993. DOE-FN and DOE-HQ comments were received May 17 and 21, respectively. June activities will include the incorporation of DOE comments and the submittal of the RAWP/CPID to the EPAs by June 30, 1993.

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

RA No. 29, Temporary Nitrate Storage Tanks

This removal action involves the field actions to empty and thoroughly cleanse the interior of the tanks followed by disposition of the materials. The water will be characterized, transferred and treated through the exiting water treatment facilities. The sludges will be characterized, drummed, and dispositioned appropriately. The liners will be cleaned and decontaminated as required and free-released.

A draft Removal Site Evaluation (RSE) was provided to the DOE-FN on March 15, 1993. Major revisions to the RSE have been made and sent to DOE on April 29, 1993. DOE issued an Action Memorandum to FERMCO on May 6, stating that a Removal Action is *not* warranted because the existing monitoring and water-level control procedures for the tanks are adequate. The restoration of this area will be addressed through the RI/FS process and subsequently during Remedial Design/Remedial Action. DOE issued a letter to the U.S. and Ohio EPAs on May 7 amending the list of Phase IV Removal Actions.

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REMOVAL ACTIONS

RA No. 29, Temporary Nitrate Storage Tanks (continued)

KEY MILESTONES	STATUS	DUE DATE
Submit draft Work Plan to EPA	No Longer Required	No Longer Required

RA No. 30, Sewage Treatment Plant Incinerator

This removal action involves the field activities to decontaminate and dismantle the incinerator and associated equipment. This work includes characterization and disposition of the wastes, containerization of equipment for shipment to NTS, removal and packaging of the transite for on-site storage, dismantling and monitoring of steel for free release, decontamination of removable contamination from the remaining slab, and decontamination of the work area.

A draft RSE was provided to DOE-FN on March 15, 1993. Major revisions to the RSE have been made and sent to DOE on April 29, 1993. DOE issued an Action Memorandum to FERMCO on May 6, stating that a Removal Action is *not* warranted. The soil contamination associated with the incinerator is being adequately addressed by RA No. 14, and radiological surveys confirm that the remaining contamination on the external surfaces of the incinerator is predominately "fixed" contamination. The incinerator is located within a controlled and posted radiological contamination area. The restoration of this area will be addressed through the RI/FS process and subsequently during Remedial Design/Remedial Action. DOE issued a letter to the U.S. and Ohio EPAs on May 7 amending the list of Phase IV Removal Actions.

KEY MILESTONES	STATUS	DUE DATE
Submit draft Work Plan to EPA	No Longer Required	No Longer Required

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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 the two treatment process options identified in the Operable Unit 1 Initial Screening of Alternatives document: cement stabilization and vitrification. The technical feasibility of these technologies will be evaluated by conducting a series of experiments on both composite waste samples and individual strata samples. Performance criteria, including formulation ranges, compressive strength, leachability, bulking factor, and permeability, will be investigated. 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 consists of 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 consists of testing on strata samples where available. Each phase contains two stages permitting additional reagent testing as necessary. An optional phase to evaluate waste form durability is also being considered.

Status:

Samples for durability testing are being generated for submission to the University of Cincinnati. Data validation is continuing. All other test work is complete.

Issues/Corrective Actions:

None to report.

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1.2 Remedial Investigation

Scope:

A RI Report will be prepared 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:

All of the sections of the RI have gone through technical review and comments are being incorporated. Sections 1 through 4 are being prepared by the individual section leads for DOE-HQ review on July 15. Fate and Transport and Risk Assessment sections will be submitted for DOE-HQ review on August 13 as per the revised schedule.

A presentation to the U.S. EPA will take place on July 7. The meeting will be a post-validation update on the interpretation of all data being incorporated into the RI report.

Issues\Corrective Actions:

None to report.

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

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1.3 Planned Activities for June 1993

- Treatability report will be initiated upon completion of data validation
- Validated data will be "frozen" for the purposes of inclusion into the RI Report on June 1
- Sections 1 through 4 being completed for final editing

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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:

The Remedial Investigation (RI) Report for Operable Unit 2 was submitted by DOE-FN 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 responses to those comments submitted by DOE-FN on February 7, 1993, a second phase of RI sampling and analysis is required for Operable Unit 2 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 Operable Unit 2 RI/FS. This Sampling and Analysis Plan has been prepared in accordance with CERCLA Guidance for Conducting Remedial Investigations and Feasibility Studies.

The draft RI/FS Work Plan Addendum for Operable Unit 2 was submitted to DOE-FN on March 3, 1993. The draft RI/FS Work Plan Addendum for Operable Unit 2 was transmitted to the EPAs on March 8, 1993. Pursuant to the informal dispute resolution process with the U.S. EPA, field investigations were initiated on March 16, 1993.

<u>South Field</u>

The Work Plan calls for the installation of three Type 1 and two Type 2 monitoring wells. The status of which is as follows:

- 1942 Groundwater sample collected May 1, 1993.

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

- 2943 Well development activities completed May 3, 1993; groundwater sample collected in May.
- 2944 Contingency well; may not be needed.
- 2945 The expanded Scope of Work included the completion of two Type 1 wells (1954 and 11085) and one Type 2 well (2954). Wells 1954 and 11085 were completed in May 1993. Well 2954 was initiated in May and is expected to be completed in June 1993. All three wells will be developed and sampled in June.

Hydropunch II Operations

The Work Plan Addendum calls for the installation of 11 Hydropunch II (HP) operations and subsequent groundwater sampling activities. HP11 was completed prior to the installation of Monitoring Well 1941. HP 11014 and 11015 were completed in March 1993. HP 11009, 11010, 11011, 11012, 11013, 11016, 11017, and 11018 were completed in April 1993. Groundwater samples were transported to the on-site FERMCO laboratory for Total Uranium analysis.

The expanded Scope of Work for the South Field included completion of an additional Hydropunch borings and associated medial sampling (11019, 11020, 11021, 11022, 11023, 11024, 11025, 11028, 11029, 11030, 11077, 11082, 11083, and 11084). Borings 11019,11020, 11021, 11022, 11023, 11024, 11025, 11028, and 11030 were completed in May 1993. Borings 11029, 11030, 11047, 11082, 11083, and 11084 will be completed in June 1993.

Surface Water and Sediments

The Work Plan Addendum required a total of four surface water and four sediment samples. Surface water and sediment samples were collected in March 1993 for SF-SW-01, SF-SD-01, SF-SW-02, SF-SD-02, SF-SW-03, and SF-SD-03. SF-SW-04 and SF-SD-04 were not collected; no surface water was encountered at these locations. The sediment samples were transported to the contract laboratory for full Hazardous Substance List (HSL), full radiological, and miscellaneous radiological parameter analyses. The surface

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

water samples were sent to the contract laboratory for full HSL, general groundwater quality, and full radiological analyses. In additional, a Total Uranium surface water sample was collected and sent to the FERMCO on-site laboratory for analysis.

Near Surface and Surface Soil Hand Borings

The Operable Unit 2 Work Plan Addendum required 21 near surface (0" to 6") and surface (6" to 12") hand borings be completed at planned locations. The same locations were used to install the auger soil borings. The hand borings were completed in April 1993 and sent to the contract laboratory for full HSL, full radiological, and miscellaneous radiological parameter analyses.

Soil Auger Borings

Borings 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, and 1978 were completed in April 1993. The boring depths ranged from approximately 10 feet to 35 feet based on the encountered thickness of the fill and glacial overburden. All samples were sent to the contract laboratory for full HSL, full radiological, geotechnical, and miscellaneous radiological parameter analyses.

Existing Monitoring Well Groundwater Sampling

Groundwater sampling and subsequent laboratory analysis is required for existing Monitoring Wells 2401, 1014, 2014, 1516, 1517, 1518, 1046, 2046, 1065, 2065, and 2085. Well 2014 was sampled in April 1993; Wells 2401, 1046, 2046, 1065, and 2065 were sampled in May. Sampling of wells 1014, 1516, 1517, and 1518 was attempted in May but the wells were dry. Well 2085 was not sampled but is expected to be sampled in June.

Geophysical Survey/Trenching Activities

Geophysical survey is required per the Work Plan Addendum. Subsequent anomalies will be identified and further investigated through trenching operations. Trenching activities were initiated in May and are expected to be completed in June 1993.

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

Solid Waste Landfill

The Work Plan Addendum requires the installation of three Type 1 and four Type 2 monitoring wells. The status well installation is as follows:

- 1947 Installation completed.
- 1950 Installation completed May 6, 1993. The well was set at approximately 20 feet with a 10-foot screen. Well development and groundwater sample collection will be completed in June 1993.
- 1952 Installation completed May 14, 1993. The well was set at approximately 20 feet with a 10-foot screen. Well development completed May 14, 1993.

Surface Soil Sampling

The Work Plan calls for 12 surface soil samples to be collected at predetermined locations. Surface soil samples SWL-SS-01 through SWL-SS-12 were completed in April 1993. Samples were transported to the contract laboratory for full HSL, full radiological, and miscellaneous radiological parameter analyses.

Surface Water and Sediment Sampling

Surface water and sediment sampling is required in two locations. Surface water and sediment sampling was completed in April 1993 at SWL-SW-01, SWL-SD-01, SWL-SW-02, and SWL-SD-02. The sediment samples were sent to the contract laboratory for full HSL, full radiological, and miscellaneous radiological parameter analyses. Surface water samples were sent to the contract laboratory for full HSL, full radiological, miscellaneous, and general groundwater quality parameter analysis. Samples for Total Uranium were sent to the FERMCO on-site laboratory for analysis.

Soil Auger Borings

The Work Plan Addendum required 12 soil auger borings be completed. Soil boring 1985 was completed and boring 1986 commenced in April 1993. Auger boring operations at location 1982, 1983, 1984, 1987 through 1993 were completed in May. Samples for

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

radiological and chemical parameters were sent to the contract laboratory for analysis. An additional six soil borings were requested in the expanded Scope of Work (11036 through 11041). All borings were completed in May. This activity is considered complete and will not be updated in future reports.

Existing Monitoring Wells Groundwater Sampling

Groundwater sampling and subsequent laboratory analysis on existing Monitoring Wells 1719, 2027, 1035, 1037, 2037, 1038, and 2052 was initiated in April 1993. Wells 2027, 2037, 1038, and 2052 were sampled in April; Well 1035 was sampled in May 1993. Sampling of wells 1719 and 1037 were attempted in May but were found to be dry.

Soil Gas Survey

Fifty soil gas survey points were completed in April 1993. Fourteen volatile organic compounds were encountered during the survey. The average readings for these was 25 ppm. Methane was encountered 29 times, with an average range detected of 1 ppm to 1000 ppm. Readings were achieved using a Foxboro OVA 128 (FID) meter with a methane probe. Offsite laboratory analyses pending; results will be reported in June 1993.

Inactive Flyash Pile

The Work Plan Addendum requires the installation of one Type 1 and one Type 2 Monitoring Wells. The status of the two monitoring wells is as follows:

- 1954 Installation completed May 13, 1993. The well was set at approximately 19 feet with a 10-foot screen. Well development has not yet been completed.

- 2955 Installation completed May 5, 1993. The well was set at approximately 70 feet with a 15-foot screen. Well development has not yet been completed May 21, 1993. Groundwater sample will be collected in June 1993.

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

Soil Auger Borings

Soil auger borings in five predetermined locations are to be installed under the requirements of the Work Plan Addendum. Borings 1996 and 1998 were completed in April 1993; borings 1994, 1995, and 1997 were completed in May. An additional 10 soil borings were identified in the expanded Scope of Work. (11048 through 11057). All borings, except 11050, were completed in May, boring 11050 will be completed in June.

Subsequent samples were sent to the contract laboratory for full HSL, full radiological, miscellaneous radiological, and various geotechnical parameter analyses. Certain samples were also sent to the FERMCO on-site laboratory for Total Uranium and Gamma Spectrometry.

Surface Soil Sampling

Surface soil sampling is required at 7 locations. IFP-SS-01 through IFP-SS-07 were completed in April 1993. Samples were sent to the contract laboratory for full HSL, full radiological, and miscellaneous radiological parameter analyses.

Surface Water and Sediment Samples

The Work Plan Addendum required the sampling of surface water and sediment media. Surface water and sediment samples were not taken at location IFP-SW-01 and IFP-SD-01; no surface water was encountered. IFP-SW-02, IFP-SD-02, IFP-SW-03, and IFP-SD-03 were collected in April 1993. The sediment samples were transported to the contract laboratory for full HSL, full radiological, and miscellaneous radiological parameter analysis. The surface water samples were sent to the contract laboratory for full HSL, general groundwater quality, and full radiological analysis. In additional, a Total Uranium surface water sample was collected and sent to the FERMCO on-site laboratory for analysis.

Hydropunch II Operations

Hydropunch II (HP) sampling is required at 10 predetermined locations (1999 through 11008) in the Inactive Flyash Pile. HP 1999, 11000, 11001, 11003, 11004, 11005, 11006, and 11007 were completed in April 1993. HP 11002 and 11008 were completed in May 1993. Samples were sent to the FERMCO on-site laboratory for Total Uranium

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

parameter analysis. Four additional Hydropunch borings were requested for the expanded Scope of Work. One boring (11077) was completed in May 1993; the remaining three borings will be completed in June 1993.

Existing Monitoring Wells Groundwater Sampling

Groundwater sampling is required per the Work Plan Addendum at existing Monitoring Wells 1016, 2016, 1433, 1711, 1047, 2047, and 2402. Wells 2016, 1047, and 2047 were sampled in April 1993; Well 2402 was sampled in May 1993. Sampling was attempted in May for Wells 1016, 1433, and 1711 but they were found to be dry.

Active Flyash Pile

The Work Plan Addendum stipulates the installation of one Type 2 Monitoring Well 21033; this well was completed May 17, 1993. Development of the well was completed May 24, 1993. A ground water sample will be collected in June.

Soil Auger Borings

Three soil auger borings, 1979, 1980, and 1981, are to be advanced in the Active Flyash Pile. These borings were completed in May 1993 and will not be updated in future reports.

Surface Soil Samples

Six surface soil samples are to be taken within the Active Flyash Pile, AFP-SS-01 through AFP-SS-06. These samples were collected on May 14, 1993. This activity is considered complete and will not be updated in future reports.

Hydropunch Soil Samples

The expanded Scope of Work includes the completion of one Hydropunch boring in the Active Flyash Pile. This boring is expected to be completed in June 1993.

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

Surface Water and Sediment Sampling

Two surface water samples, AFP-SW-01 and AFP-SW-02, and six sediment samples, AFP-SD-01 through AFP-SD-06 are required to be extracted from the Active Flyash Pile area. AFP-SW-01 was collected on May 13, 1993; AFP-SD-01 through AFP-SD-06 samples were collected on May 12 and 13, 1993. AFP-SW-01 will be collected in June 1993.

Existing Monitoring Wells Groundwater Sampling

Five existing Monitoring wells 1045, 2045, 1048, 2048, and 2049 are to be sampled. Wells 2045, 1048, and 2048 were sampled in April 1993; Well 2049 was sampled in May 1993. Sampling was attempted at Well 1045 but the well was found to be dry.

Lime Sludge Ponds

The Work Plan Addendum requires the installation of three Type 1 and three Type 2 Monitoring Wells the status of which follows:

- 1934 Installation completed May 4, 1993. The well was set at approximately 20 feet with a 10-foot screen. Well development was completed May 10, and groundwater samples were collected May 13, 1993.
- 1937 Installation completed May 1, 1993. The well was set at approximately 20 feet with a 10-foot screen. Well development was completed May 6 and groundwater samples were collected May 11, 1993.
- 1940 Installation completed May 16, 1993. The well was set at approximately 20 feet with a 10-foot screen. Well development and groundwater sampling will be completed in June. 1993.
- 2935 Installation completed May 11, 1993. The well was set at approximately 70 feet with a 17-foot screen. Well development and groundwater sampling will be completed in June 1993.

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2.1.1 RI/FS Work Plan Addendum for Operable Unit 2 (continued)

- 2936 Installation completed May 14, 1993. The well was set at approximately 72 feet with a 15-foot screen. Well development was complete May 28, 1993, groundwater sampling will be completed in June 1993.

- 2939 Installation completed May 13, 1993. The well was set at approximately 69 feet with a 17-foot screen. Well development and groundwater sampling will be completed in June 1993.

Soil Sampling

Fourteen soil samples are to be extracted from the Lime Sludge Ponds, LSP-SS-01 through LSP-SS-14. These samples were collected in May 1993. This activity is considered complete and will not be updated in future reports.

Soil Auger Borings

Currently, 15 soil auger borings are identified in the Work Plan Addendum, 1956 through 1970. Soil auger operations for 1964 through 1970 were completed in April 1993; soil auger operations for 1956 through 1963 will be initiated in June.

Existing Monitoring Wells Groundwater Sampling

The Work Plan Addendum requires groundwater samples be taken from 8 existing Monitoring Wells 1210, 1229, 1134, 1039, 1041, 1042, 2042, and 1176. Wells 1229, 1039, and 1042 were sampled in April 1993; Wells 1041 and 2042 were sampled in May 1993. Sampling was attempted for Wells 1210 and 1176 in May but the wells were found to be dry. Well 1134 was not sampled but is expected to be sampled in June 1993.

Issues/Corrective Actions:

None to report.

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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:

DOE has not concurred through the Change Proposal Process, on the revised schedule.

Corrective Actions:

DOE Level 0 Board concurrence on Change Proposal FY-93-1600-0001-01.

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	06/24/94 C	07/25/94 C

C = Consent Agreement Date

2.3 Planned Activities for June 1993

- Complete the fate and transport sensitivity studies with the addition of select inorganic and organic compounds.
- Complete development of chemical specific applicable or relevant and appropriate requirements.
- Complete development of working level of PRGs.
- Complete Title Design for long term erosion protection measure for Inactive Flyash Pile.

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2.3 Planned Activities for June 1993 (continued)

- Complete repair and operation and Maintenance Plan for Active Flyash Pile.
- Complete groundwater sampling of Well 2085 (South Field).
- Continue trenching activities in South Field area.
- Develop and collect a groundwater sample from 1950 (Solid Waste Landfill).
- Collect surface water sample in Active Flyash Pile area (AFP-SW-01).
- Complete soil auger borings 1956 through 1963 in Lime Sludge Pond area.
- Complete groundwater sampling of Wells 1134, 1940, 2935, 2936, and 2939 (Lime Sludge Ponds).
- Develop and collect a groundwater ample from 1954 (Inactive Flyash Pile).
- Collect a groundwater sample from 2955 (Inactive Flyash Pile).
- Collect a groundwater sample from 21033 (Active Flyash Pile).
- Complete Hydropunch borings 11029, 11030, 11047, 11082, 11083 and 11084 in the South Field area.
- Develop wells and collect groundwater samples from Wells 1954, 11085, and 2954 (South Field area).
- Complete one Hydropunch boring in the Active Flyash Pile area.
- Complete boring 11050 in Inactive Flyash Pile area.
- Complete three additional Hydropunch borings in Inactive Flyash Pile.

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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, but not limited to, 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 purpose of the RI/FS Work Plan is to detail the approaches and assumptions to be applied to the gathering of information and the presentation of 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:

Comments and conditional approval of the RI/FS Work Plan Addendum (WPA) were received from the Ohio EPA on February 16, 1993. In an April 14, 1993, letter, the U.S. EPA approved the revised WPA, based on the comment-response package provided to the EPAs on March 19, 1993. The U.S. EPA approval stated, however, that the changed proposed in the comment-response package must be incorporated into the WPA and a final version of the WPA be submitted to the U.S. EPA by May 15, 1993. The revised WPA was finalized and transmitted to DOE on May 14 for transmittal to the EPAs by May 17, 1993.

Issues/Corrective Actions:

None to report.

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3.1 RI/FS Work Plan (continued)

OPERABLE UNIT 3 WORK PLAN ADDENDUM

SCOPE	RECEIVE FROM EPA	SUBMIT TO EPA
The Work Plan Addendum includes an initial evaluation of OU3 (e.g., conceptual models and waste/contaminant quantities), a work plan rationale (e.g., data requirements and SAP approach) and specific OU3 RI/FS tasks.	08/04/92 A	12/18/92 C 12/17/92 A

C = Consent Agreement Date A = Actual

3.2 Field Investigation

Scope:

The purpose of the Operable Unit 3 field investigation program is to 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:

Radiological surveys to support the Field Work Packages are underway. Twenty-six Operable Unit 3 RI/FS Characterization field sampling procedures have been issued; four additional procedures for newly identified equipment are being generated. Lesson Plans for the Operable Unit 3 procedures have been developed. A Readiness Review to begin the RI/FS characterization is underway. The Operable Unit 3 RI/FS Health and Safety Plan, draft 1, is ready for review and comment. An Independent Assessment program is being developed. A portion of Building 5E has been cleared in preparation for setting up a storage area for Operable Unit 3 sampling equipment. A cage has been ordered to secure the sampling equipment, unauthorized access to the building is being eliminated, and locks are being installed. Decontamination of Building 5E has been completed. A radiological survey and an X-ray fluorescence (XRF) screening has been conducted to document a clean area for sampling equipment. The XRF analyzer has arrived on site, the gas chromatograph is expected to arrive soon.

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3.2 Field Investigation (continued)

Issues/Corrective Actions:

None to report.

3.3 Treatability Studies

Scope:

The purpose of treatability studies is to 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:

Formal identification of treatability studies for Operable Unit 3 has not been undertaken; however, remedy screening treatability studies will be conducted in parallel with the Field Investigation and Alternatives development. Development of an outline for a Treatability Study Work Plan (TSWP) was initiated in January and is continuing. Current actions involve the Screening of Alternatives to identify needed studies. The revision of the RI/FS Work Plan Addendum identifies a delivery date for the TSWP of January 1994.

Issues/Corrective Actions:

None to report.

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3.4 Remedial Investigation Report

Scope:

The purpose of the RI is to provide a summary of the field investigations and to support the FS 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.

3.5 Feasibility Study

Scope:

The purpose of the FS is to evaluate alternatives in detail with respect to the nine U.S. EPA evaluation criteria. The alternatives are analyzed individually and then compared to one another to determine respective strengths and weaknesses and to identify key tradeoffs.

Status:

Formal activities associated with the FS have not been initiated for Operable Unit 3, 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 dismantlement (handled by the Proposed Plan). The FS will focus on treatment and disposition issues.

Issues/Corrective Actions:

None to report.

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3.6 Planned Activities for June 1993

- Focus on technology research and initiate identification of remedy screening tier treatability studies for preparation of the Treatability Study Work Plan.

- Submit Proposed Plan document (to achieve an interim Record of Decision for decontamination and dismantlement of components for Operable Unit 3) for DOE-HQ review.

- Initiate preparation of the Remedial Design/Remedial Action Work Plan for the Proposed Plan for Interim Action.

- The full-scale writing of Field Work Packages (FWPs) will continue. Radiological screening to support the FWPs continue.

- Training is to be conducted for Operable Unit 3 Field Investigations personnel on the use of the XRF and gas chromatograph and PCB test kits. This will enable the field screening portion of the program to begin.

- Initiation of chemical screenings is to begin. The XRF and gas chromatograph will be used to determine the media chemical "hot spots" for subsequent media sampling.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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

4.1.1 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 will be installed in the uppermost perched water interval in the K-65 Silos area. One well or lysimeter will target the perched water zone downgradient of the Decant Sump Tank. Three lysimeters will be 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:

The completed work plan addendum was processed as part of the Operable Unit 4 RI/FS baseline and was approved by the Level III, II, and I Change Control Boards on January 15, 1993, January 22, 1993, and January 27, 1993, respectively. Due to the schedule constraints associated with the completion of the investigative effort in time to include the additional data into the Operable Unit 4 Feasibility Study Report, the U.S. DOE has authorized FERMCO to proceed with the implementation of the work plan without the U.S. EPA formal approval of the addendum. This notice was given by the U.S. DOE with the confidence that previous U.S. EPA concerns about this project have been adequately addressed in the work plan and proposed field work.

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4.1 Field Investigation (continued)

Notice to Proceed was given to the subcontractor on February 1, 1993. Field work was initiated on February 9, 1993. Drilling activities were initiated on March 11, 1993. Monitoring Wells 1891, 1892, and 1893 were purged, developed, and sampled for the primary parameters as specified in the Work Plan. Hydropunch II samples are currently being analyzed by the FERMCO contract laboratory.

Lysimeters 1894, 1895, and 1896 were installed and sampled for primary parameters as specified in the Work Plan. The samples were transported to the FERMCO contract laboratory for analysis. Preliminary results for the scanning of fluorescein dye were negative.

Groundwater sampling at existing Monitoring Well 2032 was completed and results have not been received.

Comments and disapprovals on the Work Plan Addendum for Additional Characterization of the Perched Water West of the K-65 Silos from the Ohio EPA and the U.S. EPA were received on March 22, 1993. A meeting was conducted on April 1, 1993, with DOE-FN and the U.S. EPA to discuss the proposed resolution of the disapproval/comments of the Work Plan Addendum. A formal response to the Ohio EPA and U.S. EPA comments was submitted to DOE-FN on April 30, 1993. The responses were scheduled to be forwarded to DOE for transmittal to Ohio EPA and U.S. EPA on June 1, 1993.

The primary concern expressed by the agencies was the ability of the project, as described in the Work Plan, to result in an adequate characterization of the nature and extent of the groundwater contamination in the K-65 Area. As a result, a piezometer will be installed adjacent to each of the lysimeters (borings 1894, 1895 and 1896) in order to determine if a perched water condition exists in the glacial overburden adjacent to Paddy's Run. In addition, the Work Plan was revised to allow for the possibility of installing a piezometer southwest of boring 1891. The additional piezometer would be installed only if the total uranium sampling results from boring 1891 exceed 20 ug/l. Preliminary results from boring 1891 were received and total uranium was 330 ug/l, therefore the additional piezometer will be installed as indicated in the revised Work Plan.

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4.1 Field Investigation (continued)

Issues/Corrective Actions:

The information obtained from this investigation program will be considered in the Operable Unit 4 Feasibility Study. Highest priority must be given to these field investigations to avoid schedule delays to the Operable Unit 4 Feasibility Study Report submittal. The results from this sampling effort will be integrated into the Operable Unit 5 Remedial Investigation Report. If the field investigation, perched groundwater analyses, and data validation is completed in a timely fashion, the information will be presented in the Final RI Report for Operable Unit 4.

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.

The Treatability Study Work Plan for cementation and chemical extraction will demonstrate whether stabilization achieves the desired level of material strength, provide information to help determine the effectiveness of chemical extraction, and provide data for use in fate and transport modeling. The study is composed of three preliminary phases, an advanced phase, and an optional phase. The preliminary phases determined the potential reagents and conditions for stabilization and/or extraction of composites of the silo material. The advanced phase evaluated the material variability by testing formulations and/or extraction on the top, middle, and bottom layers from each silo. The optional phase consists of testing stabilized waste for durability using American Society of Testing and Materials wet/dry and freeze/thaw test methods. In addition, radon emanation and radon leaching of cement stabilized waste and precipitate will be performed.

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4.2 Treatability Studies (continued)

The Treatability Study Work Plan for the vitrification of residues from Silos 1, 2, and 3 considers vitrification of silo material, radon emanation rate from the vitrified waste, and the leachability of the vitrified waste.

Status:

Cement Stabilization Preliminary and Advanced Phase Tests- Complete.
Chemical Extraction tests - Complete.

The draft Cement Stabilization/Chemical Extraction Treatability Study Report was submitted for internal review on March 31, 1993. Comments were consolidated and are currently being incorporated, but due to competing manpower resources with the Operable Unit 4 Feasibility Study Report, the submittal date of the revised Draft Cement Stabilization/Chemical Extraction Treatability Study Report to the U.S. DOE has been extended to June 11, 1993.

Cement Stabilization Optional Phase Treatability Testing - Complete.

The draft Cement Stabilization Optional Phase Treatability Study Report was submitted for internal review in May 1993.

The revised draft Cement Stabilization Optional Phase Treatability Study Report will be submitted to the U.S. EPA as Appendix H of the Operable Unit 4 Feasibility Study Report.

Vitrification Treatability Tests - Complete.

The U.S. DOE comments on the initial draft Operable Unit 4 Treatability Study Report for the Vitrification of Residues from Silos 1, 2, and 3 were received and incorporated. The final draft Operable Unit 4 Treatability Study Report for the Vitrification of Residues from Silos 1, 2, and 3 was submitted to DOE on May 2, 1993.

Issues/Corrective Actions:

None.

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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.

Status:

The revised draft Operable Unit 4 Remedial Investigation Report was submitted to the U.S. EPA on April 19, 1993, in accordance with the Amended Consent Agreement schedules. Comments from the U.S. EPA are expected to be submitted to the U.S. DOE by June 18, 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 C	06/18/93 C	07/18/93 C

C = Consent Agreement 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.

4.4 Feasibility Study (continued)

Status:

The revision of remedial alternatives, described in the U.S. EPA-approved Initial Screening of Alternatives, is designed to provide separate alternatives for the different waste subunits. For example, alternatives for the disposition of Silos 1, 2, and 3 contents are being created; silo structures, berms, and subsoils are being grouped into a separate set of alternatives; and Silo 4 is being dispositioned in a separate set of alternatives. On-property disposal options were discussed during October 1992 and have been included as appropriate to the alternatives. Draft detailed alternative description revisions were completed for internal review. Cost estimates, alternative risk assessments and fate and transport modeling were also completed for internal review.

The draft Operable Unit 4 Feasibility Study Report was completed for internal review.

The initial Comprehensive Response Action Risk Evaluation (CRARE) risk assessment activities were completed and the draft CRARE was completed for internal review.

The draft FEMP Sitewide Environmental Impact Statement was completed for internal review.

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.

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4.4 Feasibility Study (continued)

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. The remediation alternatives presented in the Proposed Plan, especially the preferred alternative, will be proposed to the U.S. EPA for consideration.

Status:

The draft Proposed Plan was issued for internal review.

Issues/Corrective Actions:

Development and submittal of the Proposed Plan is dependent on the completion of the FS. The Proposed Plan is being prepared concurrently with the FS and will be submitted with the FS.

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4.5 Proposed Plan (continued)

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 June 1993

- Complete the draft Feasibility Study Report for Operable Unit 4 for submittal to DOE.
- Revise the CRARE risk assessment with direction from DOE and submit the revised draft CRARE for internal review.
- Complete the draft FEMP Sitewide Environmental Impact Statement for submittal to DOE.
- Complete the draft Proposed Plan for Operable Unit 4 for submittal to DOE.
- Initiate revisions to the internal review of the draft Cement Stabilization Optional Phase Treatability Study Report.
- Prepare the Operable Unit 4 Remedial Investigation Report supporting documents for the inclusion in the Administrative Record.
- Prepare the outline for the Record of Decision for internal review.
- Additional Characterization:
    - Complete the first round of groundwater sampling at existing Monitoring Well 2032.

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4.6 Planned Activities for June 1993 (continued)

- Complete the laboratory analysis of the samples and subsequent data validation.

- Revise the existing Work Plan to incorporate the comment resolutions of the regulatory agencies comments.

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REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

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 Field Investigation

5.1.1 Operable Unit 5 Work Plan Addenda

Scope:

Soil and perched groundwater sampling will be 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 are pending completion of a FERMCO and DOE-FN internal review. After completion of the internal review, responses will be transmitted to the respective regulatory agency. The Work Plan Addenda will be revised once final comment resolutions have been obtained from the regulatory agencies, DOE-FN and FERMCO.

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5.1.1 Operable Unit 5 Work Plan Addenda (continued)

Attempts to sample Monitoring Well 1890 for the second round continue; however, due to extremely slow recharge rates, a variance to procedures has been approved and sampling should be completed during June 1993. The samples collected during the field investigations for the KC-2 Warehouse Area, Scrap Metal Pile and Electrical Substation are being analyzed at the contract laboratory for radiological parameters. Field work for this program is nearly complete.

Issues/Corrective Action:

Final resolution of the Ohio EPA and U.S. EPA comments should be reached with resolutions transmitted back to the respective regulatory agency for final review and approval.

Lack of comment resolution has caused an apparent negative variance in the Operable Unit 5 Consent Agreement Baseline Schedule. Conditional approval received from the regulatory agencies has provided some schedule recovery through acceleration of both field characterization effort and subsequent sample analysis at the contract laboratories.

5.1.2 Outfall Line Investigation

Scope:

This Work Plan Addendum defines the sampling and analysis required to investigate potential leakage from the Outfall Line as part of the Operable Unit 5 RI. The installation of Monitoring Well 2119 and subsequent sampling program were based upon possible failure of the pipeline between Manhole 179 and 180. If groundwater contamination has occurred due to a failure in the pipeline between Manhole 179 and 180, then a previously unidentified occurrence of contamination in groundwater may exist beyond the FEMP eastern boundary. Installation of Monitoring Well 2119 will determine if there is groundwater contamination associated with a pipeline failure between Manholes 179 and 180. If an off-site plume is identified, then an additional investigation may be required to determine vertical and lateral extent of the plume.

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5.1.2 Outfall Line Investigation (continued)

Status:

Responses to comments from the Ohio EPA and U.S. EPA are pending completion of an internal review. However, the evident lack of contamination in the monitoring well sample reduced the applicability of the comments.

After completion of the internal review, responses will be transmitted to the respective regulatory agency. The Work Plan will be revised once final comment resolutions have been obtained from the regulatory agencies, DOE-FN and FERMCO. FERMCO Operable Unit 5 staff are currently reviewing the analytical data from Monitoring Wells 2119 and 2067 to determine if additional investigation of this area is needed.

Issues/Corrective Actions:

Final resolution of the Ohio EPA and U.S. EPA comments should be transmitted to the respective regulatory agency for final review and approval in June.

5.1.3 Additional Operable Unit 5 Field Investigation Tasks

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

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

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5.1.3 Additional Operable Unit 5 Field Investigation Tasks (continued)

The draft Project Specific Plans (PSPs) and internal reviews for six of these programs have been completed and submitted to DOE. Preparation and internal review of the PSP for the Trap Shooting Range Investigation will be completed in early June.

During May, sampling activities occurred in three of the seven programs: "Snapshot" Sampling, Seeps and Surface Water Background, and Additional Monitoring Well Installation. The remaining four programs will be initiated in early June. The current schedule specifies early to mid-July as the completion date for all sampling activities associated with the seven programs. Sufficient laboratory capacity and procurement of resources and equipment have caused some schedule slippage in the field programs. Problem resolution is ongoing.

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

In March 1993, a Removal Site Evaluation (RSE) for the KC-2 Warehouse/Well No. 67 was performed to assess the need for a removal action. The RSE was performed to assess the impact of sediment-like material present in Well No. 67 on groundwater quality in the lower portion of the Great Miami Aquifer, pursuant to Section 104 (a)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended.

The DOE, as the lead agency, determined the need for a removal action pursuant to 40 CFR 300.415 Sections (b)(2)(ii) and (b)(2)(viii). The following removal action will be implemented as defined in 40 CFR 300.415. Since Well No. 67 was screened in the lower portion of the Great Miami Aquifer, and this aquifer is a sole source aquifer, the removal action will be performed as a Time Critical Removal Action.

The Work Plan requires that the sediments in the well casing be removed prior to abandonment of the well. This will provide relative assurance for eliminating the potential of introducing further contamination into the Great Miami Aquifer.

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5.1.4 Abandonment and Plugging of KC-2 Warehouse Well No. 67 (continued)

No attempts to remove the existing well casing will be made because of the confined work area and the possibility that the casing could break at depth leaving a potential vertical migration pathway through the glacial overburden. Sediments and groundwater removed from the well will be sampled and drummed.

The analytical results will be used to develop a vertical profile of the sediment column and to perform a hazardous waste characterization to determine disposal options for these materials. An attempt will be made to re-develop the well and collect a groundwater sample. The casing will then be filled with Volclay grout to 30 inches below grade. The remaining 30 inches of casing will then be removed and a concrete cap will be placed over the hole. A monitoring well will be installed downgradient of the former Well No. 67 location at an equivalent depth in the Great Miami Aquifer. This installation will be described in a separate Work Plan prepared by Operable Unit 5.

Field work associated with this removal action is scheduled to begin in June.

5.2 Treatability Study

Scope:

The purpose of this study is to provide information to support the FS and subsequent remedy selection for Operable Unit 5. Specifically, the study will demonstrate the feasibility of soil washing as a remedial technology for cleaning soils in Operable Unit 5. The study incorporates a physical separation/chemical extraction process that initially involves the separation of a soil into different particle-size fractions. Reagent formulas in the washing solutions are used in the extraction of 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 (OU 5-A).

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5.2 Treatability Study (continued)

Status:

Installation of the skids, housing the soil washing pilot plant equipment, into Plant 8 was completed in April 1993. Training of supervisors and technicians for the operation of the pilot plant was conducted. Documents completed in April in support of the startup of the soil washing pilot plant included the health and safety plan, environmental compliance plan and the risk management plan.

The data from the remedy screening tests for the ID-A and ID-B soils was received from IT Corporation by FERMCO on April 12, 1993. The data from the OU5-A soil was received in the middle of May. Results from these bench-scale studies were being 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.

Design and programming of a database to accommodate Operable Unit 5 remedy screening and remedy selection data was initiated. The database is being designed to also accommodate soil washing treatability test data from Lockheed Environmental, Oak Ridge National Laboratory, and Westinghouse-Savanna River. These soil washing test programs have been conducted in parallel to the Operable Unit 5 study.

It was decided to provide a laboratory to support any additional bench-scale testing. It is currently being supplied with soil washing bench-scale testing equipment and supplies.

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

Scope:

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 will be installed and operational by March 30, 1994.

2. Utilize 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, i.e., 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 implemented by March 30, 1995.

Status:

A request for proposal has been issued and proposal was subsequently received from Parsons for performing the engineering of Part 1. This proposal has been evaluated and is in the process of revision. Changes to the AWWT project scope have been completed to eliminate the treatment of the Sewage Treatment Plant and administrative side general sump flows to provide for Part 3. Evaluation of the best

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

method for transferring South Plume water to Part 2 is being investigated. Provisions have been made in the AWWT design to allow AWWT Phase I to accommodate South Plume flows when no stormwater is available for treatment to address Part 2.

5.4 Initial Screening of Alternatives (ISA)

Scope:

The ISA Report documents the initial activities of the Feasibility Study (FS). These activities include: developing remedial action objectives; developing general response actions; identifying volumes or areas of media to which response actions might be applied; identifying and screening technologies; identifying and evaluating technology process options; assembling selected representative process options into alternatives; and performing an initial screening of alternatives.

Status:

A draft copy of the ISA Report was submitted to the Ohio EPA and U.S. EPA for review on November 13, 1992. Comments from both agencies were received in January 1993. A response to comments document was prepared and transmitted to both agencies on February 12, 1993. Approval of the responses (with one exception) has been received. The final ISA report was prepared and submitted to the Ohio EPA and U.S. EPA on March 26, 1993. This is more than three months ahead of the original Consent Agreement schedule date.

Issues/Corrective Actions:

None to report.

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5.5 Remedial Investigation (RI)

Scope:

The RI serves as 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:

RI data compilation and evaluation continues. All data sources to be included in the RI 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 geologic and hydrogeologic information contained in RI/FS and site files and documents is being compiled, evaluated and updated. 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 generated.

A significant data validation effort was initiated in January and became fully operational in February. A backlog of nearly 8,000 RI/FS samples requiring validation has been identified. Validation of all these samples is scheduled for completion in early June 1993.

FERMCO review of RI report Sections 1, 2 and 3 is continuing. Review comments on the glacial overburden portion of Section 3 were prepared. Work on improving the current regional aquifer model continues. Two reports have been prepared: (1) a Groundwater Modeling Report documenting previous modeling activities; and (2) a Groundwater Model Improvement Plan. Both of these reports were submitted to DOE and the EPAs. The reports will be agenda items for a Technical Information Exchange meeting on fate and transport modeling to be held in early June.

A comprehensive report on groundwater and surface water background values was completed. The report was transmitted to DOE and the EPAs in May. Work on preparing an ecological risk screening study based on U.S. EPA Region V guidelines continues. Completion of the screening study is expected in June.

5.5 Remedial Investigation (RI) (continued)

Issues/Corrective Actions:

None to report.

5.6 Planned Activities for June 1993

- Conduct a Technical Information Exchange meeting early in June with U.S. EPA, Ohio EPA, DOE-FN and DOE-HQ on the general topic of contaminant fate and transport modeling.

- Complete and transmit to DOE the remaining PSPs for the seven new Operable Unit 5 field investigation tasks.

- Conduct field investigation activities as specified in the following PSPs:

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

- Initiate field work associated with the plugging and abandonment of Well No. 67 in the KC-2 Warehouse.

- Continue work on RI report Sections 1, 2 and 3. Continue compilation and evaluation of historic data in support of the RI report. Complete validation of data backlog. Complete screening study for ecological risk assessment and transmit report to DOE.

- Address 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 Model Development."

- Complete sampling specified in the Operable Unit 5 Work Plan Addenda.

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5.6 Planned Activities for June 1993

- Complete comment responses to Ohio EPA and U.S. EPA comments on the OU 5 Work Plan Addenda. Revise the Work Plan 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.

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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".

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6.1 EWMF General Siting Report (continued)

- 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".

- 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:

A contract has been placed for IT Corporation to complete the six above mentioned technical reports. All six technical reports have been received. 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 June 1993

None to report.

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7.0 Site-Wide Characterization Report

7.1 Risk Assessment Work Plan Addendum

Scope:

The Risk Assessment Work Plan Addendum provides a detailed scheme for development and completion of a baseline risk assessment for each operable unit, a preliminary site-wide baseline risk assessment, and a remedial action risk evaluation with each operable unit FS.

The Risk Assessment Work Plan Addendum presents the specific risk assessment methods to be followed in the RI/FS risk assessment tasks. It also establishes the scope of risk assessment work and documents the specific approach to determine whether estimated risks associated with selected remedial alternatives for the entire site are protective of human health and the environment. The addendum provides the methods, models, and parameters to develop the baseline risk assessment for each operable unit, the preliminary baseline risk assessment of the Site-Wide Characterization Report (SWCR), the remedial action risk evaluation, and the comprehensive response action risk evaluation for each operable unit FS.

Status:

The (Final) Risk Assessment Work Plan Addendum was transmitted to the U.S. EPA and Ohio EPA on June 19, 1992. Responses to comments received from the U.S. EPA on August 6, 1992, were submitted on September 24, 1992.

Issues/Corrective Actions:

None to report.

7.2 SWCR Report Preparation

Scope:

The SWCR is a one-time summary of all FEMP site data available as of December 1, 1991. It contains the preliminary baseline risk assessment which estimates human health and ecological risk of the FEMP from a site-wide perspective. The SWCR also provides the initial list of the leading remedial alternatives for each operable unit for input into the FS cumulative response action risk evaluation.

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7.2 SWCR Report Preparation

Status:

The revised SWCR, addressing the original (October 1992) and additional (January 1993) comments from the U.S. EPA and the Ohio EPA, was submitted to the EPAs on April 20, 1993. The report utilizes some risk assessment methodologies over which there is still lack of agreement with the EPAs; however, these issues will be addressed in the preparation of the Operable Unit-specific risk assessments.

This section will not be included in future editions of this report.

SITE-WIDE CHARACTERIZATION REPORT **SECONDARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Provides a one-time summary of site characterization data available as of 12/1/91, the Preliminary Baseline Risk Assessment, and a list of the leading remedial alternatives.	08/05/92 A	10/08/92 A	12/1/92 A

C = Consent Agreement Date A = Actual

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8.0 Community Relations

Status

The FEMP is working with the U.S. and Ohio EPAs and members of the local community activist group, Fernald Residents for Environment, Safety and Health (FRESH), to establish a site-specific citizen advisory board. The convener is Dr. Eula Bingham, a professor of environmental health in the College of Medicine at the University of Cincinnati. Dr. Bingham has begun talking to key stakeholders about the advisory committee. Based on these discussions, she will draft a charter and ground rules for the committee, and nominate a slate of candidates. Details about this process will be discussed with the public at the next community meeting on June 22, 1993.

The public comment period on the Operable Unit 4 RI Report ended on May 19, 1993. There were no comments received from the public.

On May 19, representatives from the Centers for Disease Control (CDC) and their invited guests, toured the FEMP. The 13-member panel, including scientists, epidemiologists, statisticians, physicians, and one member of FRESH, conducted a workshop that afternoon. Twenty members of the public attended. That same evening, CDC sponsored a public meeting. Fifty community residents and the news media were in attendance. Following a presentation from CDC, the panel took questions from the audience. On May 20, a discussion by the 13-member panel of the two previous sessions. The public was invited and 10 residents attended. An opportunity was provided for oral and/or written comments for the record at all three sessions. As soon as the Fernald Dosimetry Reconstruction Project, being conducted by Radiological Assessments Corporation, is completed later this year, CDC will determine if there is an association between FEMP- related radiation exposure and health effects in the surrounding community, and whether an epidemiological study is warranted. Information from these meetings was placed in the reading room at the PEIC.

DOE-FN representatives attended the monthly FRESH meeting, held May 27, 1993. Thirty members of the community attended the meeting. Topics included:

- Joint Response '93 emergency preparedness exercise with the State of Ohio and Hamilton and Butler counties is scheduled for June 26.
- Status on the progress of the new advisory committee now that a convener has been selected
- Presentation on the summer field sampling program

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8.0 Community Relations (continued)

DOE-FN officials announced at the May FRESH meeting that Dave Adler, DOE-Oak Ridge, will discuss the "Formerly Utilized Sites Remedial Action Program (FUSRAP)" at the June monthly meeting.

Issues/Corrective Action

None.

Planned Activities for June 1993

A public workshop to inform the public of the alternatives for Operable Unit 5, taken from the Initial Screening of Alternatives document, will be held June 1, 1993.

A DOE news release on the Fernald Advisory Committee will be issued.

Notices of Availability announcing the Public Comment Periods on two removal actions will be published in June.

The *Fernald Project Cleanup Report* publication will be mailed around June 10.

The DOE will hold a Community Meeting on June 22, 1993. The exhibits will open at 6:00 and the regular meeting will begin at 7:00.

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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 May 1993.

Summary - May 1993

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 1I000004001) was 28.57 kilograms*. The average uranium concentration for the previous 12 months was 0.61 mg/L. This is 68.5% 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 May 1993. Based on 2.99 inches of rainfall in May 1993, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.49 kilograms.

* The 28.57 kilograms does not include the uranium discharged to public water during the South PLume pump test.

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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: May 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	0.202	405	342	0.82	0.63	277
2	0.268	604	392	1.16	1.18	392
3	0.368	631	396	1.06	1.48	358
4	0.449	459	387	0.88	1.49	297
5	0.460	266	369	0.46	0.80	155
6	0.596	207	86	0.25	0.56	84
7	0.594	162	131	0.19	0.43	64
8	0.392	126	225	0.22	0.33	74
9	0.331	180	320	0.28	0.35	95
10	0.408	117	234	0.22	0.34	74
11	0.369	113	468	0.24	0.34	81
12	0.358	113	311	0.17	0.23	57
13	0.616	405	293	0.76	1.77	257
14	0.442	315	275	0.69	1.15	233
15	0.580	185	126	0.36	0.79	122
16	0.354	230	140	0.33	0.44	111
17	0.417	167	315	0.34	0.54	115
18	0.773	297	90	0.37	1.08	125
19	0.772	284	158	0.49	1.43	166
20	0.875	221	153	0.34	1.13	115
21	0.905	369	108	0.55	1.88	186
22	0.787	369	180	0.60	1.79	203
23	0.876	383	194	0.53	1.76	179
24	0.941	347	194	0.50	1.78	169
25	0.804	378	180	0.51	1.55	172
26	0.357	311	252	0.55	0.74	186
27	0.329	230	239	0.44	0.55	149
28	0.337	171	153	0.25	0.32	84
29	0.291	347	320	0.53	0.58	179
30	0.262	261	410	0.53	0.53	179
31	0.306	279	707	0.53	0.61	179
TOTAL	15.819				28.57	

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month May 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.	0.510	293	229	0.48	0.92	161
Max.	0.941	631	707	1.16	1.88	392
Min.	0.202	113	86	0.17	0.23	57

The average uranium concentration for the previous twelve months was 0.61 mg/L. This is 68.5% 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.

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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: 11000004002
002 Discharge (Overflow) to Storm Sewer Outfall Ditch
Stormwater Retention Basin Spillway (Effluent to Paddy's Run)

Month: May 1993

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

Based on 2.99 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 8.49 kgs.

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ENCLOSURE B

FFCA: INITIAL REMEDIAL MEASURES

AND OTHER OPEN ACTIONS

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INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period May 1 through May 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 May 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 April 1993 was transmitted to the U.S. EPA on May 19, 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 April 1993, was transmitted to the U.S. EPA on May 19, 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

MAY 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 April 1993 was transmitted to the U.S. EPA on May 19, 1993. (DOE-1983-93)
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

MAY 31, 1993

C.	Provide annual reports to the U.S. EPA per 40 CFR 61.94(c).	yearly	The Annual NESHAP Compliance Report for CY1990 was transmitted to the U.S. EPA on June 25, 1992 (DOE-1912-92).
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

MAY 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	April's FFCA Monthly Progress Report was transmitted to the U.S. EPA on May 19, 1993. (DOE-1983-93).

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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 MAY 31, 1993

ENCLOSURE C

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

080

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

Period Ending May 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 May 1 through May 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 May 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 May 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 characterization 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 May 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.

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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 MAY 31, 1993

ENCLOSURE D

DRILLING/BORING LOGS

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

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

MONTH: MAY, 1993

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
05/01/93	0.6 $	0.6	0.5	@
05/02/93	$	0.5	0.5	@
05/03/93	0.2 $	0.3	0.4	@
05/04/93	0.3	0.3	0.3	@
05/05/93	0.5	0.3	0.3	@
05/06/93	0.9	0.7	0.7	@
05/07/93	1.0	0.7	0.7	@
05/08/93	1.1	0.7	0.7	@
05/09/93	1.1	0.9	0.8	@
05/10/93	1.2	0.8	0.8	@
05/11/93	1.1	0.8	0.8	@
05/12/93	0.9	0.7	0.6	@
05/13/93	0.4	0.3	0.3	0.4
05/14/93	0.5	0.4	0.4	0.9
05/15/93	0.4	0.3	0.3	0.7
05/16/93	0.7	0.6	0.6	1.0
05/17/93	0.7	0.6	0.5	0.9
05/18/93	0.7	0.5	0.4	0.9
05/19/93	0.4	0.3	0.3	0.8
05/20/93	0.6	0.5	0.5	1.0
05/21/93	0.7	0.5	0.5	1.0
05/22/93	0.8	0.6	0.6	1.0
05/23/93	0.5	0.4	0.4	0.8
05/24/93	0.4	0.3	0.3	0.8
05/25/93	0.5	0.3	0.4	0.8
05/26/93	0.8	0.7	0.6	0.9
05/27/93	1.0	0.8	0.7	0.8
05/28/93	0.7	0.6	0.7	0.9
05/29/93	0.5	0.3	0.3	0.7
05/30/93	0.7	0.5	0.4	0.8
05/31/93	0.4	0.3	0.4	0.8

Summary of Daily Averages

	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
AVERAGE	0.7	0.5	0.5	0.8
MAXIMUM	1.2	0.9	0.8	1.0
MINIMUM	0.2	0.3	0.3	0.4
MEDIAN	0.6	0.6	0.5	0.8
STD. DEV.	0.3	0.2	0.2	0.1

NOTES:
1. "@" indicates data unavailable due to relocation of monitor.
2. "$" indicates censored data due to erroneous readings.
3. "#" indicates operator error in programming monitor.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME. CRU 2 / PHASE 2	
BORING NUMBER: 2947	COORDINATES:	DATE. 04/07/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/07/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	111339 0920 04/07/93	6 15 15	12	STIFF, 10 YR 3/2, DARK BROWN SILTY CLAY, MOTTELING SOME SAND AND PLANT FIBERS, LOW PLASTICITY, MOIST	CL	1.5	BZ 60-80 cpm HNU 0 ppm ALPHA 0 cpm
2 3	111340 0935 04/07/93	12 13 15	8	STIFF, 10 YR 5/4, BROWN, SILTY CLAY MOTTELING, SOME FINE SAND LOW PLASTICITY, MOIST	CL	1.5	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
4	111341 0940 04/07/93	10 12 11	10	SAA	CL	1.5	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
5 6	111342 0942 04/07/93	11 11 10	12	STIFF 10YR 4/2, ~~DARK BROWN~~, SILTY CLAY, REDDISH MOTTELING, SOME FINE SAND, LOW PLASTICITY, MOIST	CL	1.0	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
7	111343 0952 04/07/93	3 5 8	9.5	VERY STIFF, 10YR 5/2, SILTY CLAY MOTTELING, SOME FINE SAND & GRAVELS LOW PLASTICITY, MOIST	CL	3.0	BZ 60-80 cpm HNU 0 ppm ~~ALPHA~~ 0 cpm
8 9	111344 0955 04/07/93	9 11 14	18	VERY STIFF 10YR 5/2, SILTY CLAY, MOTTELING SOME FINE SAND, LOW PLASTICITY, MOIST 9"-18" VERY STIFF, 10YR 5/1 CLAYEY SILT MEDIUM PLASTICITY, MOIST	CL / ML	3.0	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
10	111345 1005 04/07/93	13 25 28	18	VERY STIFF, 10 YR 5/4, SILTY CLAY MOTTELING, SOME FINE SAND, TRACE SMALL GRAVELS, LOW PLASTICITY MOIST	CL	3.0	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
11 12	111346 1025 04/07/93	9 22 17	16	SAA	CL	3.5	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
13	111347 1035 04/07/93	10 13 16	18	VERY STIFF, 10YR 5/1 CLAYEY SILT MOTTELING (RED OXIDE) SOME FINE SAND & SMALL GRAVEL, LOW PLASTICITY, MOIST	ML	3.5	BZ 80-120 cpm HNU 0 ppm ALPHA 0 cpm
14 15	111348 1335 04/07/93	12 19 16	18	VERY STIFF 10YR 5/3 CLAYEY SILT FINE SAND, SOME SMALL GRAVELS OXIDE STAIN, LOW PLASTICITY, MOIST	ML	3.5	BZ 80-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm

NOTES:

DRILLING CONTRACTOR PENNSYLVANIA DRILLING
DRILLING RIG 72 SPEED STAR
DRILLER CRAIG COULTER
HELPER BILL SIBERT
SAMPLE TECH - JENNIFER MILLHEET

ABRV.: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

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

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME. CRU 2 / PHASE 2	
BORING NUMBER: 2947	COORDINATES:	DATE. 04/07/93 (08)
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/07/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15 16	111349 1435 04/07/93	7 10 16	16	VERY STIFF 2.5 Y 5/4, CLAYEY SILT FINE SAND, SOME SMALL GRAVELS, OXIDE STAIN, LOW PLASTICITY, MOIST	ML	2.0	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
17 18	111350 1445 04/07/93	7 11 17	16	SAA	ML	2.0	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
19	111351 1450 04/07/93	9 17 25	16	VERY STIFF 2.5Y 4/1, CLAYEY SILT SOME SMALL GRAVELS, OXIDE STAIN LOW PLASTICITY, MOIST	ML	3.0	Bg 80-100 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
20 21	111352 1505 04/07/93	9 16 26	18	SAA	ML	2.5	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
22	111353 1515 04/07/93	7 12 27	16	SAA	ML	3.0	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
23 24	111354 1605 04/07/93	7 15 17	16	VERY STIFF 2.5Y 4/1 CLAYEY SILT SMALL GRAVELS, LOW PLASTICITY, MOIST	ML	2.0	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
25	111355 1615 04/07/93	9 15 20	14	SAA	ML	2.5	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
26 27	111356 1625 04/07/93	6 12 20		SAA	ML	3.5	Bg 60-80 cpm PHOTOVAC 0.0 ppm ALPHA 0 cpm
28	111357 1025 04/08/93	8 16 19	6	SAA	ML	2.5	Bg 60-80 cpm PHOTOVAC 0 ppm ALPHA 0 cpm
29 30	111358 1035 04/08/93	7 10 17	4	SAA	ML	2.0	Bg 40-60 cpm PHOTOVAC 0 ppm ALPHA 0 cpm

NOTES:

DRILLING CONTRACTOR PENNSYLVANIA DRILLING
DRILLING RIG 72 SPEED STAR
DRILLER CRAIG COULTER
HELPER BILL SIBERT
SAMPLE TECH - JENNIFER M. MCHEET

ABRV.s : SAA - SAME AS ABOVE
NA - NOT APPLICABLE

- SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
- COLORS IDENTIFIED USING MUNSEL COLOR CHART

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2947	COORDINATES:	DATE: 04/08/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/07/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 6

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30 31	111359 1045 04/08/93	7 17 25	3	SAA	ML	3.0	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
32 33	111360 1055 04/08/93	7 12 23	12	SAA	ML	2.5	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
34	111361 1345 04/08/93	0 0 13 16	8	SAA	ML	2.5	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
35 36	111362 1400 04/08/93	16 50/3	4	very soft 2.5y 4/1 clayey silt small gravels, low plasticity, some sand moist	ML	3.0	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
37	111363 1425 04/08/93	50/3	3	SAA	ML	2.0	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
38 39	111364 1445 04/08/93	12 17 20	18	SAA	ML	3.5	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
40	111365 1500 04/08/93	40 23 25	16	very soft 2.5y 4/1, clayey silt small gravels, small sand lenses, low plasticity, moist	ML	3.5	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
41 42	111366 1515 04/08/93	9 17 23	16	SAA	ML	3.0	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
43	111367 1530 04/08/93	14 50/2	14	~~0-17 fine sand~~ 0-7" SAA top of aquifer? 7"-14" very dense 10yr 5/6 very fine silty sand moist	ML/SM	3.0/NA	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm
44 45	111368 1540 04/08/93	24 29 50	16	BP of aquifer ~43.5-44.5 SAA	SM	NA	BZ 40-60 cpm HNU 0 ppm ALPHA 0 cpm

NOTES:

DRILLING CONTRACTOR PENNSYLVANIA DRILLING
DRILLING RIG F2 SPEED STAR
DRILLER CRAIG CULTER
HELPER BILL SIBERT
SAMPLE TECH - JENNIFER MILLER

ABRV.: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

- SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST
- COLORS IDENTIFIED USING MUNSEL COLOR CHART

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 2003.05 (RDCII)	PROJECT NAME. CRU 2 / PHASE 2	E-4529
BORING NUMBER 2947	COORDINATES.	DATE 04/05/93 - 04/12/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 04/07/93
ENGINEER/GEOLOGIST P. McCARREN	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS CABLE TOOL		PAGE 4 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45							
50	111369 0910 04/12/93	50/4	4	VERY DENSE 10YR 5/6. MEDIUM TO FINE SILTY SAND SOME GRAVELS MOIST	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm
55	111370 0935 04/12/93	50/4	6	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm
60	111371 1450 04/12/93	24 40 31	12	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm
62	111372 1510 04/12/93	9 24 36	14	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm
64	111373 1600 04/12/93	50/4	4	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm ORITA LARGE GRAVEL
65	111374 1625 04/12/93	50/4	10	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm
67	111375 1645 04/12/93	50/4	4	SAA	SM	NA	Bz 20-40 cpm HNU 0 ppm ALPHA 0 cpm

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 72 SPEED STAR
Driller CLAG COULTER
Bill SIBERT
SAMPLE TECH - JENNIFER MCCHEER

SAA - Same as above
NA - Not Applicable

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

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05 (ACC II)	PROJECT NAME. Cell 2 / Phase 2	
BORING NUMBER. 2947	COORDINATES.	DATE 04/12/93 - 04/13/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 04/07/93
ENGINEER/GEOLOGIST P. McCarren	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS CABLE TOOL		PAGE 5 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
67.5 68	111376 1710	21 42		VERY DENSE 10YR 5/6 MEDIUM TO FINE SILTY SAND, SOME SMALL GRAVELS MOIST	SM		BZ 20-40 cpm ① TOP of LINA Bearing zone ~68.5 ft
69	04/12/93	50	10	6"-10.5' VERY DENSE 10YR 4/1, POORLY SORTED COARSE MEDIUM & FINE SAND AND GRAVELS WET	SM	NA	HNU 0 ppm ALPHA 0 cpm
70	111377 0910 04/13/93	29 41 50	12	VERY DENSE 10YR 4/1, POORLY SORTED COARSE MEDIUM & FINE SAND SOME SILT. WET AND SMALL GRAVELS	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
71 72	111378 0940 04/13/93	12 25 34	14	SAA	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
73	111379 1020 04/13/93	50/4	14	VERY DENSE 10YR 4/1, POORLY SORTED COARSE MEDIUM & FINE SAND, 15% SMALL GRAVELS 20mm WET!	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
74	111380 1045 04/13/93	12 24 50	10	SAA	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
75 76	111381 1055 04/13/93	2 5 15	8	SAA	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
77	111382 1110 04/13/93	8 27 50	10	SAA	SM	NA	BZ 20-40 cpm HNU 0 ppm ALPHA 0 cpm
78 79 80 82				FINISHED sampling - last sample 78'			

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 72 SPEED STAR
Driller CRAIG GULTER
BILL SIBERT
SAMPLE TECH - JENNIFER MICKEM

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Char-

FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2947	COORDINATES:	DATE: 04/13/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/07/9
ENGINEER/GEOLOGIST: P. McCAREN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: CABLE TOOL		PAGE 6 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
82							
83							
84							
85				Bottom of Boring 85.0 ft			COLLECTED COMPOSITE SIEVE SAMPLE 111383 from 60ft-78ft COLLECTED COMPOSITE TOTAL U SAMPLE 1113E from 60ft-78ft - 8" STEEL CASING from 0.0ft TO 85.0 ft - WILL INSTALL 4" STA. STEEL WELL ~300 gallons of u USED

PRELIMINARY

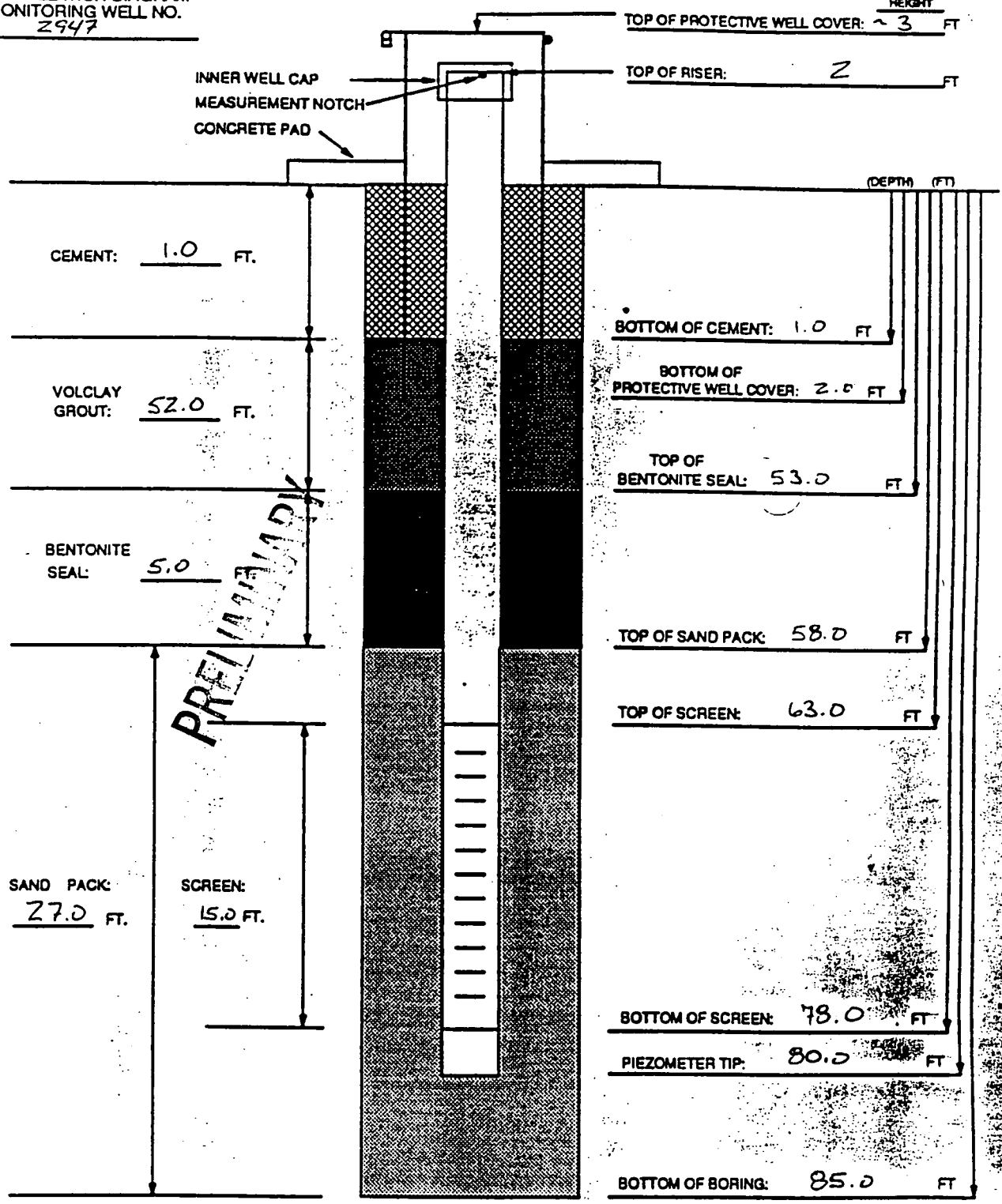
NOTES:
Drilling Contractor - Pennsylvania Drilling
Drilling Equipment - 72 Speed Star
Driller - Craig Coulter
Helper - Bill Sibert

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

SAMPLES COLLECTED PER ASTM STANDARD PENETR

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2947

INSTALLATION DATE: 04/16-18/93



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 4/30 COARSE - 18 50Lbs BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 5
BAGS OF VOLCLAY GROUT: 7 50Lbs BAGS
AMOUNT OF CEMENT: 1/2 50Lbs BAG
AMOUNT OF WATER USED: ~300 GALLONS
OTHER: 8 DRUMS SOIL/WATER 1 DRUM ALCONOX/WATER
TASK: 20.03.05 (RDC11)

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 68.1 FT/6
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Paul C McCarren

FERNALD
RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 2 / PHASE 2 FIELD ENG./GEO. P. McCARREN DATE [illegible]
PROJECT NO. 20.03.05 (RDC11) CHECKED BY DATE
BORING NO. 2947
PIEZOMETER NO. MW 2947 DATE OF INSTALLATION 04/16-18/93

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID (S) USED:
FLUID WATER FROM 0.0 ft TO 85.0 ft
FLUID FROM TO

TYPE OF BIT Hammer Dress [illegible]
CASING SIZE (S) USED:
SIZE 8 IN FROM 0.0 ft TO [illegible] ft
SIZE FROM TO

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 IN
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.020 IN
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 6 - 10 ft 1 - 5 ft
JOINING METHOD SCREW PIPE - FLUSH JOINT THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 2.5 ft
PROTECTIVE PIPE O.D. 10 IN

OTHER PROTECTION Hinged Locking Cover with pad lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT / ~~SLURRY~~ Poured 04/16/93	TOP 1.0	BOTTOM 53.0	TOP	BOTTOM
BENTONITE Pellets	TOP 53.0	BOTTOM 58.0	TOP	BOTTOM
SAND #30 COARSE	TOP 58.0	BOTTOM 85.0	TOP	BOTTOM
GRAVEL - NONE USED	TOP N.A	BOTTOM N.A	TOP	BOTTOM
PERFORATED SECTION	TOP 63.0	BOTTOM 78.0	TOP	BOTTOM
PIEZOMETER TIP	80.0 ft			
BOTTOM OF BOREHOLE	85.0 ft			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS Cement placed from 0.0' to 1.0' to hold protective [illegible]

Customer Number: _____

MATERIAL: 930413-086 SAMPLE NUMBER: _____

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 189.3

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	51.2	~~51.2~~ 27.0	27.0	78.7
20	41.5	21.9	48.9	33.5
40	41.1	21.7	70.6	16.7
60	25.6	13.5	84.1	9.8
100	12.0	6.3	90.4	5.9
200	7.8	4.1	94.5	3.0
Pan	9.5	5.0	99.5	

$$\frac{W_2 \times 100\%}{W_1} = R \quad (188.7)$$

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

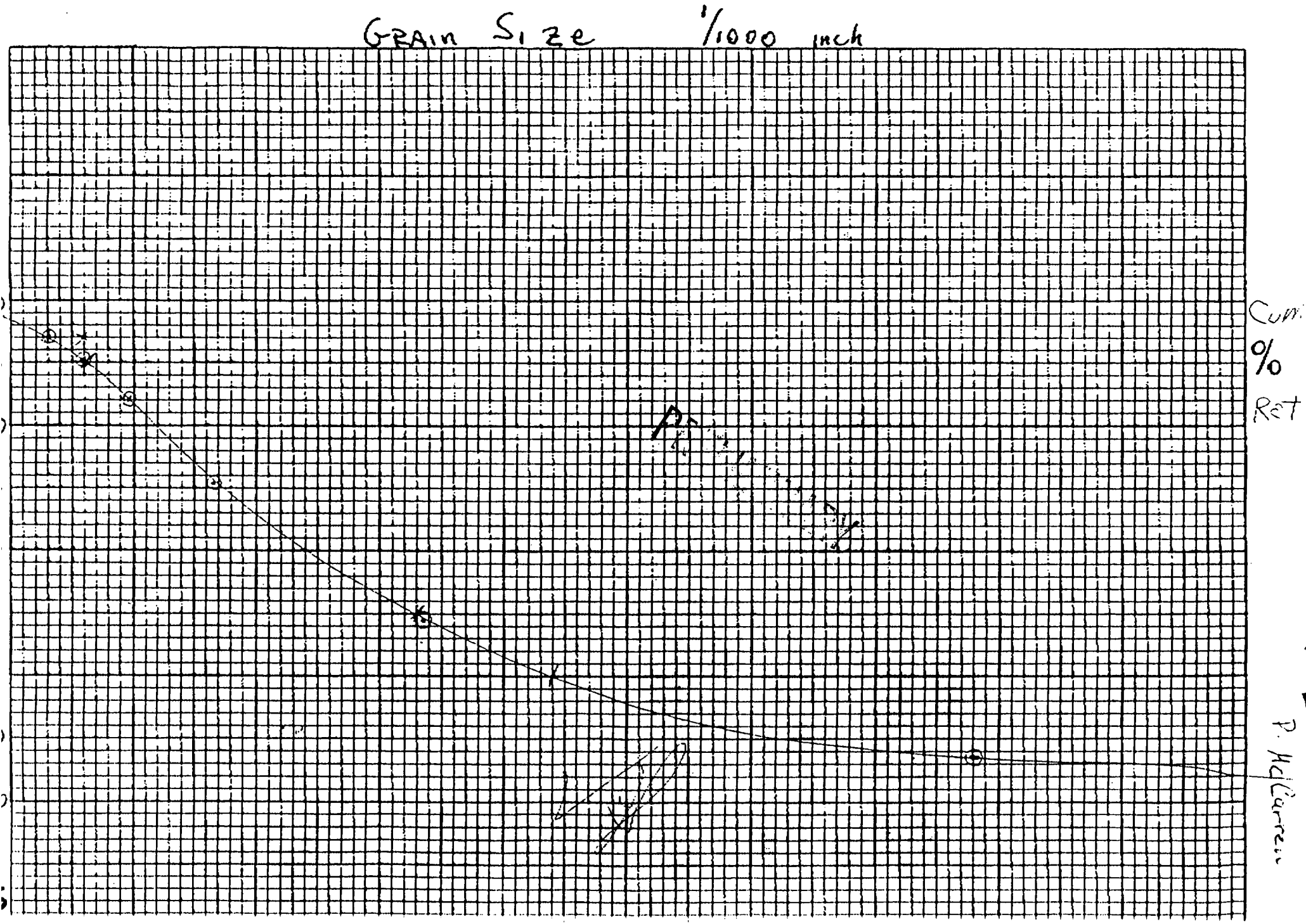
Analyzed by: Tom McCullough | Checked by: [illegible] | Date analyzed: 4-15-93

Grain Size Retained

40 %	44
50 %	33
90 %	6

NO. 340/ 1-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

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



IV-4529
P. McCarren

SIEVE ANALYSIS CALCULATION

4/5/93
BY P. McCARREN

WELL # 2947

RETAINED VALUES

90% = .006
50% = .033
40% = .044

40%/90% .044/.006 = $7.\overline{33}$ $7.\overline{33} > 3$ USE FACTOR 4

4 x .033 = .132

PRELIMINARY

THE 50% RETAINED VALUE MORE CLOSELY FITS THE 4/30 COARSE SAND AND .020 SLOT SCREEN

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU-2 SOUTHFIELD		
BORING NUMBER 1973 (SF-58-10)	COORDINATES.		DATE 041295
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 041293
ENGINEER/GEOLOGIST J BOYER	Depth	Date/Time	DATE COMPLETED 041293
DRILLING METHODS Hollow Stem Auger 8 1/2			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	112500 1030	6	6	DENSE, (2.5Y, 4/4) OLIVE BROWN, CLAYEY SILT, MOIST, SLIGHTLY PLASTIC	ML		HNU = <1 ppm
1	112501 1030	10	6	SAA			BZ = 800 ppm
	112502 1030	25	2	DENSE, (2.5Y, 5/6) LIGHT OLIVE BROWN, CLAYEY SILT WITH GRAVEL, COBBLE SIZE TO TO COARSE SAND, MOIST	ML		
2	112503 1045	28	6	DENSE (2.5Y, 5/4) OLIVE BROWN, SILTY GRAVEL, COBBLE TO COARSE SAND, MOIST, ODOR (METHANE) STAINED BLUE GREEN	GM		BZ = 800 ppm HNU = 5 ppm LARGE COBBLE STAINED (5B 4/1) DARK BLUISH GRAY METHANE ODOR
		9	0	" ~~SAA~~ 9cb			
		21	0	~~SAA~~ 20cb			
3	112504 1055	10	6	MEDIUM LOOSE (2.5Y, 4/3) OLIVE BROWN, CLAYEY SILTY GRAVEL, COBBLES TO COARSE, SLIGHT PLASTICITY, MOIST	ML		HNU = <1 BZ = 600 ppm
4	112505 1055	11	6	STIFF, (2.5Y 5/6), LIGHT OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.0	
	112506 1055	15	6	SAA		2.0	
5	112507 1415	5	6	MEDIUM DENSE, (2.5Y 5/4) LIGHT OLIVE BROWN, SILTY SAND WITH CLAY, LOW PLASTICITY, MOIST	ML	1.5	HNU = <1 BZ = [illegible]
	112507 1415	3	6	SAA		0	
	112507 1415	5	6	SAA		1.0	
6	112507 1415	8	5	SAA		0.5	HNU = <1 BZ = [illegible]
	112508 1430	8	6	MEDIUM DENSE (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY SAND WITH CLAY, LOW PLASTICITY, MOIST.	ML		
▽ 7	112509 1430	10	6	STIFF, (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, MEDIUM PLASTICITY, WET	~~ML~~ CL	2.0	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment SKID RIG CME 45
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable

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

FERNALD
RI/FS

E-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: FERNALD RI/FS		
BORING NUMBER: 1473 (SFSB-10)	COORDINATES:	DATE: 041293	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 041293	
ENGINEER/GEOLOGIST: J Doyle	Depth Date/Time	DATE COMPLETED: 041293	
DRILLING METHODS: AUGER (HOLLOW STEM) 8 1/2		PAGE 2 OF 2	

DEPTH (FT.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	112510 1430	14	6	SAA		2.0	HNU = <1 α = BZ = 60cpm
	112511 1445	5	6	VERY STIFF, (2.5y, 5/4) light olive brown, silty clay, low plasticity, moist	cl	3.5	
	112512 1445	8	6	SAA		3.0	
9	112513 1445	16	6	VERY STIFF (2.5y, 5/4) light olive brown, silty clay, low plasticity, slightly moist	cl	3.0	HNU = <1 α = BZ = 60cpm
	112514 1500	3	6	MEDIUM DENSE, (2.5y 5/6) light olive brown, clayey silty gravel, moist.	ml		
10	112514 1500	5	6	SEE MEDIUM DENSE (2.5y 5/6), light olive brown, silty sand with gravel, moist	SM		
11	112514 1500	7	6	SAA			HNU = <1 α = BZ = 60cpm
	112514 1500	8	6	SAA			
	112515 1520	9	6	SAA			
12	112516 1520	18	6	MEDIUM DENSE (2.5y 5/6), light olive brown, silty sand with gravel, wet	SM		HNU = <1 α = BZ = 60cpm
13				Bottom of Boring 12.5 ft.			
14							HNU = α = BZ =

NOTES:

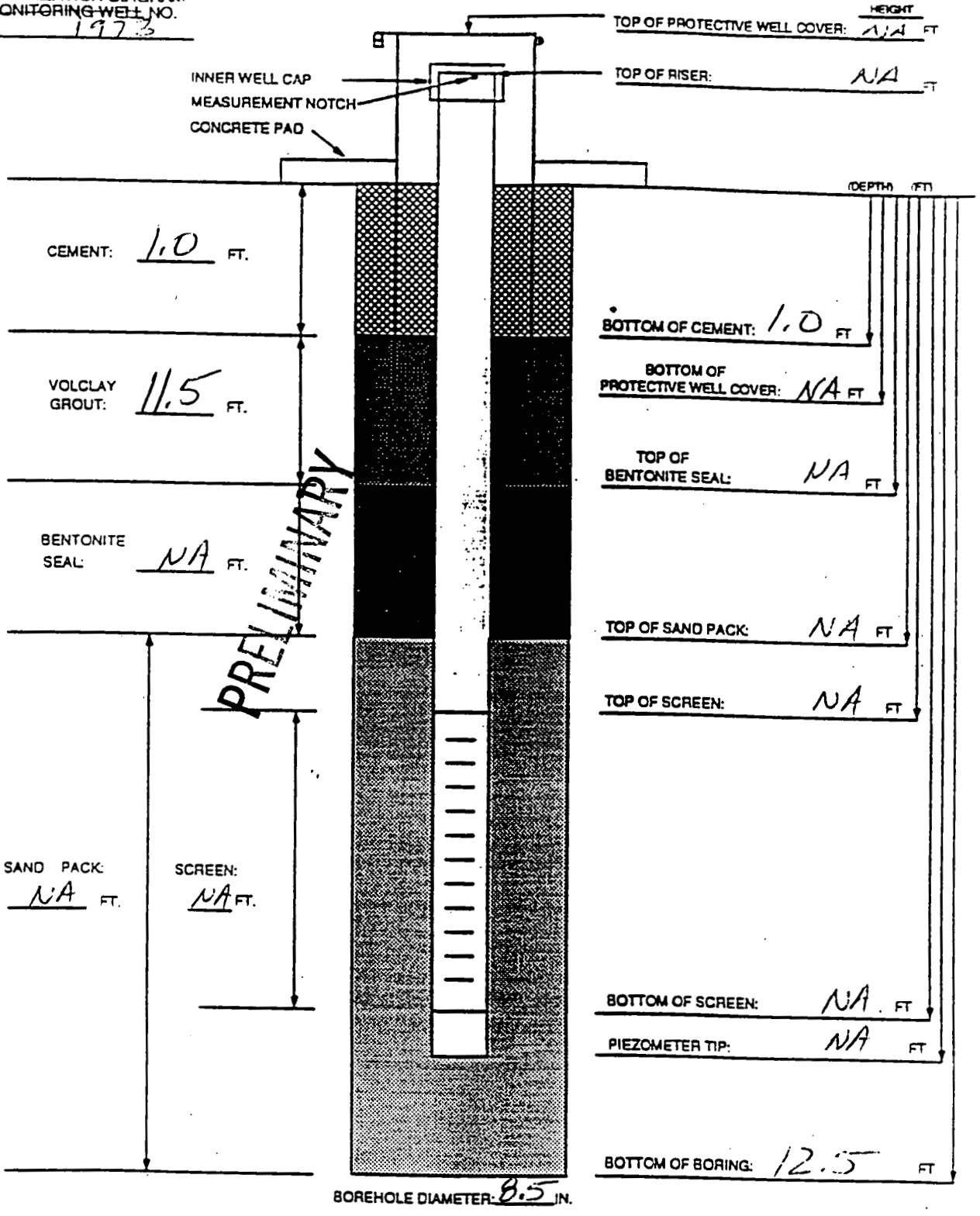
-4529

FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. 1973

INSTALLATION DATE: _____

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 1 SOIL, 1 WATER DRUMS
OTHER: 5 gallons
TASK: 20.03.05

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
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: J. Boyer

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-2 Southfield FIELD ENG./GEO. J. Boyer DATE 01
PROJECT NO. 20.03.05 CHECKED BY _____ DATE ____
BORING NO. 1973
PIEZOMETER NO. NA DATE OF INSTALLATION 04/23/93

BOREHOLE DRILLING

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

PIEZOMETER DESCRIPTION

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

PRELIMINARY

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS: ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 12.5	TOP NA	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	12.5		NA	
GWL AFTER INSTALLATION	NA		NA	

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

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. Southfield OU2	
BORING NUMBER. 1974	COORDINATES.	DATE 04-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 04-13-93
ENGINEER/GEOLOGIST J. Boya/J. Reagan	Depth Date/Time	DATE COMPLETED. 04-13-9
DRILLING METHODS Hollow stem 8½" auger		PAGE 1 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (ocb 050393 4)
1	112518 1010			Pushed shelby tube ↓ pushed shelby tube			
2	112519 1030	5	6	soft (2.5Y4/3) olive brown, silty fine sand, low plasticity, moist. Black fragments present	ml	0.5	βγ = 50cpm
		6	6	medium stiff (2.5Y4/3) olive brown, silty clay low plasticity, moist. some gravel	cl	1.0	HNu = <1ppm
3		12	6	very stiff (2.5Y4/3) olive brown, silty clay low plasticity, moist. some gravel	cl	3.0	
	112519 1030	13	0	No recovery			
4	112520 1035	5	6	very stiff (2.5Y5/4) light olive brown, silty clay, low plasticity, moist. gravels present	cl	3.0	βγ = 200cpm
		8	6	soft (2.5Y4/3) olive brown, silty fine sand, low plasticity, moist. gravels present	ml	0.5	HNu = <1ppm
5		10	4	very stiff (2.5Y5/4) light olive brown, silty clay, slightly plastic, moist. gravels	cl	3.0	
	112520 1035	11	0	No recovery			
6	112521 1045	7	6	very stiff (2.5Y5/4) light olive brown, silty clay, slightly plastic, moist	cl	3.0	βγ = 150cpm
	112522 1045	14	6	SAA	cl	3.0	HNu = <1ppm
7	112523 1045	18	6	very stiff (10YR5/4) yellowish brown, silty clay, slightly plastic, moist, black concretions present	cl	3.0	

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment CME-45
Driller Joe RAAB
Roger Davis

SAA - Same as above
NA - Not Applicable
Samples collected per ASTM standard penetration etc
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20	PROJECT NAME. Southfield OU 2		
BORING NUMBER: 1974	COORDINATES.		DATE 4-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 4-13-93
ENGINEER/GEOLOGIST J. Boyer/J. Reagan	Depth	Date/Time	DATE COMPLETED 4-13-93
DRILLING METHODS Hollow Stem auger 8½"			PAGE 2 OF 2

DB 05039

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	112524 1315	9	6	Stiff (10YR 4/6) dark yellowish brown, silty clay, slightly plastic, moist.	cl	2.0	βγ = 150cpm
	112525 1315	11	4	Soft (10YR 5/4) yellowish brown, silty clay, low plasticity, moist	cl	1.0	HNu = <1ppm
		11	0	No recovery			
9	112526 1330	10	6	very stiff (2.5Y 5/4) light olive brown, silty clay, slightly plastic, moist	cl	3.0	βγ = 50cpm
	↓	15	6	SAA	cl	3.0	HNu = <1ppm
10	112526 1330	25	6	Stiff (2.5Y 5/4) light olive brown, silty clay, low plasticity, moist.	cl	2.0	
11	112527 1330	31	6	very stiff (2.5Y 5/4) light olive brown silty clay, slightly plastic, moist	cl	3.0	
				Bottom of boring 11 ft.			

NOTES
Drilling Contractor: Pennsylvania Drilling
Drilling Equipment:
Driller:
SAA Same as above
NA Not Applicable
Samples collected per ASTM standard practice
Colors identified using Munsell Color Chart

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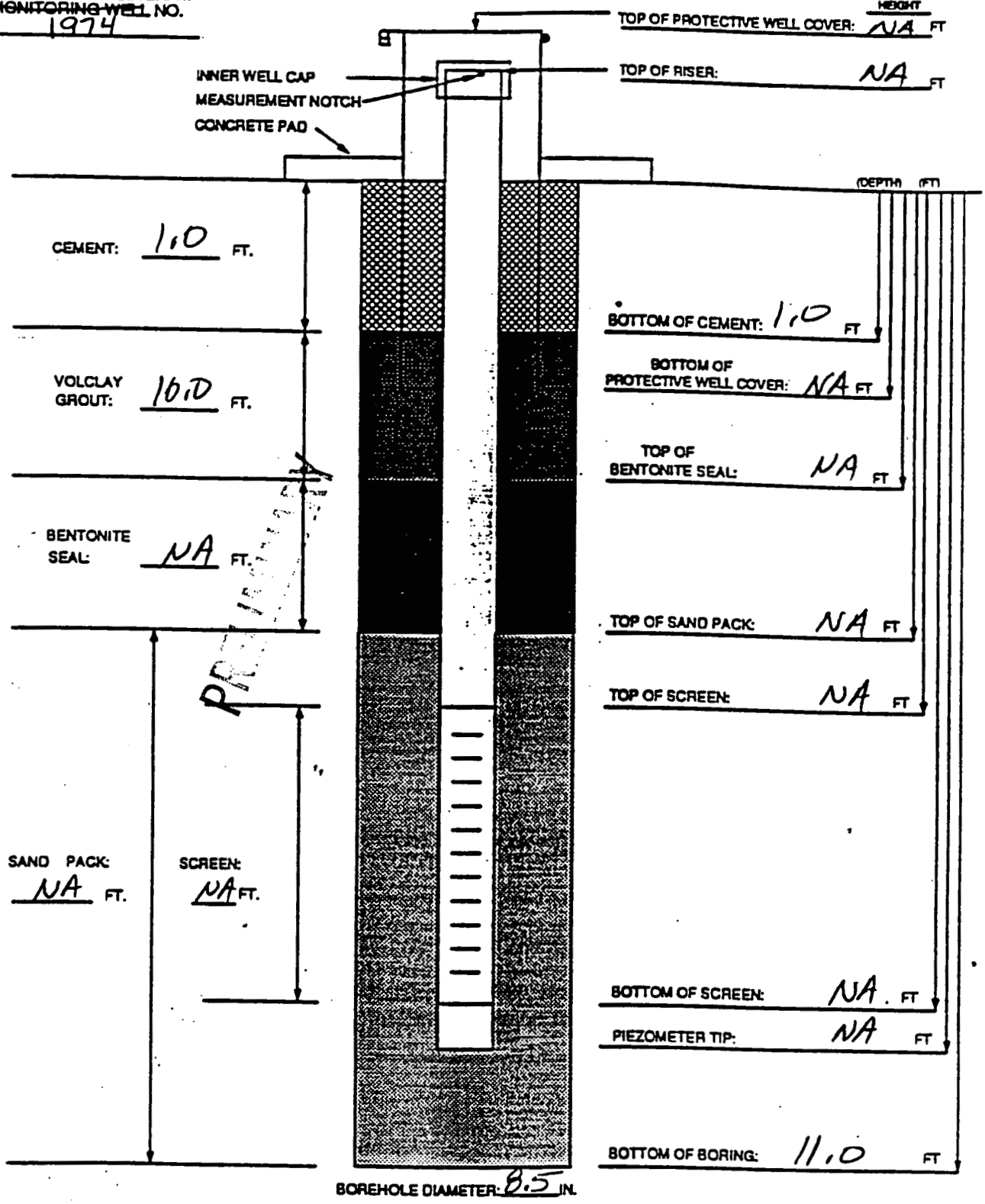
050393 3 of 4 -4529 ~~2 of 2~~

FERNALD RI/FS
INSTALLATION DIAGRAM
~~MONITORING WELL~~ NO. 1974

INSTALLATION DATE: 041393



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~5-8 gallons
OTHER: 1 SOIL, 1 WATER DRUM
TASK: 20.03.05

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/
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: J. Boyer

106 18

ASI FORM 0157 REV. (0)

-4029
JEB 050393
~~1 of 2~~ 4 of 4

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-2 Southfield FIELD ENG./GEO. J. Boyer DATE 04/.
PROJECT NO. 20.03.05 CHECKED BY _____ DATE ___
BORING NO. 1974
PIEZOMETER NO. NA DATE OF INSTALLATION 041393

BOREHOLE DRILLING

DRILLING METHOD 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 NA FROM NA TO N/
SIZE NA FROM NA TO N/

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 (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS: ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 11.0	TOP NA	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	11.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

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FERNALD
RI/FS

E--4009

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20-03.05 RDC 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER. 2951	COORDINATES.	DATE 4-13-93
ELEVATION:	GWL: Depth 61.7 Date/Time 4/23/93 1020	DATE STARTED 4-12-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 4-23-9
DRILLING METHODS Cable Tool		PAGE 1 OF 10

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	111389 0930 4-13-93	1 4 6	12	Stiff (2.5Y, 4/3) Olive Brown Silty Clay with mottling, non-plastic, slightly moist	CL	1.5	HNU = 0 ppm βγ = 100 cpm α = 0 cpm
2 3	111390 0933 4-13-93	6 10 2	12	Very Stiff (2.5Y, 5/6) light olive brown Silty Clay with trace gravel, non-plastic, slightly moist	CL	4.0	HNU = 0 ppm βγ = 100 cpm α = 0 cpm
4	111391 0940 4-13-93	6 21 25	14	Hard (2.5Y, 5/6) light olive brown, Silty Clay with trace gravel, non-plastic, slightly moist	CL	4.5	HNU = 0 ppm βγ = 60 cpm α = 0 cpm
5 6	111392 0945 4-13-93	30 33 30	15	Very Dense (2.5Y, 6/2) light brownish gray, clayey Silt with trace gravel, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 100 cpm α = 0 cpm
7	111393 0955 4-13-93	21 27 31	16	Very Dense (2.5Y, 6/3) light olive brown, clayey Silt with trace gravel, slightly plastic, moist	ML	N/A	HNU = 0 ppm βγ = 100 cpm α = 0 cpm
8 9	111394 1005 4-13-93	34 37 30	17	Very Dense (2.5Y, 5/3) light olive brown clayey Silt with trace gravel, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 70 cpm α = 0 cpm
10	111395 1500 4-13-93	9 18 23	6	Dense (10YR, 6/6) Brownish Yellow, Clayey Silt, mottling, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 80 cpm α = 0 cpm
11	111396 1500 4-13-93	10 15 15	14	Medium Dense (2.5Y, 6/3) light yellowish Brown, Clayey silt, non-plastic, slightly moist	ML	N/A	HNU = 0 ppm βγ = 80 cpm α = 0 cpm
12 13	111397 1535 4-13-93	4 5 8	7	Medium Dense (2.5Y, 4/2) dark grayish Brown, Clayey Silt, slight plasticity, moist	ML	N/A	HNU = 0 ppm βγ = 60 cpm α = 0 cpm
14 15	111398 1550 4-13-93	1 4 7	6	Medium Dense (2.5Y, N4/) dark gray, Clayey Silt, low plasticity, moist	ML	N/A	HNU = 0 ppm βγ = 80 cpm α = 0 cpm

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Lonnie McGloklin

SAA - Same As Above
NA - Not Applicable
Samples collected per ASTM standard penetration tes
Colors identified using Munsell Color Chart

Background Readings

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 10.03.05 RDC 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER. 2951	COORDINATES.	DATE 4-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-12-9
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 4-23-9
DRILLING METHODS Cable Tool		PAGE 2 OF 10

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	111399 1610 4-13-93	2 4 8	5	Medium Dense (5Y, 5/2) Olive Gray, Clayey Silt, low plasticity, moist	ML	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
17–18	111400 1630 4-13-93	1 4 8	7	SAA	ML	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
19	111401 1640 4-13-93	2 4 8	6	Medium Dense (5Y, 5/2) Olive Gray, Clayey Silt with trace gravel, low plasticity, moist	ML	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
20–21	111402 0850 4-15-93	25 27 8	14	Dense (5Y, 5/1) Gray Silty Sand with trace gravel, non-plastic, moist	SM	N/A	HNU = 0 ppm; βγ = 120 cpm; α = 0 cpm
22	111403 0910 4-15-93	8 16 45	6	Very Dense (5Y, 4/2) Olive Gray Silty Sand, non-plastic, moist	SM	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
23–24	111404 0925 4-15-93	31 21 35	8	Very Dense (5Y, 5/2) Olive Gray Silty Sand with trace gravel, non-plastic, moist	SM	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
25	111405 0945 4-15-93	11 25 31	5	Very Dense (5Y, 5/2) Olive Gray Silty Sand with trace gravel, non-plastic, moist	SM	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
26–27	111406 1005 4-15-93	12 19 50/.3	9	Very Dense (5Y, 5/1) Gray Clayey Silt, non-plastic, moist	ML	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
28	111407 1030 4-15-93	10 12 14	13	Medium Dense (5Y, 5/1) Gray Clayey Silt with trace organics and gravel, slightly plasticity, moist	ML	N/A	HNU = 0 ppm; βγ = 60 cpm; α = 0 cpm
29–30	111408 1040 4-15-93	11 17 17	12	Medium Dense (5Y, 5/1) Gray Clayey Silt, slight plasticity, moist	ML	N/A	HNU = 0 ppm; βγ = 80 cpm; α = 0 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Lonnie McGloklin

SAA - Same as above
NA - Not Applicable

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

Background Readings

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME CRU 2 Phase II	
BORING NUMBER 2951	COORDINATES	DATE 4-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-12-93
ENGINEER/GEOLOGIST Keith Payne	Depth Date/Time	DATE COMPLETED 4-23-93
DRILLING METHODS Cable Tool		PAGE 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31.0	111409 1350 4-15-93	10 11 15	14	Medium dense (5Y, 4/1) dark gray clayey silt, non plastic, moist	MC	N/A	HNU = 0 ppm $\beta\gamma$ = 100 cpm α = 0 cpm
32.0 33.0	111410 1405 4-15-93	5 6 15	8	Medium dense (5Y, 4/1) dark gray silty sand, non plastic, moist	SM	N/A	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
34.0	111411 0910 4-16-93	12 30 25	18	Hard (5Y, 4/1) dark gray, silty gravelly, medium plasticity clay, moist	CL	4.5	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
35.0 36.0	111412 0930 4-16-93	17 21 30	13	Very Dense (2.5Y, 4/4) olive brown, well graded, pebbly sand, dry	SW	N/A	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
37.0	111413 0940 4-16-93	22 28 25	11	Very Dense (2.5Y, 6/3) light yellowish brown, well graded sand, dry	SW	N/A	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
38.0 39.0	111414 0955 4-16-93	16 15 21	9	Dense (10YR, 6/3) pale brown well graded sand, dry	SW	N/A	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
40.0							
41.0	111415 1045 4-16-93	9 9 9	10	Very soft (2.5Y, 5/2) grayish brown silty, sandy, medium plasticity clay, wet	CL	<0.25	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
42.0 43.0	111416 1330 4-16-93	27 50/.4	10	Very dense (2.5Y, 6/3) light yellowish brown, well graded pebbly sand, dry	SW	N/A	HNU = 0 ppm $\beta\gamma$ = 60 cpm α = 0 cpm
44.0 45.0				Resumed sampling at 5 ft intervals			

Drilling Subcontractor: Pennsylvanian Drilling
Drilling Equipment: Cyclone 42
Driller: Bob Johnson
Lonnie McGlocklin

4-16-93
$\beta\gamma$ background = 40-60 cpm
α background = 0 cpm
HNU background = 0 ppm

FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME CLU 2 Phase II	
BORING NUMBER 2951	COORDINATES	DATE 4-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-12-93
ENGINEER/GEOLOGIST Keith Payne	Depth Date/Time	DATE COMPLETED 4-17-93
DRILLING METHODS Cayle 1001		PAGE 4 OF 5

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (cm)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0							
46.0	111417 1350 4-16-93	7 21 45	7	Very Dense (10YR, 6/2) light brownish gray, well graded, gravelly sand, dry	SW	N/A	HNU = 0ppm $\beta\gamma$ = 60cpm α = 0cpm
47.0							
48.0							
49.0							
50.0							
51.0	111418 1440 4-16-93	11 10 21	10	Dense (10YR, 4/2) dark grayish brown, well graded, silty, clayey sand, wet	SC	N/A	HNU = 0ppm $\beta\gamma$ = 60cpm α = 0cpm
52.0							
53.0							
54.0							
55.0							
56.0	111419 1500 4-16-93	21 19 50/.4	10	Very Dense (2.5Y, 6/2) light grayish brown, poorly graded, gravelly sand, dry	SP	N/A	HNU = 0ppm $\beta\gamma$ = 60cpm α = 0 cpm
57.0				Begin continuous sampling for sieve analysis and total U			
58.0							
59.0	111420 0910 4-17-93	18 29 30	8	Very Dense (2.5Y, 6/2) light brownish gray, poorly graded, gravelly sand, dry	SP	N/A	Microtip(MT) = 5.2 ppm $\beta\gamma$ = 60cpm α = 0cpm
60.0	111421			See Page 5			

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cyclone 42
Driller: Bob Johnson
Lonnie McGlocklin

4-17-93
MT background = 2-3 ppm
$\beta\gamma$ background = 60cpm
α background = 0cpm

PRELIMINARY

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER. 2951	COORDINATES.	DATE 4-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-12-93
ENGINEER/GEOLOGIST Keith Payne	Depth Date/Time	DATE COMPLETED: 4-17-93
DRILLING METHODS Cable Tool		PAGE 5 of 10

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61.0	111421 0930 4-17-93	4 9 10	9	Medium dense (2.5Y, 5/4) light olive brown, well graded, gravelly sand, wet	SW	N/A	MT = 6.6 ppm βγ = 60 cpm α = 0 cpm
62.0	111422 0945 4-17-93	9 10 12	16	Medium dense (2.5Y 4/2) dark grayish brown, well graded, gravelly sand, wet	SW	N/A	MT = 8 ppm βγ = 60 cpm α = 0 cpm
63.0 64.0	111423 1000 4-17-93	14 13 14	12	Medium Dense (5Y, 5/1) gray, well graded sand with some gravel, wet	SW	N/A	MT = 7 ppm βγ = 60 cpm α = 0 cpm
65.0	111424 1030 4-17-93	18 23 16	11	Dense (5Y, 5/1) gray, well graded sand with some gravel, wet	SW	N/A	MT = 4.9 ppm βγ = 60 cpm α = 0 cpm
66.0 67.0	111425 1315 4-17-93	32 50/3	10	Very Dense (10YR, 4/1) dark gray well graded sand with some gravel wet	SW	N/A	MT = 0 ppm βγ = 60 cpm α = 0 cpm
68.0	111426 1335 4-17-93	13 15 35	15	Dense (10YR, 4/1) dark gray well graded sand with some gravel, wet	SW	N/A	MT = 0 ppm βγ = 60 cpm α = 0 cpm
69.0 70.0	111427 1400 4-17-93	12 18 18	16	Dense (5Y, 4/2) olive gray, well graded, sand with some gravel, wet	SW	N/A	MT = 0 ppm βγ = 60 cpm α = 0 cpm
71.0	111428 1415 4-17-93	10 11 12	15	Medium Dense (5Y, 4/2), olive gray, well graded sand with some gravel, wet	SW	N/A	MT = 0 ppm βγ = 60 cpm α = 0 cpm
72.0 73.0	111429 1500 4-17-93	50 50/3	10	Very Dense (5Y, 4/2) olive gray well graded sand with some gravel wet	SW	N/A	MT = 0 ppm βγ = 60 cpm α = 0 cpm
74.0 75.0				Bottom of Casing at 75.0' Bottom of boring at 75.0'			

NOTES
Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cyclone 42
Driller: Bob Johnson
Lonnie McGlocklin

See Page 4 for background readings

PRELIMINARY

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 2 Phase II FIELD ENG./GEO. K. Payne DATE 4-2
PROJECT NO. 20.03.05 RDC11 CHECKED BY _____ DATE _____
BORING NO. 2951
PIEZOMETER NO. ~~NA~~ 2951 BR 4-21-93 DATE OF INSTALLATION 4-23-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 65.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 FT TO 75.0 F
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 15.0 FT²

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 5-10FT; 1-5FT; 2-
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

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

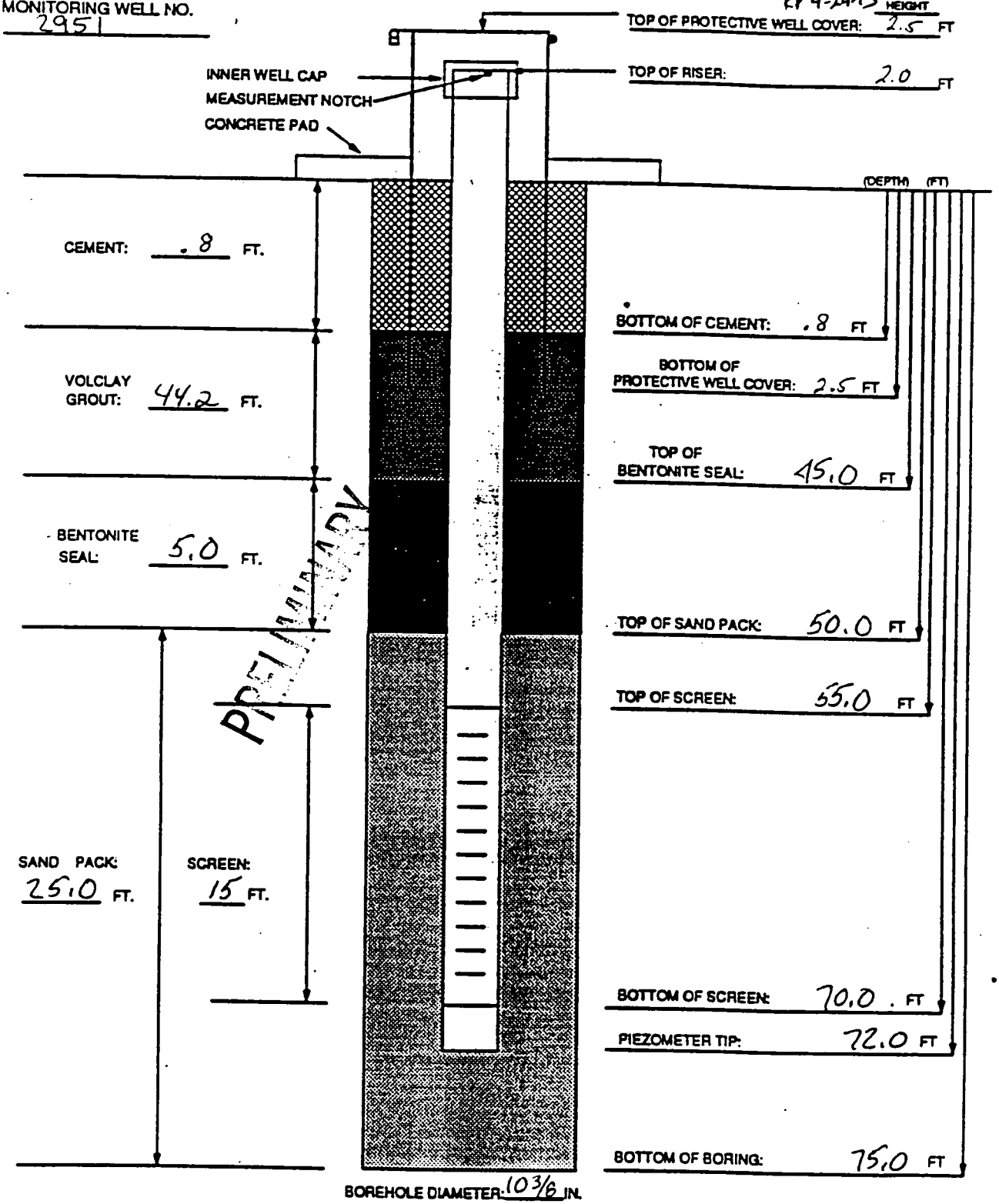
OTHER PROTECTION Hinged locking cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0 FT			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5 FT			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM .8 FT		
Cement GROUT/SLURRY	TOP .8 FT	BOTTOM 45.0 FT	TOP	BOTTOM
BENTONITE	TOP 45.0 FT	BOTTOM 50.0 FT	TOP	BOTTOM
SAND	TOP 50.0 FT	BOTTOM 75.0 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 55.0 FT	BOTTOM 70.0 FT	TOP	BOTTOM
PIEZOMETER TIP	72.0 FT			
BOTTOM OF BOREHOLE	75.0 FT			
GWL AFTER INSTALLATION	61.7 FT (Top of Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS Cement was placed from 0.0 to .8 ft to hold the protective cover in place.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2951

INSTALLATION DATE: ~~4/19/93~~ 4-23-9
KP 4-22-93



BOREHOLE DIAMETER: 10 3/8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20, 25 bags @ 50lb
BENTONITE PELLETS (5-GALLON BUCKETS): 4
BAGS OF VOLCLAY GROUT: 10.5
AMOUNT OF CEMENT: 1 bag @ 94 lb
AMOUNT OF WATER USED: 900 gal
OTHER: 13 Drums Soil; 1 Drum Alconox/Water
TASK: 20.03.05 ROC 11

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 4/23/93 FT/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Keith Payne

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MW2951

930419-048

4-20-93 Tom McCullough

PRELIMINARY

C

***** CHAIN OF CUSTODY *****

Analysis ID: 930419-048 Project No.: 0020-0001 Charge: RDC11
Customer No.: 111430 Customer Name: FERMCO
Matl. Descr.: OU-2 PHASE 2 Deadline: 26-APR-19
Sample Matrix: SOIL Date Sampled: 17-APR-19
Comments: SEND RESULTS TO: MIKE FRANE FAX: (513)738-0145

Sample Logged By: KS FRENCH Modified By: KS FRENCH
Sampled From: B295J Date Modified: 19-APR-1993 13:25

ENVIRONMENTAL & PROCESS MATERIALS LABORATORY

Analysis	Units	Activ.	Prep Proc No	Analys Proc
SIEVE ANALYSIS, 40% RETAINED	.001 INCH	9158	42	9158
SIEVE ANALYSIS, 50% RETAINED	.001 INCH	9158	32	9158
SIEVE ANALYSIS, 90% RETAINED	.001 INCH	9158	8	9158

Crosschecked by: _____ FAXED
Entered on Computer by: _____ Phoned in at _____ hrs on _____
Approved and Printed by: _____ Dated by _____

Customer Number: 111430

MATERIAL: 930419-048 SAMPLE NUMBER:

DETERMINATION: Particle Size METHOD: Sieve Analysis

Sample weight: 191.9

Sieve Number	Weight Retained, g	% Retained	Cumulative % Retained	Grain Size, 1/1000 inch
10	45.4	~~23.6~~ 23.7	~~23.6~~ 23.7	78.7
20	47.3	24.6	48.3	33.5
40	53.0	27.6	75.9	16.7
60	25.8	13.4	89.3	9.8
100	8.3	4.3	93.6	5.9
200	4.8	2.5	96.0	3.0
Pan	6.9	3.6	99.6	

$\frac{W_2 \times 100\%}{W_1}$ 191.5 = R

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

PRELIMINARY

Analyzed by: Tom McCullough

Checked by:

Date analyzed: 4-20-93

GRAIN SIZE RETAINED

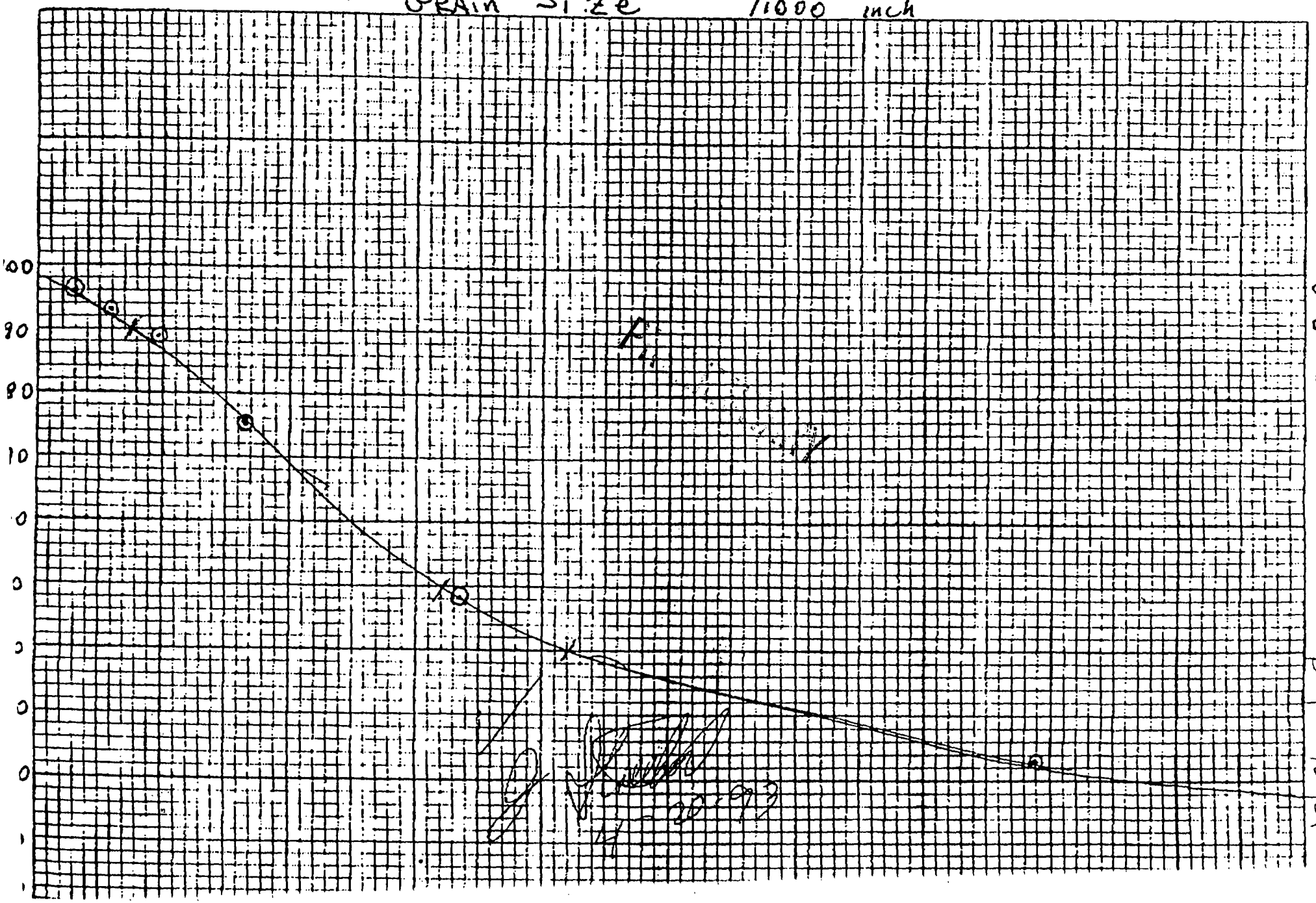
40 %	42
50 %	32
90 %	8

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

930419-048 EUGENE DIETZGEN CO. MADE IN U. S. A.

Tom McCullough

GRAIN SIZE 1/1000 inch



I-4529

FEMA
RI/FS

E--4520

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: IFP-HP-06 / 11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/9	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18/	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1545 111856 04/17	4	6	Firm (2.5Y 4/3) silty clay, organic material, some gravel, low plasticity dry	CL	1.0	HNU = 0 ppm Bσ = 40-50cpm
	1545 111857 04/17	7	6	Black ash, dry (2.5YR 2.5/0)	NA	NA	HNU = 0 ppm Bσ = 40-50cpm
	1545 NA	6	0	No Recovery	NA	NA	HNU = NA Bσ = NA
2	1550 111858 04/17	4	6	Black ash, dry	NA	NA	HNU = 0 ppm Bσ = 40-50cpm
	1550 111859 04/17	8	6	SAA	NA	NA	HNU = 0 ppm Bσ = 40-50cpm
3	1550 111860 04/17	12	6	SAA	NA	NA	HNU = 0 ppm Bσ = 40-50 cp
	1555 111861 04/17	12	6	SAA	NA	NA	HNU = 0 ppm Bσ = 30-40 cp
4	1555 111862 04/17	4	6	SAA	NA	NA	HNU = 0 ppm Bσ = 30-40 cp
	1555 NA	9	0	No Recovery	NA	NA	HNU = NA Bσ = NA
5	1600 111863 04/17	4	6	Black ash, dry	NA	NA	HNU = 0 ppm Bσ = 20-30 cp

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller Don Smith
Assistant Sam Smith

Background: HNU = 0 ppm
Bσ = 40-50cp

SAA- Same As Above
NA- Not Applicable

PRELIMINARY

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FERNALD
RI/FS

E- -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: 1FP-HP-06/11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/9	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18/c	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5	1600 111864 4/17	8	6	Black Ash, dry (2.5YR 2.5/0)	NA	NA	HNU = 0 ppm Bγ = 20-30 cpm
	1600 NA	5	0	No Recovery	NA	NA	HNU = NA Bγ = ~~20-3~~ NA ac 04/18/93
6	1605 111865	4	6	Black Ash, dry	NA	NA	HNU = 0 ppm Bγ = 40-50 cpm
	1605 111866	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 40-50 cpm
7	1605 111867 4/17	2	3	SAA	NA	NA	HNU = 0 ppm Bγ = 40-50 cpm
	1610 111868	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 20-30 cpm
8	1610 111869	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 20-30 cpm
	1610 111870	3	2	SAA	NA	NA	HNU = 0 ppm Bγ = 20-30 cpm
9	1615 111871	2	6	SAA	NA	NA	HNU = 0 ppm Bγ = 10-20 cpm
	1615 111872 4/17	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 10-20 cpm
10							

PRELIMINARY

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller D. Smith
Assistant S. Smith

Background: HNU = 0 ppm
Bγ = 40-50 cpm

SAA - Same As Above
NA - Not Applicable

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: 1FP-HP-06/11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18/93	
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10	1615 NA 4/17	2	0	No Recovery	NA	NA	HNU = NA Bγ = NA
	1620 111873	5	6	Black Ash, dry	NA	NA	HNU = 0 ppm Bγ = 10-20 cpm
11	1620 111874	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 10-20 cpm
	1620 111875 4/17	2	2	SAA	NA	NA	HNU = 0 ppm Bγ = 10-20 cpm
12	0630 111876 4/18	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 30-40 cp
	0630 111877	4	6	SAA	NA	NA	HNU = 0 ppm Bγ = 30-40 cp
13	0630 NA 4/18	4	0	No Recovery	NA	NA	HNU = NA Bγ = NA
	0635 111878	3	6	Black Ash, dry	NA	NA	HNU = 0 ppm Bγ = 30-40 cpm
14	0635 111879	3	6	SAA	NA	NA	HNU = 0 ppm Bγ = 30-40 cp
	0635 111880 04/18	6	6	SAA, with some 2.5Y 6/6 ~~silty~~ clay, low plasticity, dry ac 04/18/93 silt	NA	NA	HNU = 0 ppm Bγ = 30-40 cp
15							

PRELIMINARY

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller D. Smith
Assistant S. Smith

Background: HNU = 0 ppm
Bγ = 40-50 cpm

NA - Not Applicable
SAA - Same As Above

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PETIMALL
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: IFR HP06 / 11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18	
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	0840 111881 4/18	3	6	Black Ash, dry	NA	NA	HNV = 0 ppm B γ = 30-40 cpm
16	0840 111882 04/18	7	6	Hard (10YR 5/6) ~~silty~~ clay/silt low plasticity, dry, some small gravel ac 04/18/93	ML	3.25	HNV = 0 ppm B γ = 30-40 cpm
	0840 NA	10	0	No Recovery	NA	NA	HNV = NA B γ = NA
17	0845 111883 04/18	7	6	Hard ac 04/18/93 10YR 5/6 clayey silt, some small gravel, low plasticity, dry	ML	3.5	HNV = 0 ppm B γ = 30-40 cpm
	0845 111884 04/18	9	6	SAA	ML	3.5	HNV = 0 ppm B γ = 30-40 cpm
18	0845 NA	2	0	No Recovery	NA	NA	HNV = NA B γ = NA
	0850 111885 04/18	7	6	Hard 10YR 5/6 clayey silt, some small gravel, low plasticity, dry	ML	3.25	HNV = 0 ppm B γ = 30-40 cpm
19	0850 111886 04/18	7	6	SAA with 10YR 5/6 silty sand, well graded, dry	ML	~~3.25~~ ac 04/18/93	HNV = 0 ppm B γ = 30-40 cpm
	0850 NA	9	0	No Recovery Medium Dense	NA	NA	HNV = ~~0~~ ac 04/18/93 NA B γ = NA
20	0855 111887 04/18	12	6	(10YR 5/6) silty sand, well graded, small gravel, dry	ML	NA	HNV = 0 ppm B γ = 30-40 cpm

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller D. Smith
Assistant S. Smith

Background: HNV = 0 ppm
B γ = 40-50 cpm

NA - Not Applicable
SAA - Same As Above

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: IFP-HP-06/11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20	0855 111888 4/18	24	6	Medium Dense (10YR 5/6) silty sand, well graded, small gravel, dry	ML	NA	HNU = 0 ppm Bσ = 30-40 cpm
	0855 111889 4/18	24	3	SAA	ML	NA	HNU = 0 ppm Bσ = 30-40 cpm
21	0925 111890 4/18	10	6	SAA, dry	ML	NA	HNU = ~~0~~ 0 ppm Bσ = 30-40 cpm
	0925 111891 4/18	18	6	SAA, moist	ML	NA	HNU = 0 ppm Bσ = 30-40 cpm
22	0925 NA 4/18	16	0	NO Recovery	NA	NA	HNU = NA Bσ = NA
	0930 111892	12	6	Medium Dense (10YR 5/3) silty sand, well graded, small gravel wet	ML	NA	HNU = 0 ppm Bσ = 30-40 cpm
23	0930 111893	28	6	Very Hard (5Y 5/1) silty clay, ~~no~~ low plasticity, gravel, dry	CL	5.0	HNU = 0 ppm Bσ = 30-40 cpm
	0930 111894 4/18	40	6	SAA	CL	5.0	HNU = 0 ppm Bσ = 30-40 cpm
24	1255 111895 4/18	12	6	Hard (5Y 5/1) silty clay medium plasticity, some gravel, dry	CL	3.25	HNU = 0 ppm Bσ = 20-30 cpm
	1255 111896 4/18	20	6	SAA, dry	CL	3.5	HNU = 0 ppm Bσ = 20-30 cpm
25							

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller D. Smith
Assistant S. Smith

Background: HNU = 0 ppm
Bσ = 30-40 cpm

NA - Not Applicable
SAA - Same As Above

PERMALOY
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20-03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: IFR-HP-06/11004	COORDINATES:	DATE: 04/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/17/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/18/93	
DRILLING METHODS: Hollow Stem Auger		PAGE 6 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25	1256 ~~1108~~ 4/18	25	0	NO Recovery	NA	NA	HNU = NA Bγ = NA
				END OF BORING			HNU = Bγ =
26							HNU = Bγ =
							HNU = Bγ =
27							HNU = Bγ =
							HNU = Bγ =
28							HNU = Bγ =
							HNU = Bγ =
29							HNU = Bγ =
							HNU = Bγ =
30							HNU = Bγ =

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller D. Smith
Assistant S. Smith

Background: HNU = 0 ppm
Bγ = 40-50 cpm
NA - Not Applicable
SAA - Same As Above

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402-1

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 1FR-HP-06/11004
PIEZOMETER NO. NA
FIELD ENG./GEO. A. Como DATE 04/18
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 04/18/93

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
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

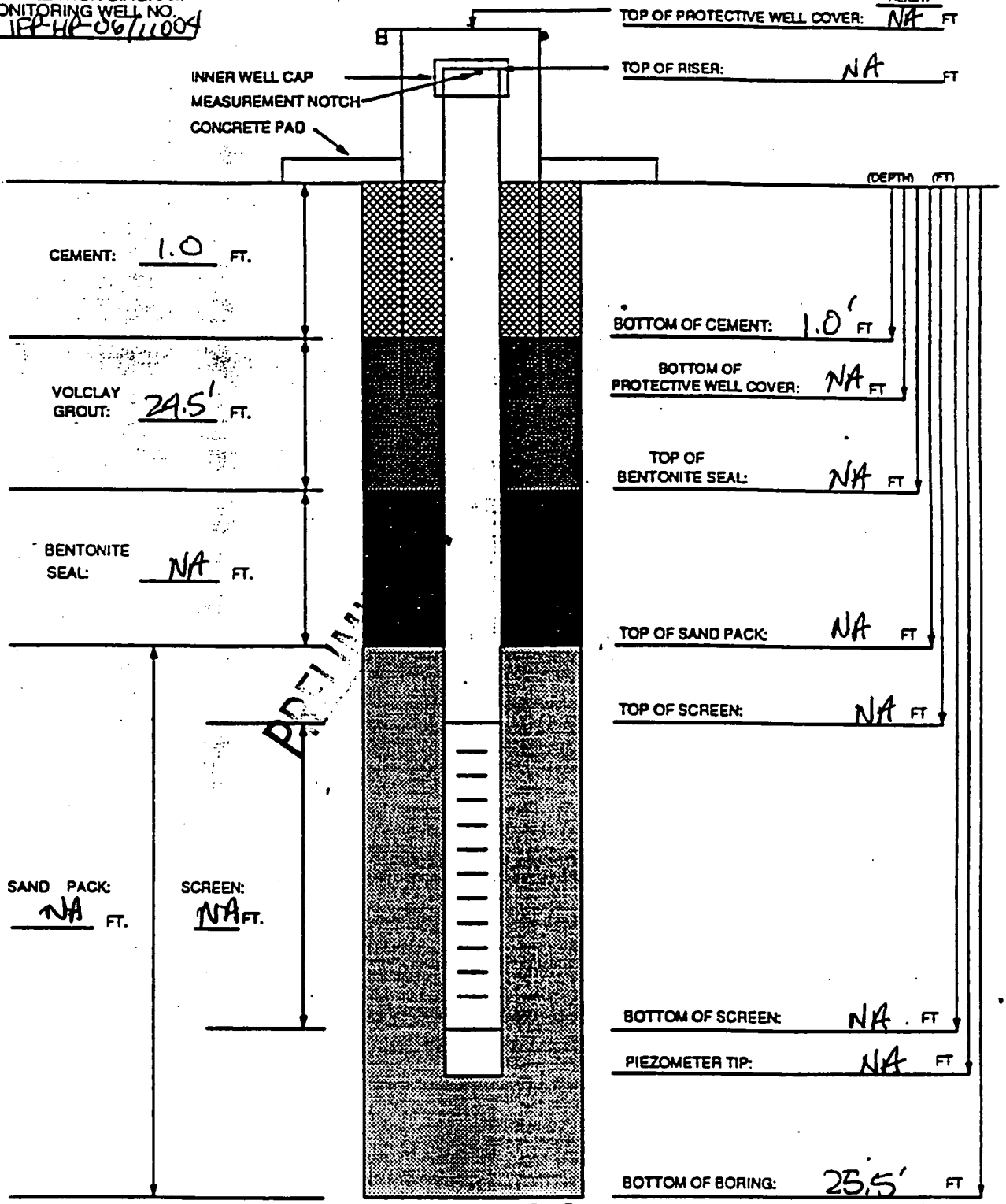
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	0.0	1.0'		
Cement GROUT/SLURRY	TOP 1.0'	BOTTOM 25.5'	TOP NA	BOTTOM N
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	25.5'			
GWL AFTER INSTALLATION	NA			

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

REMARKS Hydropunch boring

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. IP-HP-06/11004

INSTALLATION DATE: 04/18/93



BOREHOLE DIAMETER: 8.5 IN.

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MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 6
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 5.0 gal.
OTHER: NA
TASK: Hydropunch boring

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/
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Como

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197.20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1941	COORDINATES.	DATE 4/26/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Debes/Boyer	Depth Date/Time	DATE COMPLETED. 4/27/93
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 5

DEPTH (ft.)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	112765 0955 4/26/93	4	6	Stiff, Light olive brown (2.5 YR, 5/4), silty clay with some pebbles and rock fragments, low plasticity, dry	cl	1.25	MT = 1.5 ppm βγ = 80 cpm
0.5	112766 0955 4/26/93	6	6	SAA	cl	1.25	
1.0	112767 0955 4/26/93	9	2	SAA	cl	1.25	
1.5	112768 1000 4/26/93	7	6	Very stiff, Olive brown (2.5 YR, 4/4) silty clay with gravel and roots, med. plasticity, dry	cl	2.5	MT = 0.5 ppm βγ = 60 cpm
2.0	112769 1000 4/26/93	11	6	SAA	cl	2.5	
2.5	112770 1000 4/26/93	14	3	SAA	cl	2.5	
3.0	112771 1005 4/26/93	16	6	Very stiff, Yellowish brown (10 YR, 5/4) silty clay with trace of organics, med. plasticity, dry	cl	3.5	MT = 0.4 ppm βγ = 60 cpm
3.5	112772 1005 4/26/93	23	6	SAA	cl	3.5	
4.0	112773 1005 4/26/93	21	6	SAA	cl	3.5	
4.5	112774 1015 4/26/93	19	6	Very stiff, Yellowish brown (10YR, 5/4) silty clay with gravel, med. plasticity, dry.	cl	2.5	MT = 0.5 ppm βγ = 60 cpm
5.0							

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment CME-45

Driller Joe Raab

Roger Davis

MT - Microtip Photoionization

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197.20.03.05	PROJECT NAME. RI/FS Southfield	
RING NUMBER. 1941	COORDINATES.	DATE 4/26/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Debes/Boyer	Depth Date/Time	DATE COMPLETED. 4/27/93
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
5.0							
5.5	NA	14	0	No Recovery	NA	NA	NA
6.0	NA	10	0	No Recovery	NA	NA	
6.5	112775 1022 4/26/93	12	6	Very stiff, Light olive brown (2.5 YR, 5/4) silty clay with iron stains, med. plasticity, sl. moist	cl	2.5	MT = 0.5 ppm Bγ = 60 cpm
7.0	NA	15	0	No Recovery	NA	NA	
7.5	NA	18	0	No Recovery	NA	NA	
8.0	112776 1030 4/26/93	3	6	Hard, Yellowish Brown (10YR, 5/6) silty clay, med. plasticity, sl. moist	cl	4.0	MT = 0.5 ppm Bγ = 60 cpm
8.5	112777 1030 4/26/93	5	3	SAA	cl	4.0	
9.0	NA	9	0	No Recovery	NA	NA	
9.5	112778 1038 4/26/93	4	6	Hard, Light yellowish brown (10YR, 6/4) silty clay, med. plasticity, sl. moist	cl	4.0	MT = 0.5 ppm Bγ = 60 cpm
10.0	112779 1038 4/26/93	6	6	SAA	cl	4.0	

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment CME-45
Driller Joe Raab
Roger Davis

MT - Microtip Photoionization
SAA - Same as above
NA - Not Applicable

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

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1941	COORDINATES.	DATE 4/26/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Debes/Boyer	Depth Date/Time	DATE COMPLETED. 4/27/93
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0	112780 1038 4/26/93	7	6	Hard, light yellowish brown (10YR, 6/4) silty clay, med. plasticity, moist	cl	4.0	MT = 0.5 ppm βγ = 60 cpm
10.5	112781 1055 4/26/93	14	6	Olive brown (2.5YR, 6/6) clayey sand, moist.	SC	NA	MT = 0.5 ppm βγ = 60 cpm
11.0	112781 1055 4/26/93	19	6	SAA	SC	NA	
11.5	NA	27	0	No Recovery	NA	NA	
12.0	112782 1110 4/26/93	10	6	Olive brown (2.5YR, 6/6) clayey sand, moist	SC	NA	MT = 0.5 ppm βγ = 60 cpm
12.5	112783 1110 4/26/93	12	6	Very stiff, Gray (2.5YR, 6/1) silty clay, med. plasticity, sl. moist.	cl	2.5	
13.0	112784 1110 4/26/93	13	6	SAA	cl	2.5	
13.5				Split spoon sampled to 13.5'. Bottom of boring is 13.5'.			Composite sieve is sample #112781.

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment CME-45

Driller Joe Raab

Roger Davis

MT - Microtip Photoionization

SAA - Same as above

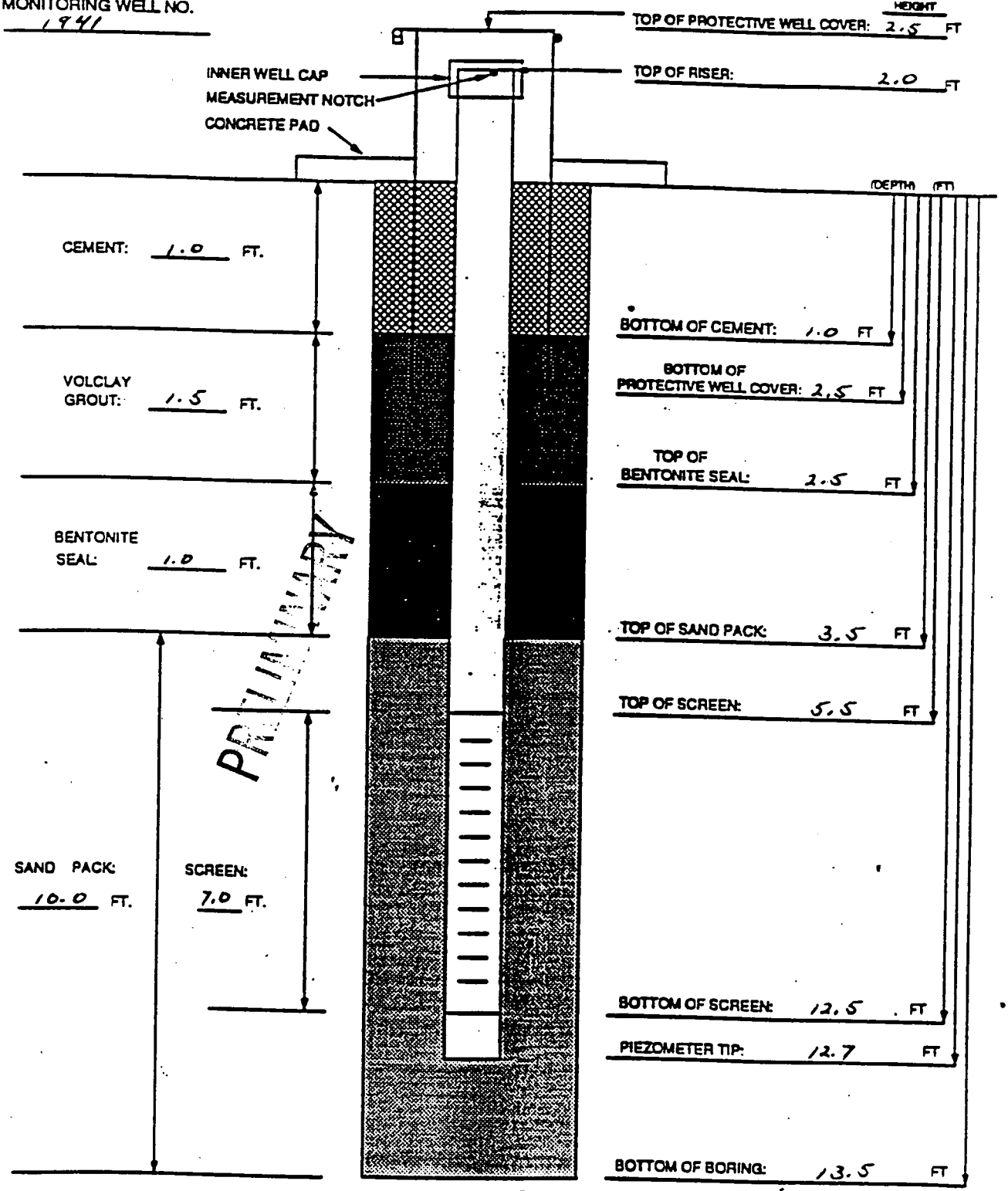
NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1941

INSTALLATION DATE: 4/26/93



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20, 6 1/2 - 50lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1-bucket
GS OF VOLCLAY GROUT: 1/2 - 50 lb bag
AMOUNT OF CEMENT: 1 - 94 lb bag
AMOUNT OF WATER USED: 7.0 gals
OTHER: 1-7' screen, 1-sump cap, 1-7 1/2' section
TASK: WBS 20.03.05 - 1000-series well

NOTES:

1) RISER PIPE IS 2.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 2.4 FT/ 4/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Debes / Boyer

ASI FORM 0157 REV. (0)

FERNALD RI/FS

MONITORING WELL MO. 4/27/93

~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME RI/FS Southfield
PROJECT NO. WBS 20.03.05
BORING NO. 1941
PIEZOMETER NO. NA

FIELD ENG./GEO. Debes/Boyer DATE 4/26
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 4/26/93

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 Auger
CASING SIZE (S) USED:
SIZE 8.0" FROM 0.0-ft TO 13.5-
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring well
DIAMETER OF PERFORATED SECTION 2.0" I.D.
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010"
TOTAL PERFORATED AREA 7.0-ft

RISER PIPE MATERIAL 316 stainless ste
RISER PIPE DIAMETERS:
O.D. 2 3/8" I.D. 2.0" I.
LENGTH OF PIPE SECTIONS 1-7½-ft sec
JOINING METHOD Screw type - flush joint threaded.

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0-ft
PROTECTIVE PIPE O.D. ~4.0"

OTHER PROTECTION Hinged well cove with lock.

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: Concrete	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 2.5	TOP	BOTTOM
BENTONITE	TOP 2.5	BOTTOM 3.5	TOP	BOTTOM
SAND	TOP 3.5	BOTTOM 13.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 5.5	BOTTOM 12.5	TOP	BOTTOM
PIEZOMETER TIP	12.7			
BOTTOM OF BOREHOLE	13.5			
GWL AFTER INSTALLATION	2.4 4/27/93			

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

REMARKS

FERNALD
RI/FS

E--4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 -		
BORING NUMBER. 1947	COORDINATES.		DATE 4/26/93
ELEVATION: NA	GWL: Depth	Date/Time	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST J. Regan	Depth	Date/Time	DATE COMPLETED. 4/28/93
DRILLING METHODS Hollow Stem auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS BG= 50cpm NNU= 0 ppm
1 2 3 4 5				Brown, silty clay moist			Refer to Boring log for MW2947 for detailed soil descriptions
6 7	111639 1420			Shelby Tube			BG= 50cpm NNU= 0ppm
8 9	111640 1440	8 10 13 13	6 6 6 6	stiff, 10YR 5/6 yellowish brown, silty clay, low plasticity moist	Cl	2.5	BG= 50cpm NNU= 0ppm
10 11	111641 1625	4 8 8	6 8 8	very stiff, 10YR 5/4, silty clay, mottled, some fine sand, low plasticity moist	cl	3.0	BG= 80cpm. NNU= 0ppm
12	111642 1630	7 8 8	6 6 0	SAA	cl	3.0	BG= 60cpm NNU= 0 ppm
13 14	111643 1640	3 10 13	6 6 4	Stiff, 10YR 5/4 silty clay mottled, low plasticity, moist	cl	1.5	BG= 60cpm NNU= 0ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller Marty Watral
Bob Deiley

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Char-

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2		
BORING NUMBER 1947	COORDINATES. NA		DATE 4/26/93
ELEVATION: NA	GWL: Depth	Date/Time	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 4/28/93
DRILLING METHODS Hollow Stem auger			PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
14.5							
15	111644	6	6	Stiff, 10YR5/4, silty clay	cl	1.5	BG 80cpm
	1650	10	6	Mottled, low plasticity, moist			NNV = 0ppm
		13	4				
16	111645	8	6	SAA	cl	1.5	BG = 60cpm
17	1655	10	6				NNV = 0ppm
		14	0				
18	111646	8	6	SAA	cl	1.5	BG = 80cpm
	1705	17	6				NNV = 0ppm
		24	6				
19	111647	4	6	SAA	cl	1.5	BG = 80cpm
20	1715	8	6				NNV = 0ppm
		12	6				

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller Marty Watral
Bob Dailey

SAA - Same as above
NA - Not Applicable

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

-4529

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2
PROJECT NO. 20.03.05
BORING NO. 1947
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 4/28
CHECKED BY NA DATE NA
DATE OF INSTALLATION 4/28/93

BOREHOLE DRILLING

DRILLING METHOD Hollowstem 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 Stainless
DIAMETER OF PERFORATED SECTION 2 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.01 in
TOTAL PERFORATED AREA 10 Ft

RISER PIPE MATERIAL Stainless
RISER PIPE DIAMETERS:
O.D. ____ I.D. 2 in
LENGTH OF PIPE SECTIONS 10', 2'
JOINING METHOD Flush thread

PROTECTION SYSTEM

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

OTHER PROTECTION Drum over riser pipe

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	1.5		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 7.0	TOP NA	BOTTOM NA
BENTONITE	TOP 7.0	BOTTOM 8.5	TOP NA	BOTTOM NA
SAND	TOP 8.5	BOTTOM 20.5	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 10.5'	BOTTOM 20.2	TOP NA	BOTTOM NA
PIEZOMETER TIP	20.5'		NA	
BOTTOM OF BOREHOLE	20.5'		NA	
GWL AFTER INSTALLATION	None		NA	

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

REMARKS Temporary well set as per instructions from John Whitehead. See attached drawing with FADL by 4/27/93

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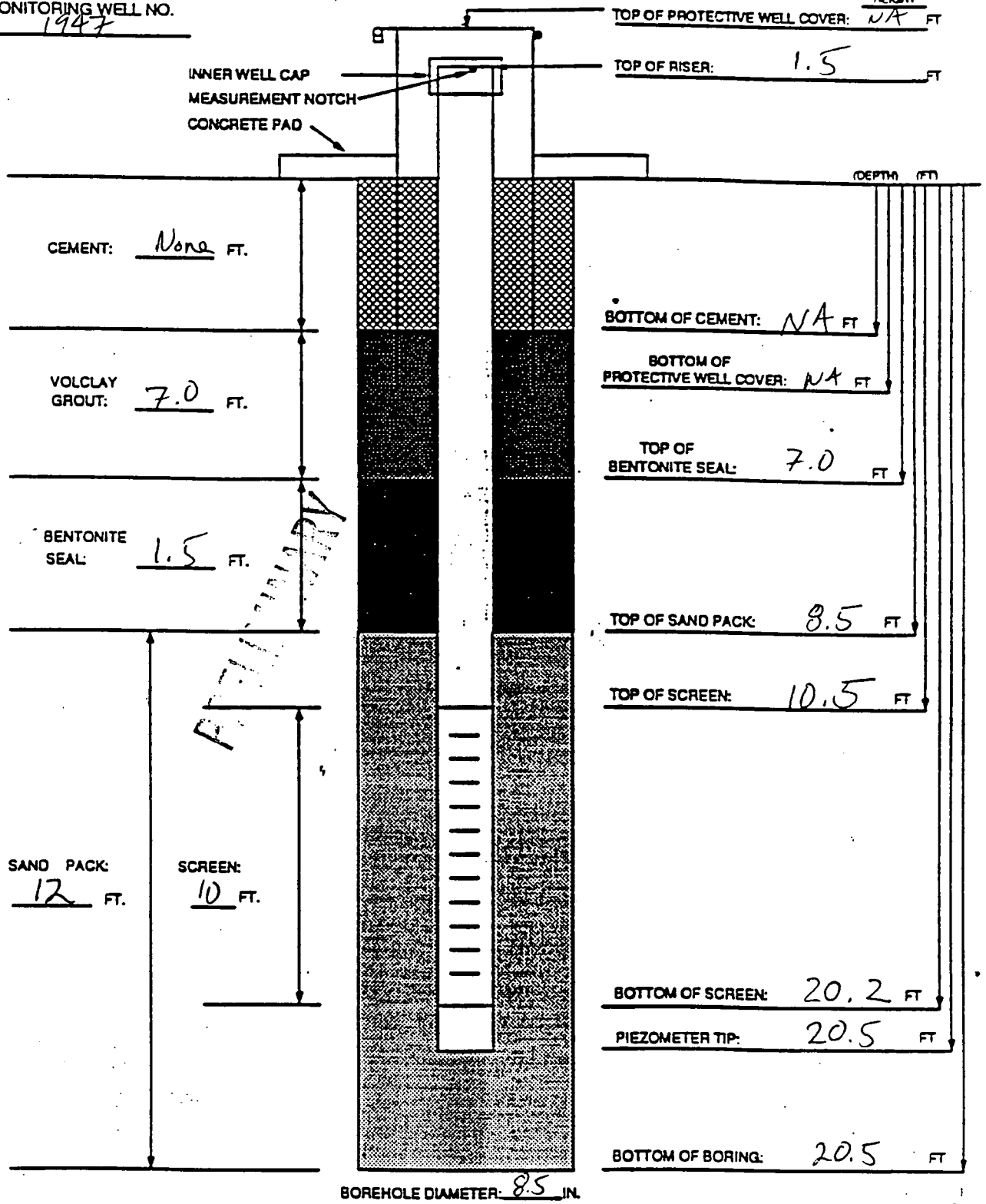
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1947

INSTALLATION DATE: 4/28/93



BOREHOLE DIAMETER: 8.5 IN.

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MATERIALS USED

SAND TYPE AND QUANTITY: 10x20, 5 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: None
AMOUNT OF WATER USED: 15 gal
OTHER: NA
TASK: NA

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2 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 N FT
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BE GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: J. Reagan

VISUAL CLASSIFICATION OF SOILS -4529

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: 1985	COORDINATES:	DATE: 04/26/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/26	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/27	
DRILLING METHODS: Hollow Stem Auger w/CME Sampler		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	1340 111440 04/26	NA	12	(2.5Y4/4) olive brown silty clay, low plasticity, some gravel, moist	CL	NA	MT = 0.0 ppm Bz = 80-100 cpm
2	1340 111440 04/26	NA	12	SAA, dry	CL	NA	MT = 0.0 ppm Bz = 80-100 cpm
	1400 111441 04/26	NA	12	(2.5Y5/3) light olive brown, silty clay, low plasticity, some gravel, dry	CL	NA	MT = 1.1 ppm Bz = 80-100 cpm
4	1400 111441 04/26	NA	12	SAA, dry	CL	NA	MT = 1.1 ppm Bz = 80-100 cpm
	1530 111442 04/26	NA	12	(2.5Y 4/4) light olive brown silty clay, low plasticity, some gravel, moist	CL	NA	MT = 1.1 ppm Bz = 40-50 cpm
6	1530 111442 04/26	NA	12	SAA, some sand, well graded can see water flowing into borehole from sidewall at 4.0'	CL	NA	MT = 1.1 ppm Bz = 40-50 cpm
	1635 111443 04/26	NA	12	(2.5Y 4/2) dark grayish brown silty clay, medium plasticity, some gravel, some sand, well graded, moist, dail	CL	NA	MT = 1.1 ppm Bz = 40-50 cpm
8	1635 111443 04/26	NA	12	SAA	CL	NA	MT = 1.1 ppm Bz = 40-50 cpm
*	1430 111444 04/27	NA	12	(2.5Y 5/4) light olive brown clayey silt, low plasticity, some gravel, some sand, well graded, moist	ML	NA	MT = 0.0 ppm Bz = 40-50 cpm
10	1430 111444 04/27	NA	12	SAA	ML	NA	MT = 0.0 ppm Bz = 40-50 cpm

NOTES

Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller Don Smith
Assistant Sam Smith

Background: MT = 0.0 ppm
Bz = 40-100 cpm

MT - Microtip
SAA - Same As Above
NA - Not Applicable

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* Started using CME sampler, from 0.0' to 8.0' a 2.0' long, no [illegible] hollow auger was used

VISUAL CLASSIFICATION OF SOILS

4529

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase 2		
BORING NUMBER: 1985	COORDINATES:	DATE: 04/27/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/26/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/27/93	
DRILLING METHODS: Hollow Stem 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
10	1430 111445 04/27	NA		Firm (2.5Y 4/2) dark grayish brown silty clay, medium plasticity, some gravel, moist	CL	1.0	MT ~~HNU~~ = 0.8 ppm (ac 4/27/93) Bγ = 40-50 cpm
11	1430 111445 04/27	NA		Hard (2.5Y 2/0) and (2.5Y 4/0) silty clay, low plasticity, dry	CL	2.5	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
12	1430 111440 04/27	NA		~~Hard~~ ac 4/27/93 SAA, dry 12.5' Hard (5Y 5/1) gray clay some (2.5Y 5/6) silty clay, low plasticity, dry	CL	2.75	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
13	1630 111447 04/27	NA		Hard (2.5Y 5/4) light olive brown clayey silt, some (2.5Y 4/0) silty clay, some gravel, low plasticity, dry	ML	3.0	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
14	1630 111447 04/27	NA		SAA, dry	ML	3.0	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
15	1630 111450 04/27	NA		Hard (2.5Y 5/4) light olive brown clayey silt, some (7.5YR 5/6) silty clay, slight plasticity, some small gravel, dry, iron staining in crevice pieces	ML	3.25	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
16	1630 111450 04/27	NA		~~Hard~~ ac 04/27/93 SAA, dry		3.25	MT ~~HNU~~ = 0.8 ppm Bγ = 40-50 cpm
17				END OF BORING			MT ~~HNU~~ = Bγ =
							MT ~~HNU~~ = Bγ =
							MT ~~HNU~~ = Bγ =

NOTES:
Drilling Co. Pennsylvania Drilling
Drilling Equipment Mobile B-80
Driller Don Smith
Assistant Sam Smith

Background: MT ~~HNU~~ = 0.8 ppm
Bγ = 40-50 cpm

MT- Microtip
SAA- Same As Above
NA- Not Applicable

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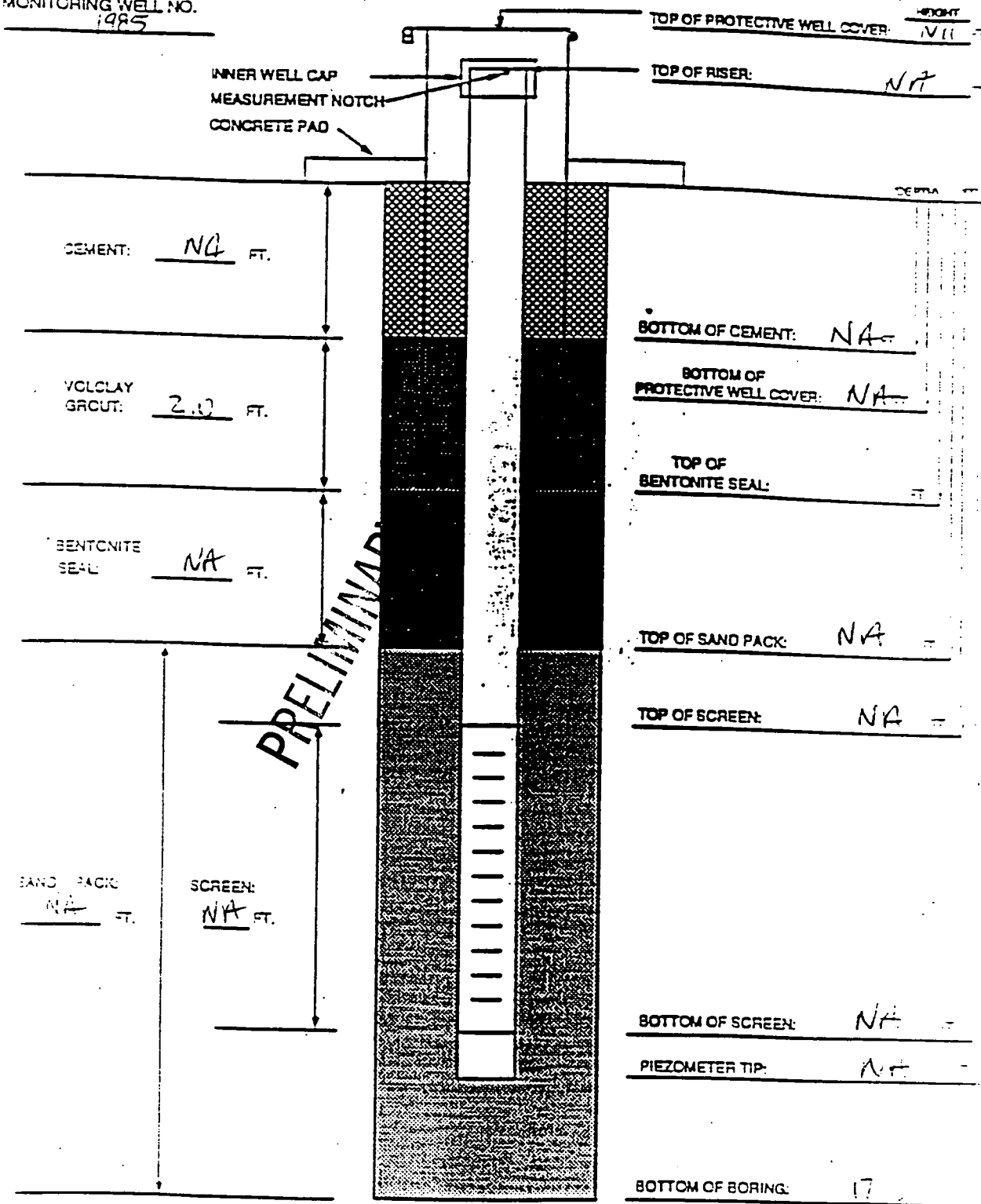
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1985

INSTALLATION DATE: 09/27/9



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: NA
OTHER: Backfilled overnight with soil cuttings
TASK: Soil Boring

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: [illegible]

4) WATER DEPTH
5) TOP OF CASING [illegible] STAINLESS STEEL
6) PARENTHESIS [illegible] GROUND LEVEL
WELL DATUM [illegible]
COVER [illegible]

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RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
PROJECT NO.: 20.03.05
BORING NO.: 1985
PIEZOMETER NO.: NA
FIELD ENG./GEO.: A. Como
CHECKED BY: DATE
DATE
DATE OF INSTALLATION

BOREHOLE DRILLING

DRILLING METHOD: bucket auger and CME sampler
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT: bucket auger / Hollow
CASING SIZE (S) USED:
SIZE NA FROM NA TO
SIZE NA FROM NA TO

PIEZOMETER DESCRIPTION

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

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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION: NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 15.0	BOTTOM 17.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	17.0			
GWL AFTER INSTALLATION	NA			

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

REMARKS: Used bucket auger from 0.0' to 8.0' Then used CME sampler from 8.0' to 17.0'. Grouted native material backfilled boring with soil cuttings.

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FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 20.03.05	PROJECT NAME: RI/FS South Field	
BORING NUMBER: 1998	COORDINATES:	DATE 4/27/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 4/27/93
ENGINEER/GEOLOGIST: Debes/Boyer	Depth Date/Time	DATE COMPLETED: 4/27/93
DRILLING METHODS: Hollow stem auger		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	112040 1605 4/27/93	7	6	Black, (2.5Y, 2.5/1), silty sand, low plasticity, dry	SM	NA	Microtip (AT) = 0.0 ppm; β γ = 120 cpm
1.0	112040 1605 4/27/93	9	6	Black (2.5Y, 2.5/1), fly ash	NA	NA	
	112040 1605 4/27/93	14	6	SAA	NA	NA	
	112040 1605 4/27/93	25	6	SAA	NA	NA	
2.0	112041 1630 4/27/93	NA	6	Shelby tube	NA	NA	Microtip (AT) = NA; β γ = NA
	112041 1630 4/27/93	NA	6		NA	NA	
3.0	112041 1630 4/27/93	NA	6		NA	NA	
	112041 1630 4/27/93	NA	6	Shelby tube	NA	NA	
4.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: CME-45
Driller: Joe Raab
Helper: Roger Davis

Background 4/27/93
β γ = 60 cpm
AT = 0.0 ppm

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

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1998	COORDINATES.	DATE 4/28/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/28/93
ENGINEER/GEOLOGIST. Debes/Boyer	Depth Date/Time	DATE COMPLETED: 4/28/93
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0 – 0.5	112042 0840 4/28/93	8	6	Black (2.5 Y, 2.5/1), Silty sand, low plasticity; dry	sm	NA	Microtip = 0.3 ppm; βγ = 60 cpm
0.5 – 1.0	112042 0840 4/28/93	7	6	Black (2.5 Y, 2.5/1), fly ash	NA	NA	
1.0 – 1.5	112042 0840 4/28/93	14	6	SAA	NA	NA	
1.5 – 2.0	112043 112044 0840 4/28/93	18	6	SAA	NA	NA	
2.0 – 2.5	112045 0905 4/28/93	5	6	SAA	NA	NA	Microtip = 0.5 ppm; βγ = 80 cpm
2.5 – 3.0	112045 0905 4/28/93	5	6	SAA	NA	NA	
3.0 – 3.5	112045 0905 4/28/93	5	6	SAA	NA	NA	
3.5 – 4.0	112046 112047 0905 4/28/93	5	6	Very stiff, Yellowish brown (10YR, 5/4), silty clay, low plasticity, dry	cl	2.5	
4.0 – 4.5	112048 0930 4/28/93	3	6	Black (2.5 Y, 2.5/1), Silty sand, low plasticity, dry	sm NA NO 4 μm	NA	Microtip = 0.6 ppm; βγ = 80 cpm
4.5 – 5.0	112048 0930 4/28/93	3	6	Black (2.5Y, 2.5/1), Fly ash.	NA	NA	

NOTES:
Pennsylvania Drilling
CME-45
Driller: Joe Raab
Helper: Roger Davis

SAA = Same As Above
NA = Not Applicable

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

PRELIMINARY

402-11-81

FERNALD RI/FS

E-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1998	COORDINATES:	DATE 4/28/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/28/93
ENGINEER/GEOLOGIST. Debes/Boyer	Depth Date/Time	DATE COMPLETED: 4/28/93
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	112048 0930 4/28/93	6	6	Stiff, Yellowish brown (10YR, 5/4), Silty clay with roots and wood fragments, low plasticity, dry	cl	1.75	MT = 0.6 ppm βγ = 80 cpm
5.5	112049 112050 0930 4/28/93	14	6	SAA	cl	1.75	
6.0	112051 0950 4/28/93	5	6	Black (2.5Y, 2.5/1), Fly ash, wet.	NA	NA	MT = 0.6 ppm βγ = 80 cpm
6.5	112051 0950 4/28/93	17	6	Hard, Light yellowish brown (10YR, 6/4) and gray (10YR, 7/2), Silty clay, med. plasticity, sl. moist	cl	3.5	
7.0	112051 0950 4/28/93	22	6	SAA	cl	3.5	
7.5	112052 112053 0950 4/28/93	28	6	SAA	cl	3.5	
8.0	112054 1055 4/28/93	8	6	Black (2.5Y, 2.5/1), Fly ash, moist.	NA	NA	MT = 0.5 ppm βγ = 60 cpm
8.5	112054 1055 4/28/93	6	6	Very stiff, Light yellowish brown (10YR, 6/4), Silty clay, low plasticity, dry.	cl	2.5	
9.0	112055 1055 4/28/93	8	6	Black (2.5Y, 2.5/1), Fly ash, wet.	NA	NA	
9.5	112055 112056 1055 4/28/93	14	6	Very stiff, Gray (10YR, 6/1), Silty clay with iron stringers and gravel, low plasticity, dry	cl	3.0	
10.0							

NOTES:

Pennsylvania Drilling
CME - 45
Driller: Joe Raab
Helper: Roger Davis

MT = Microtip Photoionization
SAA = Same as Above
NA = Not Applicable
Samples collected per ASTM Standard Penetration Test.
Colors identified using Munsell Color Chart.

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PRELIMINARY

FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1998	COORDINATES.	DATE 4/28/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 4/28/93
ENGINEER/GEOLOGIST Debes/Boyer	Depth Date/Time	DATE COMPLETED: 4/28/93
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 6

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0	112057 1330 4/28/93	3	6	Medium stiff, Light brownish gray (10YR, 6/2), Silty clay, med. plasticity, dry	cl	1.5	MT = 0.3 ppm βγ = 60 cpm
10.5	112057 1330 4/28/93	6	6	SAA	cl	1.5	
11.0	112057 1330 4/28/93	12	6	Light olive brown (2.5Y, 5/4), Gravelley sand, wet.	sw	NA	
11.5	112058 112059 1330 4/28/93	17	6	Hard, Light olive brown (2.5Y, 5/4), Silty clay with pea gravel, low plasticity, dry.	cl	3.5	
12.0	112060 1355 4/28/93	4	6	Light olive brown (2.5Y, 5/4), Poorly graded gravelley sand, wet.	sp	NA	MT = 0.5 ppm βγ = 60 cpm
12.5	112060 1355 4/28/93	10	6	Stiff, gray (2.5Y, 5/1), Silty clay with pea gravel, dry.	cl	3.5	
13.0	112060 1355 4/28/93	17	6	SAA	cl	3.5	
13.5	112061 112062 1355 4/28/93	20	6	SAA	cl	3.5	
14.0	112063 1410 4/28/93	3	6	Stiff, Gray (2.5, 5/1), Silty clay with pea gravel, med. plasticity, sl. moist.	cl	3.0	MT = 0.5 ppm βγ = 60 cpm
14.5	112063 1410 4/28/93	5	6	SAA	cl	3.0	
15.0							

NOTES:
Pennsylvania Drilling
CME-45
Driller: Joe Raab
Helper: Roger Davis

MT = Microtip Photoionization
SAA = Same As Above
NA = Not Applicable
Samples collected per ASTM Standard Penetration Test.
Colors identified using Munsell Color Chart.

FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. RI/FS Southfield	
BORING NUMBER. 1998	COORDINATES:	DATE 4/28/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4/28/93
ENGINEER/GEOLOGIST. Dabes / Boyer	Depth Date/Time	DATE COMPLETED: 4/28/93
DRILLING METHODS Hollow Stem Auger		PAGE 4 OF 6

DEPTH (ft.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	112063 1410 4/28/93	12	6	Stiff, Gray (2.5Y, 5/1), silty clay with pea gravel, med. plasticity, sl. moist.	cl	3.0	MT = 0.5 ppm BG = 60 cpm
15.5	112063 1410 4/28/93	14	3	Gray (2.5Y, 6/1), poorly graded sand, moist.	sp	NA	
16.0	112064 1430 4/28/93	NA	6	Shelby Tube	NA	NA	The shelby tube could only be pushe 1-foot in this materi
16.5	112064 1430 4/28/93	NA	6	Shelby Tube	NA	NA	
17.0	112065 1524 4/28/93	>50/6	6	Hard, Gray (2.5Y, 5/1), silty clay with pea gravel, low plasticity, dry. (Hard Pan)	cl	4.0	MT = 0.5 ppm BG = 60 cpm
17.5	112065 1524 4/28/93	>50/6	6	SAA	cl	4.0	
18.0	112065 1524 4/28/93	>50/6	6	SAA	cl	4.0	
18.5	112066 112067 1524 4/28/93	>50/6	6	SAA	cl	4.0	
19.0				Bottom of boring 19.0 feet			

NOTES:
Pennsylvania Drilling
CME-45
Driller: Joe Raab
Helper: Roger Davis

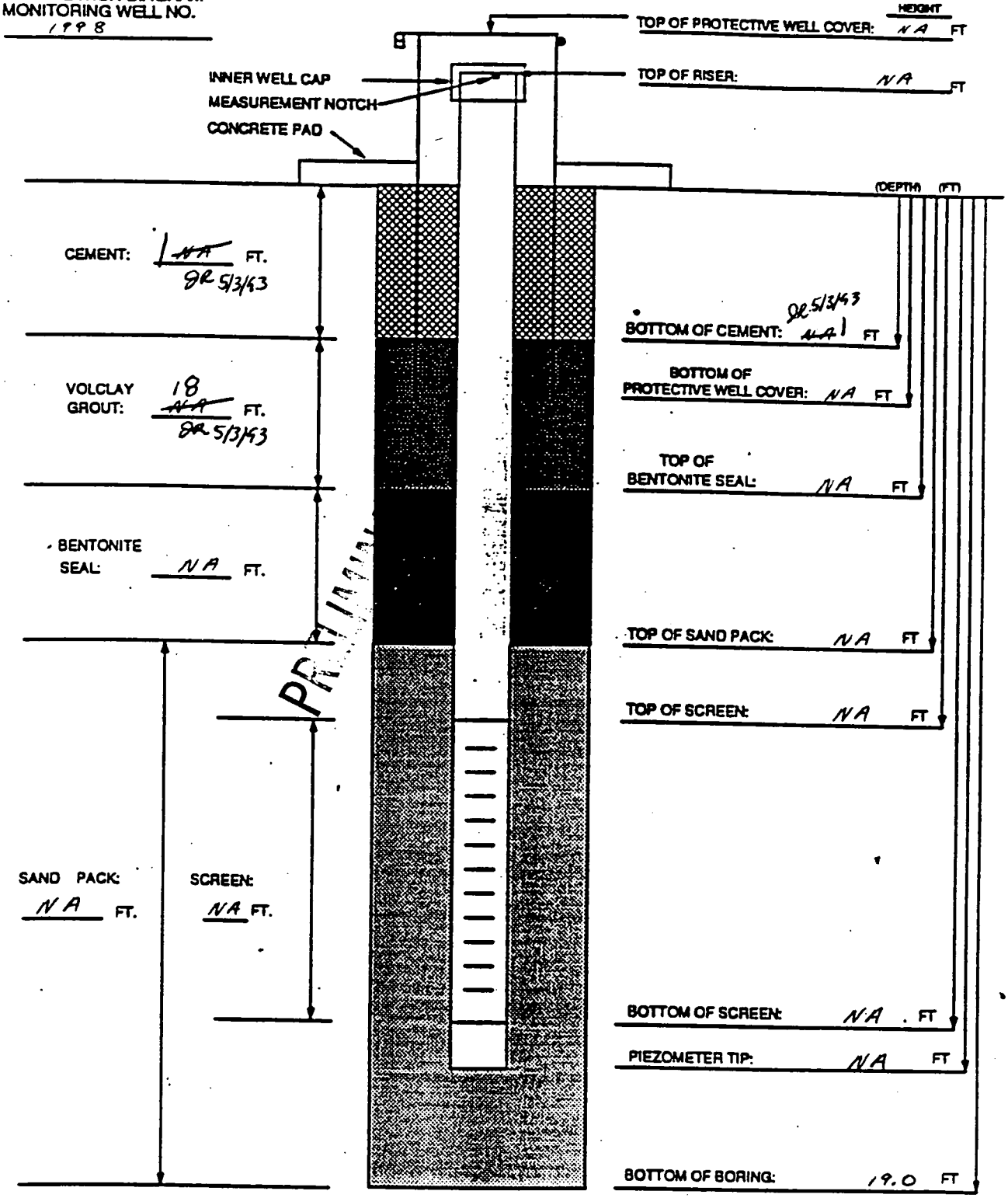
MT = Microtip Photoionization
SAA = Same As Above
NA = Not Applicable
Samples collected per ASTM Standard Penetration Test.
Colors identified using Munsell Color Chart.

402-11

-4539

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
1998

INSTALLATION DATE: 4/28/93



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	NA FT	
TOP OF RISER:	NA FT	
BOTTOM OF CEMENT:	~~NA~~ 1 JR 5/3/93 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:	19.0 FT	

BOREHOLE DIAMETER: 8.0 IN.

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MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~~NA~~ 3 JR 5/3/93
AMOUNT OF CEMENT: ~~NA~~ 1 JR 5/3/93
AMOUNT OF WATER USED: ~~NA~~ 15 gal JR 5/3/93
OTHER: NA
TASK: Sample collection

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: Debes / Boyer

4) WATER DEPTH AND DATE NA FT/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELO GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

ACL FORM 0457 REV. (9)

1 - 4029
6 of 4

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/FS Southfield
PROJECT NO. WBS 20.03.05
BORING NO. 1998
PIEZOMETER NO. NA

FIELD ENG./GEO. Debes/Boyer DATE 4/26
CHECKED BY J. Reagan DATE 5/3
DATE OF INSTALLATION ~~NA~~ ~~4/3~~ 5/3/5
JR 5/3/93

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 Auger
CASING SIZE (S) USED:
SIZE 8.0" FROM 0.0 ft TO 19.0 ft
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1 ~~NA~~ JR 5/3/93	BOTTOM 19 ~~NA~~ JR 5/3/93	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	19.0			
GWL AFTER INSTALLATION	NA			

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

REMARKS

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1986	COORDINATES:	DATE: 04/28/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/28/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 4/30/93	
DRILLING METHODS: Hollow stem Auger w/ CME Sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (NA)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1430			Hard (2.5Y 4/3) silty clay, low to medium plasticity, dry, some (5Y 4/2) olive gray silty clay			MT = 0.9 ppm Bd = 100-120 cpm
	111451	NA	18		CL	2.75	Found some pieces of glass in the sample
2.5	04/28						
	1430			Hard (2.5Y 4/3) silty clay, low plasticity, gravel, dry			MT = 0.9 Bd = 150-170
	111452	✓ NA	18		CL	4.0	
	111454	✓ TCLP					
	111450	Hot Sample		Hard (2.5Y 4/0) dark gray to (2.5Y 2/0) black silty clay, no plasticity, dry			MT = 0.9 Bd = 10,000 cpm This sample was at the very tip of the sample from 0-1/4" to 3/4"
5.0	04/28						
	1515			Hard (5Y 4/2) silty clay, low plasticity, some gravel, small areas of black material, some (2.5Y 5/4) silty clay w/ some (2.5Y 5/1) silty clay, dry			note: Hot sample MT = 1.0 ppm Bd = 150 cpm collected from first 2 inches. Also found green sandy material within this sample.
	111457	NA	30		CL	3.0	MT = 1.0 ppm Bd = 150-170 cpm Found some brittle, thin material in sample
7.5	04/29						

NOTES:
Drilling Co: Pennsylvania Drilling Co.
Driller: Don Smith
Assistant: Sam Smith

MT = 0.9 ppm
Bd = 150-170 cpm

MT - Microtip
NA - Not Applicable

PRELIMINARY

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1986	COORDINATES:	DATE: 04/28/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/28/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 04/30/93	
DRILLING METHODS: Hollow stem Auger w/ CME Sampler		PAGE 2 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 NA	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1515			Hard (5Y 4/2) silty clay, some subangular to rounded gravel, low plasticity, dry			MT = 1.0 ppm Bγ = 150-170 cpm
	111456	NA	24	9.0 (5Y 4/2) sand lense Hard (7.5YR 2/0) black silty clay, low plasticity, dry	CL	2.75	small pieces of glass in sample (8.0'-9.0') some greenish silty clay
	04/29						
10.0	0930			Hard (5Y 5/1) clay with (2.5Y 5/6) silty clay, low plasticity, dry 11.0			MT = 0.6 ppm Bγ = 80-90 cpm
	111457	NA	30	Hard (2.5Y 6/0) and (2.5Y 5/6) silty clay, with some (2.5Y 2/0) clay, low plasticity, dry	CL	3.0	
	04/30						
12.5	0930			Hard (2.5Y 5/6) silty clay, low plasticity, dry			MT = 0.6 ppm Bγ = 80-90 cpm
	111456	TALC		(13.0'-13.5') (2.5Y 5/6) clayey sand, well graded, some gravel, moist			
	111459	NA	30		CL	2.75	Shelby tube (sample # 111461) pushed from 15.0'-17.0'
15.0	04/30						

NOTES:
Drilling Co.: Pennsylvania Drilling Co.
Driller: Don Smith
Assisstant: Sam Smith

Background: MT = 1.0 ppm, Bγ = 150-170 cpm } 04/2 04/
MT = 0.6 ppm, Bγ = 80-90 cpm } 04/3

MT - Microtip
NA - Not Applicable

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
PROJECT NO.: 20.03.05
BORING NO.: 1980
PIEZOMETER NO.: NA
FIELD ENG./GEO.: A. Como — DATE: 04/3
CHECKED BY: — DATE:
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow stem auger w/CME sampler
TYPE OF BIT: Hollow stem 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: 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 (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	0.0	1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 15.0	TOP NA	BOTTOM N
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM N
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	15.0'		NA	
GWL AFTER INSTALLATION	NA		NA	

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

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REMARKS: Soil Boring using Hollow stem Auger w/ CME sampler. Pushed shelby tube from 15.0' to 17.0'.

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. RI/FS Southfield (Inactive Flyash)	
BORING NUMBER. 2955	COORDINATES.	DATE 4/26/93
ELEVATION:	GWL: Depth 53' Date/Time 4/30/93, 843	DATE STARTED: 4/26/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 53.3' Date/Time 5/6/93, 800	DATE COMPLETED: 5/5/93
DRILLING METHODS: Cable Tool		PAGE 1 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	110768 1345 4/26/93	3 10 9	12	Stiff olive Brown (2.5Y, 4/3) Silty Clay with some Rock fragments & Flyash Low plasticity, slightly moist	CL	1.25	Hnu = 1.4 ppm BY = 40 cpm L = 0 cpm
1.5				Medium Dense, Black (2.5Y, 2.5/1) Flyash Dry	N/A	N/A	
	110769 1350 4/26/93	6 5 8	16	Medium Dense Black (2.5Y, 2.5/1) Flyash, Dry	N/A	N/A	Hnu = 1.4 ppm BY = 40-80 cpm L = 0 cpm
3.0	110770 1355 4/26/93	4 6 8	15	SAA	N/A	N/A	Hnu = 1.4 ppm BY = 40-80 cpm L = 0 cpm
4.5	110771 1400 4/26/93	7 6 5	15	SAA	N/A	N/A	Hnu = 1.3 ppm BY = 40-60 cpm L = 0 cpm
6.0	110772 1405 4/26/93	3 3 4	13	Loose, Black (2.5Y, 2.5/1) Flyash Dry	N/A	N/A	Hnu = 1.4 ppm BY = 80 cpm L = 0 cpm
7.5	110773 1410 4/26/93	2 2 2	7	Very Loose Black (2.5Y, 2.5/1) Flyash, Dry	N/A	N/A	Hnu = 1.4 ppm BY = 60-80 cpm L = 0 cpm
9.0	110774 1415 4/26/93	2 1 2	5	SAA	N/A	N/A	Hnu = 1.4 ppm BY = 40-60 cpm L = 0 cpm
10.5	110775 1615 4/26/93	4 3 4	7	Loose, Black (2.5Y, 2.5/1) Flyash with some wood fragments, wet	N/A	N/A	Hnu = 0 ppm BY = 40-60 cpm L = 0 cpm Moisture Appears to be from Drilling Fluid
12.0	110776 1620 4/26/93	3 2 2	9	Very Loose Black (2.5Y, 2.5/1) Flyash, wet	N/A	N/A	Hnu = 0 ppm BY = 40-60 cpm L = 0 cpm Moisture Appears to be from Drilling Fluid
13.5	110777 1635 4/26/93	3 2 2	11	SAA	N/A	N/A	Hnu = 0.2 ppm BY = 60-90 cpm L = 0 cpm
15.0							

NOTES

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

Background Levels
Microtip = 1.7 ppm
BY = 40-60 cpm
L = 0 cpm

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

PRELIMINARY

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FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME RI/FS Southfield Inactive Flyash	
BORING NUMBER 2955	COORDINATES	DATE 4/26/93
ELEVATION:	GWL: Depth 53.0' Date/Time 4/30/93, 843	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 53.3' Date/Time 5/6/93, 800	DATE COMPLETED: 5/5/93
DRILLING METHODS Cable Tool		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	110778 1640 4-26-93	5 9 10	9	Medium Stiff, Olive ~~Gray~~ (5Y, 4/2) RG 4/27/93, Silty Clay with a Trace of Gravel and Root Fragments, medium Plasticity, Slightly Moist	CL	1.0	HNU = .1 BY = 60 cpm α = 0 cpm
16.5	110779 845 4/27/93	2 5 7	8	Medium Stiff, Olive (5Y, 4/2) Silty Clay with a Trace of Gravel, Medium Plasticity, Slightly moist	CL	1.0	HNU = 0 ppm BY = 60 cpm α = 0 cpm
18.0	110780 900 4/27/93	11 15 21	7	Stiff, Olive (5Y, 4/2) Silty Clay with a Trace of Gravel, Medium Plasticity, Slightly moist	CL	1.5	HNU = 0 ppm BY = 60 cpm α = 0 cpm
19.5	110781 955 4/27/93	14 18 21	18	Stiff, Olive (5Y 4/4) Silty Clay with Some Gravel, Medium Plasticity Slightly moist	CL	2.0	HNU = 2 ppm BY = 60 cpm α = 0 cpm
21.0	110782 1000 4/27/93 ~~110783~~	16 28 39	18	Very Stiff ~~Light~~ Olive Brown (2.5Y, 5/4) Silty Clay with Some Gravel medium Plasticity, Slightly moist	CL	2.5	HNU = 3 ppm BY = 60 cpm α = 0 cpm
22.5	110783 1030 4/27/93	18 29 38	5	Stiff Olive Brown (2.5Y 4/4) Silty Gravelly Clay with Some Rock Fragments medium Plasticity, Slightly moist	CL	2.0	HNU = 0 ppm BY = 60 cpm α = 0 cpm
24.0	110784 1045 4/27/93	16 18 21	14	Dense Yellowish Brown (10YR, 5/6) well Graded Sand Slightly moist	SW	NA	HNU = 0 ppm BY = 60 cpm α = 0 cpm
				Very Stiff, Gray (10YR, 5/1) Silty Clay with Some Gravel, Low Plasticity, Slightly moist	CL	3.0	
25.5	110785 1410 4/27/93	19 27 50/3	12	Very Stiff Yellowish Brown (10YR, 5/6) Silty Clay with Some Gravel + Sand, Low Plasticity, Slightly moist	CL	4.0	HNU = 1 ppm BY = 60 cpm α = 0 cpm
27.0	110786 1445 4/27/93	21 37 40	11	Very Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	HNU = 1 ppm BY = 60 cpm α = 0 cpm
28.5	~~110787~~ RG 4/27/93			No Sample Taken. Samples To Be Taken every 5' Starting at 30'.			
30.0							

NOTES

See Page 1

4/27/93 Background Levels
HNU = 0 ppm
BY = 40-60 cpm
α = 0 cpm

4/25/93 Background Levels
HNU = .4 ppm
BY = 40-60 cpm
α = 0 cpm

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FERNALD
RI/FS

E- -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME RI/FS Southfield Inactive Flyash	
BORING NUMBER 2955	COORDINATES	DATE 4/28/93
ELEVATION:	GWL: Depth 53.01 Date/Time 4/30/93, 843	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 53.31 Date/Time 5/6/93, 800	DATE COMPLETED 5/5/93
DRILLING METHODS Cable Tool		PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	110799	5		Dense, Dark Yellowish Brown (10YR, 4/4)			Hnu = .5 ppm
	910	13	7	Well Graded Sand, with	SW	N/A	Bx = 40-60 cpm
	4/28/93	25		Some Gravel, Dry			α = 0 cpm
31.5							
35.0							
	112942	13		Dense, Dark Yellowish Brown (10YR, 4/4)			Hnu = .5 ppm
	940	17	12	Poorly Graded, Sand with Some	SP	N/A	Bx = 60 cpm
36.5	4/28/93	29		Gravel, Dry			α = 0 cpm
40.0							
	112943	15		Dense, Dark Yellowish Brown, (10YR, 4/4)			Hnu = 1.0 ppm
	1000	16	10	Well Graded, Sand with Some	SW	N/A	Bx = 60-80 cpm
41.5	4/28/93	19		Gravel, Dry			α = 0 cpm
45.0							

NOTES

See Page 1

Background Levels
Hnu = .4 ppm
Bx = 40-60 cpm
α = 0 cpm

PRELIMINARY

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03 05	PROJECT NAME RI/FS Southfield Inactive Flyash	
BORING NUMBER 2955	COORDINATES:	DATE 4/28/93
ELEVATION:	GWL: Depth 53.0' Date/Time 4/30/93, 843	DATE STARTED 4/26/93
ENGINEER/GEOLOGIST Ken Geiger	Depth Date/Time 5/6/93, 800	DATE COMPLETED: 5/5/93
DRILLING METHODS Cable Tool		PAGE 4 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0 – 46.5	112944 1345 4/28/93	12 22 30	9	Very Dense Dark Yellowish Brown (10YR 4/4) well Graded Sand with Some Gravel, Dry	SW	N/A	Hnu = .5ppm BX = 60-80cpm ⊥ = 0cpm
50.0 – 51.5	112945 1510 4/28/93	17 22 29	8	Very Dense Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	Hnu = .1ppm BX = 60cpm ⊥ = 0cpm
51.5 – 53.0	112946 1330 4/29/93	50/5	4	Very Dense Dark Yellowish Brown (10YR, 4/4) Poorly Graded Gravelly Sand, slightly moist	SP	N/A	Hnu = 0ppm BX = 40cpm ⊥ = 0cpm
53.0 – 54.5	112947 1345 4/29/93	6 20 40	9	Very Dense Dark Yellowish Brown (10YR, 4/4) well Graded Sand with Some Gravel, wet	SW	N/A	Hnu = 0ppm BX = 60cpm ⊥ = 0cpm
54.5 – 56.0	112948 1405 4/29/93	9 13 16	12	Medium Dense Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, wet	SP	N/A	Hnu = 0ppm BX = 40-60cpm ⊥ = 0cpm
56.0 – 57.5	112949 1545 4/29/93	9 11 17	18	Medium Dense Dark Yellowish Brown (10YR, 4/4) well Graded Sand with Some Gravel, wet	SW	N/A	Hnu = 0ppm BX = 40cpm ⊥ = 0cpm
57.5 – 59.0	112950 1605 4/29/93	7 18 28	18	Dense, Dark Yellowish Brown (10YR 4/4) Poorly Graded Sand with Some Gravel, wet	SP	N/A	Hnu = 0ppm BX = 40-60cpm ⊥ = 0cpm
59.0 – ~~60.0~~ TD							

NOTES 4/28/93

See Page 1

4/28/93 Background Levels
Hnu = .4 ppm
BX = 40-60cpm
⊥ = 0cpm

4/29/93 Background Levels
Hnu = 0ppm
BX = 40-60cpm
⊥ = 0cpm

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FERNALD RI/FS

-4520

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 20.03.05	PROJECT NAME: RI/FS Southfield Injection Flyash	
BORING NUMBER: 2955	COORDINATES:	DATE: 4/29/93
ELEVATION:	GWL: Depth 53.0' Date/Time 4/30/93, 843	DATE STARTED: 4/26/93
ENGINEER/GEOLOGIST: Ken Geiger	Depth Date/Time 5/6/93, 800	DATE COMPLETED: 5/5/93
DRILLING METHODS: Cable Tool		PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
59.0	112951	4		Medium Dense Dark Grayish Brown			HNU = 0 ppm
	1620	8	18	(10YR, 4/2) Poorly Graded Sand	SP	N/A	Bγ = 60 cpm
60.5	4/29/93	10		with Some Gravel, WET			α = 0 cpm
	112952	10		Dense Dark Grayish Brown			HNU = 0 ppm
	1635	12	18	(10YR 4/2) Poorly Graded Sand	SP	N/A	Bγ = 60 cpm
62.0	4/29/93	20		with Some Gravel, WET			α = 0 cpm
	112953	22		Dense Dark Grayish Brown			HNU = 0 ppm
	0920	17	18	(10YR, 4/2) Poorly Graded Sand	SP	N/A	Bγ = 40-60 cpm
63.5	4/30/93	19		with Some Gravel, WET			α = 0 cpm
	112954	8		Medium Dense Dark Grayish			HNU = 0 ppm
	0940	10	18	Brown (10YR, 4/2) Well Graded Sand	SW	N/A	Bγ = 40-60 cpm
65.0	4/30/93	12		with Some Gravel, WET			α = 0 cpm
				Split Spoon Sampled To 65'			Composite Sieve
				Bottom of Boring at 70'			Sample # 112956

NOTES

See Page 1

4/29/93 Background Levels
HNU = 0 ppm
Bγ = 40-60 cpm
α = 0 cpm

4/30/93 Background Levels
HNU = 0 ppm
Bγ = 40-60 cpm
α = 0 cpm

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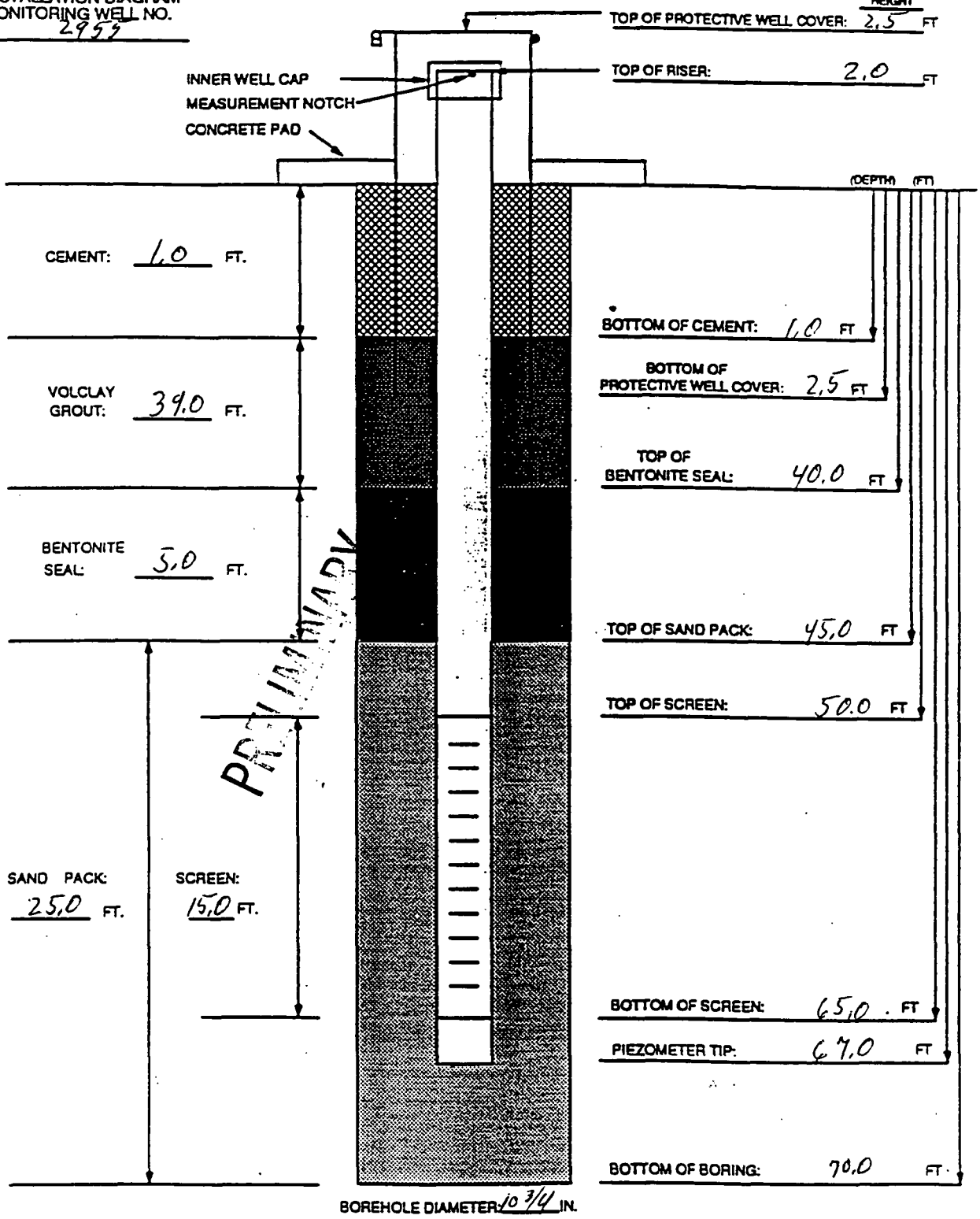
CS

-4529

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2955

INSTALLATION DATE: 5/5/93



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20, 13 - 80lb bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6 Buckets
BAGS OF VOLCLAY GROUT: 10, 50lb bags
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 500 gallons
OTHER: 1-15' Screen w/ 2' Sump, 5-10', 1-2' Sect. end
TASK: WBS 20.03.05

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 53.3 FT / 5/6/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Ken Geiger

ASI FORM 0157 REV. (0)

FERNALD RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RI/FS Southfield Inactive Flyash FIELD ENG./GEO. Ken Geiger DATE 5/5/93
PROJECT NO. WBS 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 2955
~~PIEZOMETER~~ MONITORING WELL NO. 2955 DATE OF INSTALLATION 5/5/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0' TO 53.0'
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10" FROM 0.0 ft TO 70.0 ft
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0" I.D.
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS .010"
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 5-10', 1-2', 1-15' Screen with 2' sump
JOINING METHOD Screw Type - Flush Joint Threaded

PROTECTION SYSTEM

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

OTHER PROTECTION Hinged well cover with Lock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
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	TOP	BOTTOM
BENTONITE	TOP 40.0	BOTTOM 45.0	TOP	BOTTOM
SAND	TOP 45.0	BOTTOM 70.0	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 50.0	BOTTOM 65.0	TOP	BOTTOM
PIEZOMETER TIP	67.0			
BOTTOM OF BOREHOLE	70.0			
GWL AFTER INSTALLATION	53.3			

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

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME. LIME SLUDGE POND INVESTIGATION	
BORING NUMBER. MW 1937	COORDINATES:	DATE 28APR93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 28APR93
ENGINEER/GEOLOGIST B.C. MULLER	Depth Date/Time	DATE COMPLETED: 30APR93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 5 2 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	02 MAY 93 BEM REMARKS
1	111138 28APR 1130	1	6	VERY SOFT (10YR, 3/3) DARK BROWN CLAY WITH TRACE COARSE SAND, MOIST	CL	0.25	BY = 60 CPM α = 0 CPM MT = 0 PPM
	111139 28APR 1130	4	6	HARD (10 YR, 6/4) LIGHT YELLOWISH BROWN SILTY CLAY WITH TRACE MED.-COARSE SAND MOIST	CL	4.25	
	111140 28APR 1130	13	2	SAA	CL	>4.50	
2	NA 28APR 1130	13	0	NA	NA	NA	
	111141 111142 111143 1140	11	6	VERY STIFF (2.5Y 6/4) LIGHT OLIVE BROWN SILTY CLAY, WITH TRACE MED-COARSE SAND MOIST	CL	3.0	BY = 80 CPM α = 0 CPM MT = 0 PPM TAL-D 111141 T.U. 111142 T.O.C. 111143
3	111141 111142 111143 1140	14	6	VERY STIFF (10 YR, 6/6) BROWNISH YELLOW SILTY CLAY, TRACE MEDIUM-FINE SAND, MOIST	CL	3.0	
	111141 111142 111143 1140	21	6	HARD, SAA INCREASED SILT AND TRACE ORANGE MOTTLES	CL	>4.5	
4	111141 111142 111143 1140	32	0	NA	NA	NA	
	111144 28APR 1330	3	6	VERY STIFF (2.5Y, 5/2) GRAYISH BROWN SILTY CLAY, MOIST	CL	2.5	BY = 70 CPM α = 0 CPM MT = 0 PPM
5	111145 28APR 1330	5	5	SAA	CL	2.75	
	NA 1330	7	0	NA	NA	NA	
6	111146 28APR 1335	10	6	VERY STIFF (5Y, 5/6) OLIVE, SILTY CLAY, MOIST	CL	3.5	BY = 70 CPM α = 0 PPM MT = 0 PPM
	111147 28APR 1335	14	6	SAA	CL	3.5	
7	111148 28APR 1335	14	3	SAA	CL	3.0	
	111149 28APR 1340	5	6	STIFF (2.5, 5/4) LIGHT OLIVE BROWN SILTY CLAY, MOIST	CL	2.0	

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NOTES
DRILLING CONTRACTOR: PENN DRILL
DRILLING RIG: MOBIL B80
DRILLER: DAN JAMISON
ASSISTANT: DON ARTHUR

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS
MICROTIP : 0 PPM
BY : 50-70 CPM
α : 0 CPM

NO RETURN = (NR)
SAME AS ABOVE = (SAA)

PRELIMINARY

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. WBS 20.03.05	PROJECT NAME. LIME SLUDGE POND INVESTIGATION	
BORING NUMBER. MW 1937	COORDINATES:	DATE 28 APR 93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 28 APR 93
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED: 30 APR 93
DRILLING METHODS:		PAGE 2 OF 5

02MAY93
BEM

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	111150 28APR 1240	7	6	VERY STIFF SAA (2.5, 5/4) LIGHT OLIVE BROWN, SILTY CLAY MOIST	CL	2.75	BV = 60 cpm
	111151 28APR 1340	8	6	STIFF SAA	CL	1.75	α = 0 cpm MT = 0 ppm TIME = 1340
9	111152 28APR 1350	5	6	STIFF (2.5 Y, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, MOIST	CL	1.5	BV = 60 cpm
	111153 28APR 1350	4	6	SAA + 1" SILTY LAYER, WET	CL	1.75	α = 0 cpm MT = 0 ppm
	111154 28APR 1350	5	2	VERY SOFT (2.5Y, 6/2) LIGHT BROWNISH GREY, SILTY CLAY, WET	CL	<0.25	TIME = 1350
10	111155 28APR 1400	4	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, WET	CL	1.5	BV = 60 cpm
	111156 28APR 1400	5	6	VERY SOFT SAA	CL	<0.25	α = 0 cpm MT = 0 ppm
11	111157 28APR 1400	3	2	VERY SOFT (2.5Y, N5/) GRAY SILTY CLAY, WET	CL	<0.25	TIME = 1400
12	111158 28APR 1410	4	6	VERY SOFT (2.5Y, N4/) DARK GRAY SILTY CLAY, WET	CL	<0.25	BV = 70 cpm
	111159 28APR 1410	4	6	SAA	CL	<0.25	α = 0 cpm MT = 0 ppm
13	111160 28APR 1410	6	6	MEDIUM DENSE (2.5Y, N4/) DARK GRAY, WELL SORTED, FINE SAND AND SILT, WET	SM	NA	TIME = 1410
	111161 28APR 1415	5	6	LOOSE (2.5Y N4/) DARK GRAY, WELL SORTED, FINE SAND AND SILT, WET	SM	NA	BV = 60 cpm
14	111162 28APR 1415	8	6	SAA	SM	NA	α = 0 cpm MT = 0 ppm
	111163 28APR 1415	8	2	SAA	SM	NA	TIME = 1415
	111164 30APR 0905	8	6	MEDIUM DENSE (2.5Y, 6/2) LIGHT BROWNISH GREY, SILTY FINE SAND, WET	SM	NA	157

NOTES
DRILLING CONTRACTOR: PENN DRILL
DRILLING RIG: B80
DRILLER: DAN JAMISON
ASSISTANT: DON ARTHUR

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS:
MICROTIP: 0 PPM
BV: 50-70 CPM
α: 0 CPM

NO RETURN = (NR)
SAME AS ABOVE = (SAA)

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. LIME SLUDGE POND INVESTIGATION	
BORING NUMBER. MW 1537	COORDINATES:	DATE 30APR93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 28APR93
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED: 30APR93
DRILLING METHODS: HOLLOW STEM AUGER - CONTINUOUS SAMPLE		PAGE 3 OF 35

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	111165 30APR93 0705	9	6	MEDIUM DENSE (2.5Y 6/2) LIGHT BROWNISH GREY, SILTY FINE SAND WET	SM	NA	BY = 70 CPM α = 0 CPM MT = 1.0 PPM
16	111166 30APR93 0705	15	6	SAA	SM	NA	TIME: 0705
	111167 30APR93 0520	7	6	VERY DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN SILT SOME SAND WET SMALL SANDY CLAY LAYER	SM	NA	BY = 50 CPM α = 0 CPM MT = 1.0 PPM
17	111168 30APR93 0520	46	2	VERY DENSE (2.5Y, 6/2) LIGHT BROWNISH GRAY, SILTY FINE SAND, WET	SM	NA	
	~~111169~~ 30APR93 0520	BEM 30APR93 50/5	0	NA	NA	NA	TIME: 0520
111169 18	111170 30APR93 0527	BEM 30APR93 17	6	DENSE SAA	SM	NA	BY = 70 CPM α = 0 CPM MT = 0.0 PPM
	111170 30APR93 0527	15	6	SAA	SM	NA	
111171 19	~~111172~~ 30APR93 0527	BEM 30APR93 19	6	DENSE (5Y, 5/4) OLIVE CLAYEY SANDY SILT, VERY MOIST TRACE FINE GRAVEL	MH	2.6	TIME: 0527
111172	~~111173~~ 30APR93 0534	BEM 30APR93 3	6	MEDIUM DENSE OLIVE CLAYEY SANDY SILT (5Y, 5/4) WET, TRACE GRAVEL	MH	NA	BY = 70 CPM α = 0 CPM MT = 0.6 PPM
111173	~~111174~~ 30APR93 0534	BEM 30APR93 9	6	SAA	MH	NA	
20 111174	~~111175~~ 30APR93 0534	BEM 30APR93 17	6	MEDIUM DENSE (5Y, 5/4) OLIVE CLAYEY SANDY SILT TRACE FINE GRAVEL, VERY MOIST	MH	NA	TIME: 0534
				Bottom of Boring 20.5 FT			BY = α = MT =
				BEM 02MAY93			TIME:

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NOTES

DRILLING CONTRACTOR: PENN DRILL
DRILLING RIG: MOBIL B 80
DRILLER: DAN JAMISON
ASSISTANT: MARK REBALO

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS:
MICROTIP: 1.6-1.1 PPM
BY: 40-50 CPM
α: 0 CPM

NO RETURN = (NR)
SAME AS ABOVE = (SAA)

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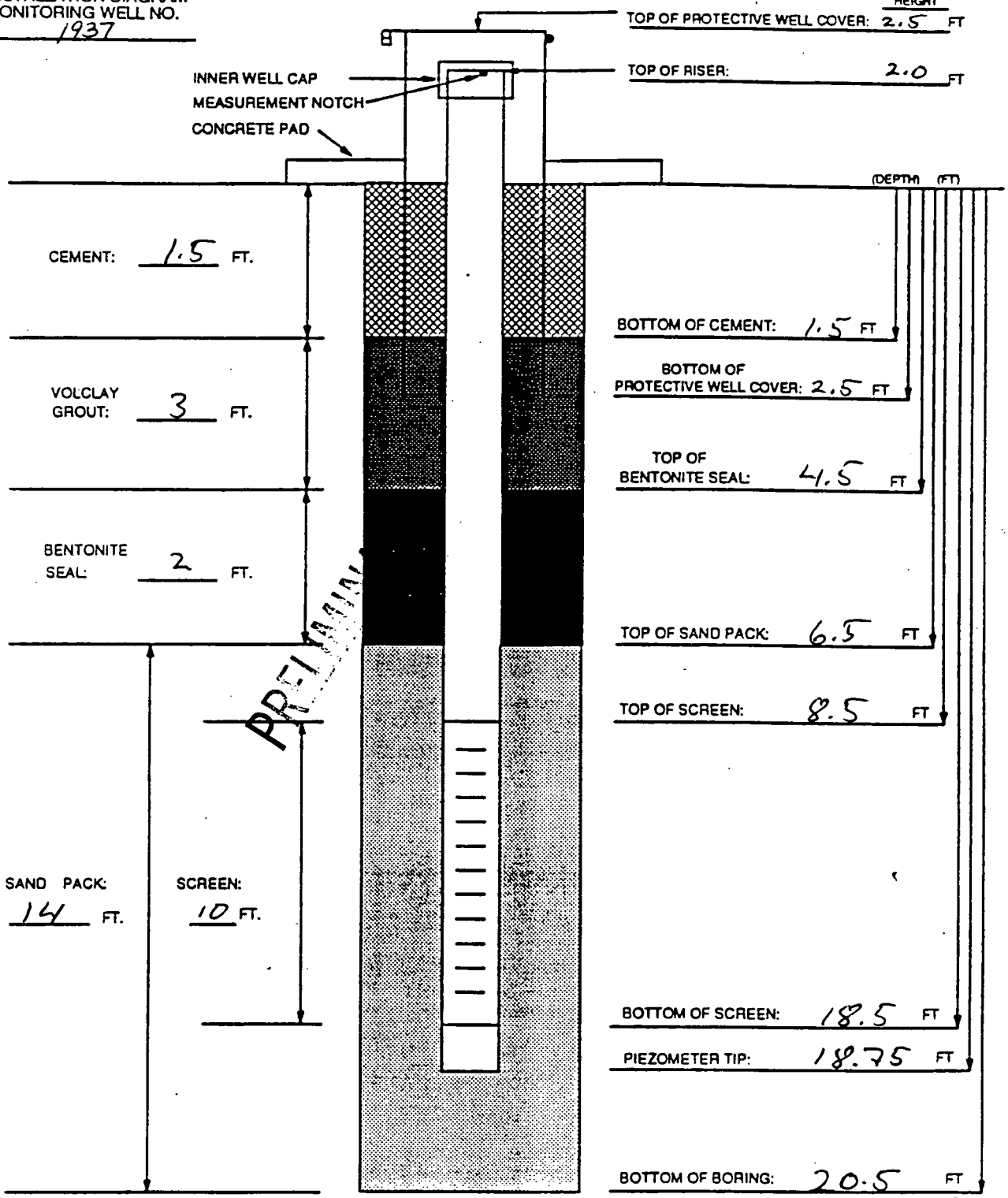
-4529

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1937

INSTALLATION DATE: May 1, 1993



BOREHOLE DIAMETER: 8 IN.

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MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 7x50#
BENTONITE PELLETS (5-GALLON BUCKETS): 1
'S OF VOLCLAY GROUT: 1/2 BAG 50#
AMOUNT OF CEMENT: 1/2 BAG 94#
AMOUNT OF WATER USED: 8 GALLONS
OTHER: NA
TASK: DA

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 2 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 1.82 FT/ 01/9
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: B. E. MULLER

ASI FORM 0157 REV. (0)

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU2 PHASE II
PROJECT NO. 20.03.05
BORING NO. 1937
PIEZOMETER NO. 1937

FIELD ENG./GEO. B.E. MULLER DATE 01 MAY
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 01 MAY 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 AUGER
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 2.0 IN I.D.
PERFORATION TYPE:
SLOTS [X] 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. _____ I.D. 2.0 IN I.D.
LENGTH OF PIPE SECTIONS 10, 5, 6 IN
JOINING METHOD FLUSH JOINT - SCREW

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 4 3/8 IN

OTHER PROTECTION HINGED PROTECTIVE COVER WITH INSTALLED PADLOCK

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 1.5	BEM 03MAY93 TOP	BOTTOM
BENTONITE	TOP 1.5	BOTTOM ~~6.5~~ 6.5	TOP	BOTTOM
SAND 03MAY93 BEM	TOP ~~6.5~~ 6.5	BOTTOM 18.5	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 8.5	BOTTOM 18.5	TOP	BOTTOM
PIEZOMETER TIP	18.75 FT			
BOTTOM OF BOREHOLE	20.50			
GWL AFTER INSTALLATION	1.82			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS THE TOP 6 IN SECTION OF RISER IS BENT AND NEEDS TO BE REPLACED

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.0305 RDC 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER 2736	COORDINATES.	DATE 4-29-93
ELEVATION:	GWL: Depth 59.05 Date/Time 5-14-93/1100	DATE STARTED 4-29-93
ENGINEER/GEOLOGIST K. Ryan	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Cable Tool		PAGE 1 OF 7

KF 3-18-93

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	110939 1335 4-29-93	3 6 12 15	15	Hard (2.5Y, 5/4) light olive brown, clay with trace gravel, non-plastic, slightly moist, fill	CL	4.5	m-tip = .8 ppm; βγ = 90 cpm; α = 0 cpm; 3 IN SPOON
2 3	110940 1345 4-29-93	17 15 13 14	24	Medium Dense (2.5Y, 5/4) light olive brown, poorly graded fine clayey sand with trace gravel, non-plastic, slightly moist, fill	SC	N/A	m-tip = .8 ppm; βγ = 90 cpm; α = 0 cpm; 3 IN SPOON
4 5	110941 1355 4-29-93	9 12 18 3	24	SAA	SC	N/A	m-tip = .6 ppm; βγ = 90 cpm; α = 0 cpm; 3 IN SPOON
6 7	110945 1420 4-29-93	2 4 6	14	Loose (2.5Y, 5/4) light olive brown, poorly graded fine clayey sand mixture, non-plastic, slightly moist, fill	SC	N/A	m-tip = 1.7 ppm; βγ = 90 cpm; α = 0 cpm
8 9	110946 1422 4-29-93	3 5 6	15	Stiff (2.5Y, 5/4) light olive brown, clay, low plasticity, moist	CL	1.5	m-tip = 2.3 ppm; βγ = 90 cpm; α = 0 cpm
10	110947 1430 4-29-93	3 6 5	12	SAA	CL	1.5	m-tip = 1.7 ppm; βγ = 90 cpm; α = 0 cpm
11 12	110948 1433 4-29-93	3 5 5	14	Stiff (7.5YR, 5/6) Strong Brown clayey sand mixture, non-plastic, moist	SC	1.0	m-tip = 1.6 ppm; βγ = 90 cpm; α = 0 cpm
13	110949 1435 4-29-93	6 11 15	6	Medium Dense (2.5Y, 6/3) light yellowish Brown, silty sand, non-plastic, wet	SM	N/A	m-tip = 2.4 ppm; βγ = 90 cpm; α = 0 cpm
14 15	110950 1440 4-29-93	12 15 17	16	Dense (2.5Y, 6/3) light yellowish Brown, Poorly Graded medium sand, non-plastic wet	SP	N/A	m-tip = 112 ppm; βγ = 100 cpm; α = 0 cpm

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Craig Coulter

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background Readings (m-tip = .3 ppm

PRELIMINARY

RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 200305 RDC 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER 2736	COORDINATES.	DATE 5-5-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-29-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Cable Tool		PAGE 2 OF 8 7

5-18-93

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	110951 1040 5-5-93	5 6 9	15	Very Stiff (5Y, 5/2) Olive Gray, Silty Clay with trace Gravel, moist, slight plasticity	CL	2.5	m-tip = 0.0 ppm; Bz = 60 cpm; α = 0 cpm
17 18	110952 1100 5-5-93	6 9 10	7	Stiff (5Y, 5/2) Olive Gray, Silty Clay, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm; Bz = 60 cpm; α = 0 cpm
19	110953 1110 5-5-93	4 4 10	10	Stiff (5Y, 5/2) Olive Gray Silty Clay, low plasticity, moist	CL	2.0	m-tip = 0.0 ppm; Bz = 70 cpm; α = 0 cpm
20 21	110954 1400 5-5-93	10 11 10	8	medium Dense (5Y, 4/2) Olive Gray, Silty Sand, very moist	SM	N/A	m-tip = 0.0 ppm; Bz = 70 cpm; α = 0 cpm
22	110955 1415 5-5-93	8 3 4	6	Loose (5Y, 5/1) Gray, Silty Sand, Wet	SM	N/A	m-tip = 0.0 ppm; Bz = 50 cpm; α = 0 cpm
23 24	1430 5-5-93	9 8 5	N/A	No Recovery 2 spoons driven	N/A	N/A	m-tip = ppm; Bz = N/A cpm; α = cpm
25	110956 0900 5-6-93	65 21 9	7	Medium Dense (5Y, 5/2) Olive Gray, Silty Gravel, Wet	GM	N/A	m-tip = 2.6 ppm; Bz = 70 cpm; α = 0 cpm
26 27	110957 0915 5-6-93	7 8 7	5	SAA	GM	N/A	m-tip = 0.0 ppm; Bz = 30 cpm; α = 0 cpm
28	110958 0930 5-6-93	6 6 5	6	Soft (5Y, 5/2) Olive Gray Sandy Clay, Slight plasticity wet	CL	1.0	m-tip = 0.0 ppm; Bz = 70 cpm; α = 0 cpm
29 30	110959 0940 5-6-93	6 21 50/5"	7	Very Dense (5Y, 5/2) Olive Gray, Well Graded Gravel, Wet	GW	N/A	m-tip = 0.0 ppm; Bz = 70 cpm; α = 0 cpm

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Mark Rebold

Ron Connors

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration te

Colors identified using Munsell Color Chart

Background Readings (m-tip = 0.0 ppm (m-tip = 0.0 ppm

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 2.03.05 RDR 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER. 2936	COORDINATES.	DATE 5-6-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-21-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Cable Tool		PAGE 3 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
31	110960 1015 5-6-93	21 35 50/.3	8	Very Dense (5Y, 5/2) Olive Gray Sandy Silt, non-plastic (5-6-93) very moist	ML	N/A	m-tip = 0.0 ppm; βγ = 80 cpm; α = 0 cpm
32 33	110961 1030 5-6-93	24 37 50/.4	12	Very Dense (5Y, 4/2) Olive Gray Sandy Silt, non-plastic very moist	ML	N/A	m-tip = 0.0 ppm; βγ = 80 cpm; α = 0 cpm
34	110962 1050 5-6-93	22 35 37	14	Very Dense (5Y, 5/1) Gray Silty Sand, wet non-plastic	SM	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
35 36	110963 1345 5-6-93	7 9 12	9	Medium Dense (5Y, 5/1) Gray Clayey Silt, moist non-plastic	ML	N/A	m-tip = 0.0 ppm; βγ = 70 cpm; α = 0 cpm
37	110964 1405 5-6-93	7 7 9	8	Medium Dense (5Y, 5/1) Gray Clayey Silt, Moist non-plastic	ML	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
38 39	110965 1420 5-6-93	6 7 9	10	Medium Dense (5Y, 4/1) Dark Gray, Clayey Silt, non-plastic, moist, organics	ML	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
40	110966 1530 5-6-93	17 19 16	8	Dense (2.5Y, 5/4) light olive Brown Poorly Graded Fine Sand, slightly moist	SP	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
41 42	110967 1540 5-6-93	19 21 29	8	Very Dense (2.5Y, 5/4) light olive Brown, Poorly Graded Fine Sand, slightly moist	SP	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
43							
44							
45							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 4.2

Driller Bob Johnson

Ron Conners

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Chart

Background Readings (m-tip = 0.0 ppm; βγ = 70 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05 RDC 11	PROJECT NAME. CRU 2 Phase II	
BORING NUMBER. 2936	COORDINATES.	DATE 5-6 93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-29-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Cable Tool		PAGE 4 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46	110968 1600 5-6-93	29 39 45	10	Very Dense (2.5Y, 5/4) light olive brown, well graded sand with trace gravel, dry	SW	N/A	M-tip = 0.0 ppm; Bq = 60 cpm; α = 0 cpm
47							
48							
49							
50	110969 1005 5-10-93	8 16 29	8	Dense (2.5Y, 6/3) light yellowish brown, poorly graded fine sand, dry	SP	N/A	M-tip = 0.4 ppm; Bq = 50 cpm; α = 0 cpm
51							
52							
53	110970 1030 5-10-93	19 39 50/.2	10	Very Dense (10YR, 4/6) Dark Yellowish Brown, well graded gravely sand, dry	SW	N/A	M-tip = 0.0 ppm; Bq = 60 cpm; α = 0 cpm
54							
55	110971 1340 5-10-93	19 29 31	8	Very Dense (2.5Y, 5/4) light olive brown, well graded gravely sand, dry	SW	N/A	M-tip = 0.0 ppm; Bq = 60 cpm; α = 0 cpm
56							
57	110972 1510 5-10-93	41 50/.2	6	Very Dense (10YR, 5/3) Brown, well graded silty sand, wet	SM	N/A	M-tip = 0.0 ppm; Bq = 80 cpm; α = 0 cpm
58	110973 1530 5-10-93	7 9 19	9	Medium Dense (2.5Y, 5/2) Grayish Brown, Poorly Graded Fine Sand, wet	SP	N/A	M-tip = 0.0 ppm; Bq = 50 cpm; α = 0 cpm
59							
60	110974 1545 5-10-93	10 11 13	14	Medium Dense (5Y, 4/2) olive Gray Poorly Graded Fine Sand, wet	SP	N/A	M-tip = 0.0 ppm; Bq = 60 cpm; α = 0 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Ron Connors

SAA - Same as above
NA - Not Applicable

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

Background Readings { M-tip = 0.0 ppm; Bq = 0 cpm; α = 0 cpm } 5-10-93 { M-tip = 0.0 ppm; Bq = 0 cpm; α = 0 cpm }

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER [illegible]	PROJECT NAME. [illegible] Phase II	
BORING NUMBER. 29 [illegible]	COORDINATES.	DATE 5-10-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 4-27-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Cable Tool		PAGE 5 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				see p 4			
61	110975 1600 5-10-93	7 11 9	17	SAA.	SP	N/A	m-tip = 0.0 ppm; βγ = 40 cpm; α = 0 cpm
62	110976 1615 5-10-93	13 13 17	18	Medium Dense (5Y, 4/2) olive Gray well Graded Medium to Fine Sand, wet	SW	N/A	m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm
63	110977 1625 5-10-93	11 13 12	18	Medium Dense (5Y 4/3) olive Poorly Graded Medium Sand, wet	SP	N/A	m-tip = 0.0 ppm; βγ = 80 cpm; α = 0 cpm
64	110978 1005 5-11-93	22 35 39	12	Very Dense (5Y, 4/2) olive Gray Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 1.9 ppm; βγ = 40 cpm; α = 0 cpm
65	110979 1025 5-11-93	20 22 50	17	Very Dense (5Y, 4/2) olive Gray Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm; βγ = 50 cpm; α = 0 cpm
66							
67							
68							
69							
70							
71							
72				Bottom of Boring 71.0 FT Bottom of Casing 72.0 FT			
73							
74							
75							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Bob Johnson

Ron Conners

John Vandiak

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell Color Char

Background Readings m-tip = 0.0 ppm (m-tip = 1.1 ppm

TERMINAL
RI/FS

F-4009

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRV2 / Phase II
PROJECT NO. 20.03.05
BORING NO. 2936
PIEZOMETER NO. 2936

FIELD ENG./GEO. [illegible] DATE [illegible]
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5-14-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 72.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE 10.0 in ID FROM 0.0 FT TO 15.0 F
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

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

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS _____
JOINING METHOD Screw type - flush joint threaded

PROTECTION SYSTEM

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

OTHER PROTECTION Hinged locking cover w/ padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		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 .6 FT		
Cement GROUT/SLURRY	TOP .6 FT	BOTTOM 43.2 FT	TOP	BOTTOM
BENTONITE	TOP 43.2 FT	BOTTOM 48.2 FT	TOP	BOTTOM
SAND	TOP 48.2 FT	BOTTOM 72.0 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	72.0 FT			
GWL AFTER INSTALLATION	59.05 FT (Top of Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement was placed from 0.0 to .6 ft. to [illegible] the protective cover in place.

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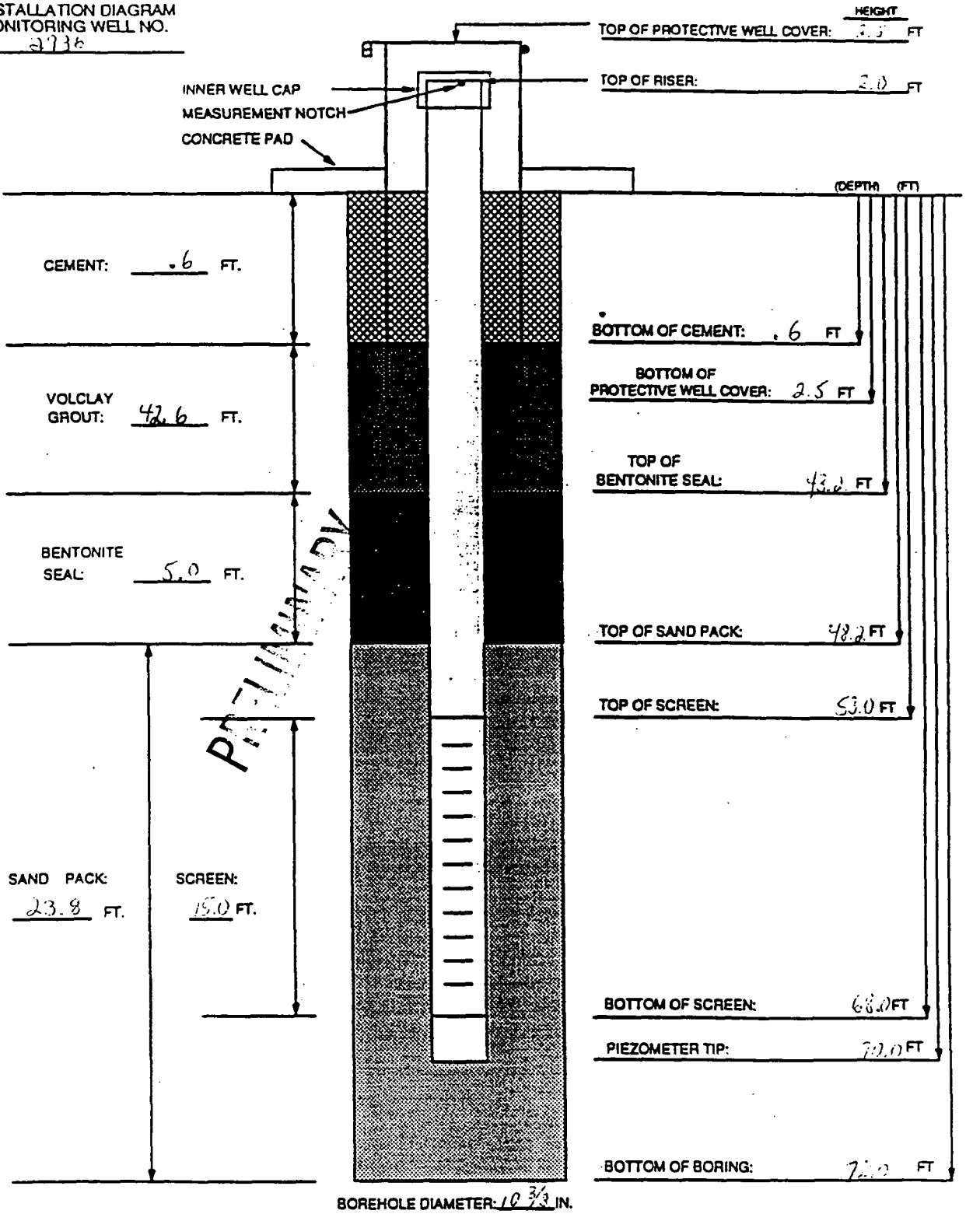
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2736

INSTALLATION DATE: [illegible]



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 27 50lb bags #10/20
BENTONITE ~~PELLETS (YELLOW BUCKETS)~~ 3/8 Hole Plug: 6 Bags
BAGS OF VOLCLAY GROUT: 12 50lb bags
AMOUNT OF CEMENT: 1 bag @ 94 lbs
AMOUNT OF WATER USED: 500 Gallons
OTHER: 14 Drums Soil, 1 Drum Aqueous
TASK: 20.03.05 RDC 11

Note: 3/8 Hole Plug are 50lb bags @ .68 cubic feet bag

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 57.05 FT/5/1
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

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ASI FORM 0157 REV. (0)

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (ROCII)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2935	COORDINATES:	DATE: 04/29/93 - 04/30/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/29/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/18/93
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 1 2	110788 0900 04/29/93	4 10 10 8	23	STIFF, 10YR 5/6, SILTY CLAY, ROOT ZONE, LARGE GRAVELS, SOME COAL FRAGS, LOW PLASTICITY, MOIST	CL	2.0	Bz - 40-60 cpm MICRONP - 3.9 ppm ALPHA - 0cpm
3 4	110789 110790 110791 0920 04/29/93	6 10 10 13	18	VERY STIFF, 10YR 5/1 TO 5/6, SILTY CLAY, MOTTLING, LOW PLASTICITY, MOIST	CL	4.0	Bz - 40-60cpm MICRONP - 13.0 ppm PEAK ↓ 0.0 ppm ALPHA - 0cpm
5	110792 0930 04/29/93	6 11 11 14	18	SAA	CL	4.0	Bz - 40-60cpm MICRONP - 19.2 ppm PEAK ↓ 0.0 ppm ALPHA - 0cpm
7	110793 0940 04/29/93	3 3 5	4	STIFF, 10YR 4/4, SILTY CLAY, SOME SAND MEDIUM PLASTICITY, MOIST TO WET AT BOTTOM OF SPOON	CL	2.0	Bz - 40-60 cpm MICRONP - 0.0 ppm ALPHA - 0cpm
8 9	110794 1220 04/29/93	4 6 9	18	STIFF ~~205~~ 2.5Y 5/4, SILTY CLAY, MOTTLING TRACE FINE SAND, MEDIUM PLASTICITY, MOIST TO WET - VERY FINE SAND LENS, WET, AT 8.0-8.25	CL	2.5	Bz - 40-60cpm MICRONP - 0.0 ppm ALPHA - 0cpm
10	110795 1055 04/30/93	7 11 11	16	STIFF, 2.5Y 5/4, SILTY CLAY TO CLAYEY SILT, MOTTLING, FE STAINING, TRACE FINE SAND LOW TO MEDIUM PLASTICITY, MOIST	CL-ML	2.5	Bz - 40-60 cpm MICRONP - 0.0 ppm ALPHA - 0cpm
11 12	110796 1335 04/30/93	10 13 13	18	VERY STIFF, 2.5Y 5/4, CLAYEY SILT, MOTTLING, FE STAINING, TRACE FINE SAND MEDIUM PLASTICITY, MOIST - LAST 1' 2.5Y 5/1 CLAY, HIGH PLASTICITY	ML	4.0	Bz - 40-60cpm MICRONP - 0.0 ppm ALPHA - 0cpm
13	110797 1400 04/30/93	2 5 6	16	STIFF, 2.5Y 5/1, CLAY (LACUSTRINE) VARVING, HIGH PLASTICITY, MOIST	CH	2.5	Bz - 40-60cpm MICRONP - 0.0 ppm ALPHA - 0cpm
14 15	110798 1410 04/30/93	5 7 9	16	SAA	CH	2.5	Bz - 40-60cpm MICRONP - 0.0 ppm ALPHA - 0cpm

NOTES

DRILLING CONTRACTOR Pennsylvania Drilling
DRILLING EQUIPMENT Bucyrus-Erie
DRILLER Bob Erickson
HELPER Richard Thomas
SAMPLE TECH Jennifer Milliert

ABRV.S: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

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

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FERNALD RI/FS

-4529

-4520

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME. CRUZ / PHASE 2	
BORING NUMBER: 2935	COORDINATES:	DATE. 04/30/93 - 05/01/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/29/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/8/93
DRILLING METHODS: CABLE TOOL		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15 16	110799 1550 04/30/93	1 4 4	16	SAA	CH	2.0	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
17 18	110800 1555 04/30/93	3 3 4	14	SAA	CH	2.0	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
19	110801 1615 04/30/93	1 3 4	8	SAA	CH	2.0	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
20 21	110802 1620 04/30/93	2 16 19	18	0-12" stiff, 2.5y 5/1, clay varving, high plasticity, moist 12"-18" stiff, 2.5y 5/1, clayey silt, slight plasticity, small medium to fine sand lens	CH / ML	2.0 / 2.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
22	110803 0815 05/01/93	1 1 7	6	Stiff, 2.5y 5/1, clayey silt, slight plasticity, medium to fine sand, moist	ML	2.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
23 24	110804 0820 05/01/93	17 13 14	12	Stiff, 2.5y 5/1, clayey silt, slight plasticity, some medium to fine sand lenses, some small gravels in silt & sand moist	ML	2.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
25	110805 0920 05/01/93	1 3 5	6	Stiff, 2.5y 4/1, clayey silt, some fine to medium sand, some small gravels 10-30mm, low plasticity, moist	ML	2.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
26 27	110806 0925 05/01/93	7 12 13	6	SAA	ML	2.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
28	110807 1320 05/01/93	5 22 25	8	Hard, 2.5y 5/1, silty clay, some fine to medium sand, some small gravels 10-30mm, low plasticity, moist	ML / CL	4.5	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm
29 30	110808 1420 05/01/93	25 35 100	18	0-14" hard, 2.5y 5/1, silty clay, some fine to medium sand, some small gravels, low plasticity, moist 14"-16" clay band, 10yr 4/6, silt with Fe stains, moist 16"-18" 10yr 4/6, medium sand moist	CL / ML/SM	4.5 / NA	Bz - 40-60 cpm MicroTip - 0.0ppm Alpha - 0cpm

NOTES

DRILLING CONTRACTOR Pennsylvania Drilling

DRILLING RIG Buckeye - Erie

DRILLER Bob Erickson

HELPER Richard Thomas

SAMPLE TECH Jennifer McKhert

ABRV.s : SAA - SAME AS ABOVE
NA - NOT APPLICABLE

- SAMPLES COLLECTED PER ASTM STANDARD PENETRATION TEST

- COLORS IDENTIFIED USING MUNSELL COLOR CHART

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: ZO. 03 05 (ROCII)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2935	COORDINATES:	DATE: 05/01/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED. 04/29/93
ENGINEER/GEOLOGIST. P. McCARREN	Depth Date/Time	DATE COMPLETED. 05/8/93
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	110804	34					
31	1515 05/01/93	37 41	16	VERY DENSE, 10YR 4/6 fine to coarse silty sand, poorly sorted, Fe staining sand	SM	NA	Bz - 40-60 cpm Microtip - 0.0 ppm Alpha - 0 cpm
32							Begin sampling at 5.0' intervals.
33							
34							
35	110810	18					
36	1630 05/01/93	27 34	14	VERY DENSE, 10YR 4/6, fine to medium silty sand, poorly sorted, Fe staining some bedding present, dry	SM	NA	Bz - 40-60 cpm Microtip - 0.0 ppm Alpha - 0 cpm
37							
38							
39							
40	110812	15					
41	0925 05/02/93	34 48	11	VERY DENSE, 2.5Y 6/6, poorly graded fine sand, dry	SP	NA	Bz - 40-60 cpm Microtip - 0.0 ppm Alpha - 0 cpm
42							
43							
44							
45							

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Pouchous - Erie

Driller Bob Erickson

Helper Richard Yoder

Middle Tech Jennifer Milchert

ABRV.s: SAA - Same As Above
NA - Not Applicable

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

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (ROC11)	PROJECT NAME: Cru 2 / PHASE 2	
BORING NUMBER: 2935	COORDINATES:	DATE: 05/02-03/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 04/29/93
ENGINEER/GEOLOGIST: P. McCarren/J. Reagan	Depth Date/Time	DATE COMPLETED: 05/13/93
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 5

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
45 46	110813 1035 5/2/93	50/6	6	very dense, 2.5Y 5/4 light olive brown, poorly graded sand, some gravels, dry	SP	NA	Bγ = 40-60cpm α = 0 cpm M+IP = 0ppm
47 48 49							
50 51	110814 1425 5/2/93	50/1	1	very dense, 2.5Y 5/4 light olive brown, poorly graded sand, some some gravels, moist	SP	NA	Bγ = 40 cpm α = 0cpm M+IP = 0ppm
52 53 54							
55 56	110815 1335 05/03/93	14 30 30	4	SAA	SP	NA	Bγ - 40-60cpm MicroIP - 0.0ppm Alpha - 0cpm
57 58	110816 1355 05/03/93	40 50 50/0	16	0-10" very dense, 2.5Y 5/4, medium to fine sand poorly graded, some gravels, moist 10"-16" very dense, 10YR 4/1, coarse, medium & fine sand & some gravels, wet - water table	SP / SM	NA	Bγ - 40-60cpm MicroIP - 0.0ppm Alpha - 0cpm
59	110817 1420 05/03/93	25 20 20	14	DENSE, 2.5Y 5/4, medium to fine sand & some gravels, wet	SM	NA	Bγ - 40-60cpm MicroIP - 0.0ppm Alpha - 0cpm

NOTES

DRILL CONTRACTOR Pennsylvania Drilling
DRILLING EQUIPMENT Bucyrus-Erie
DRILLER Bob Erickson
HELPER Richard Yoder
SAMPLE TECH Jennifer Wilbert

ABRV.S: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

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

PRELIMINARY

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (RCCII)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2935	COORDINATES:	DATE: 05/03/93 - 05/04/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED. 04/29/93
ENGINEER/GEOLOGIST. P. McCARREN	Depth Date/Time	DATE COMPLETED. 05/13/93
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
55.5 60	110818	11		0-10" SAA	SM/SP	NA	βγ - 40-60cpm
	1435	15	14	10"-14" DENSE, 2.5Y5/4, fine SAND, with medium TO COARSE SAND, WET			MICROTIP - 0.0ppm
61	05/03/93	20					ALPHA - 0cpm
	110819	16					βγ - 40-60cpm
	1510	18	16	SAA	SP	NA	MICROTIP - 0.0ppm
62	05/03/93	20					ALPHA - 0cpm
63	110820	11					βγ - 40-60cpm
	1540	15	16	SAA	SP	NA	MICROTIP - 0.0ppm
64	05/03/93	15					ALPHA - 0cpm
	110821	11					βγ - 40-60cpm
65	1550	21	16	SAA	SP	NA	MICROTIP - 0.0ppm
	05/03/93	24					ALPHA - 0cpm
66	110822	6					βγ - 60-110cpm
	0815	6	18	SAA	SP	NA	MICROTIP - 0.0ppm
67	05/05/93	12					ALPHA - 0cpm
	110823	12		VERY DENSE, 2.5Y5/4, fine SAND, with medium			βγ - 60-120cpm
68	0830	24	18	TO COARSE SAND AND some GRAVELS, WET	SP	NA	MICROTIP - 0.0ppm
	05/05/93	30					ALPHA - 0cpm
69	110824	20					βγ - 60-120cpm
	0845	30	16	SAA	SP	NA	MICROTIP - 0.0ppm
70	05/05/93	27					ALPHA - 0cpm
				BOTTOM of BORING 70.0			COLLECTED COMPOSITE SIEVE SAMPLE 110825 FROM 55 ft - 70 ft
71				- DROVE ADDITIONAL 5.0' SECTION OF CASING TO 73.0' TO MINIMIZE SAND HEAVE			- 8" STEEL CASING USED FROM 0.0 ft TO 70.0 ft
72							~250 gallons of WATER USED
73							- WILL INSTALL 4" STAINLESS STEEL WELL
74							

NOTES

DRILL CONTRACTOR Pennsylvania Drilling
DRILLING EQUIPMENT Bucyrus - Erie
DRILLER Bob Erickson
HELPER Richard Young
HYGIENE TECH Jennifer M. Wilhert

ABRV.S: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

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

PRELIMINARY

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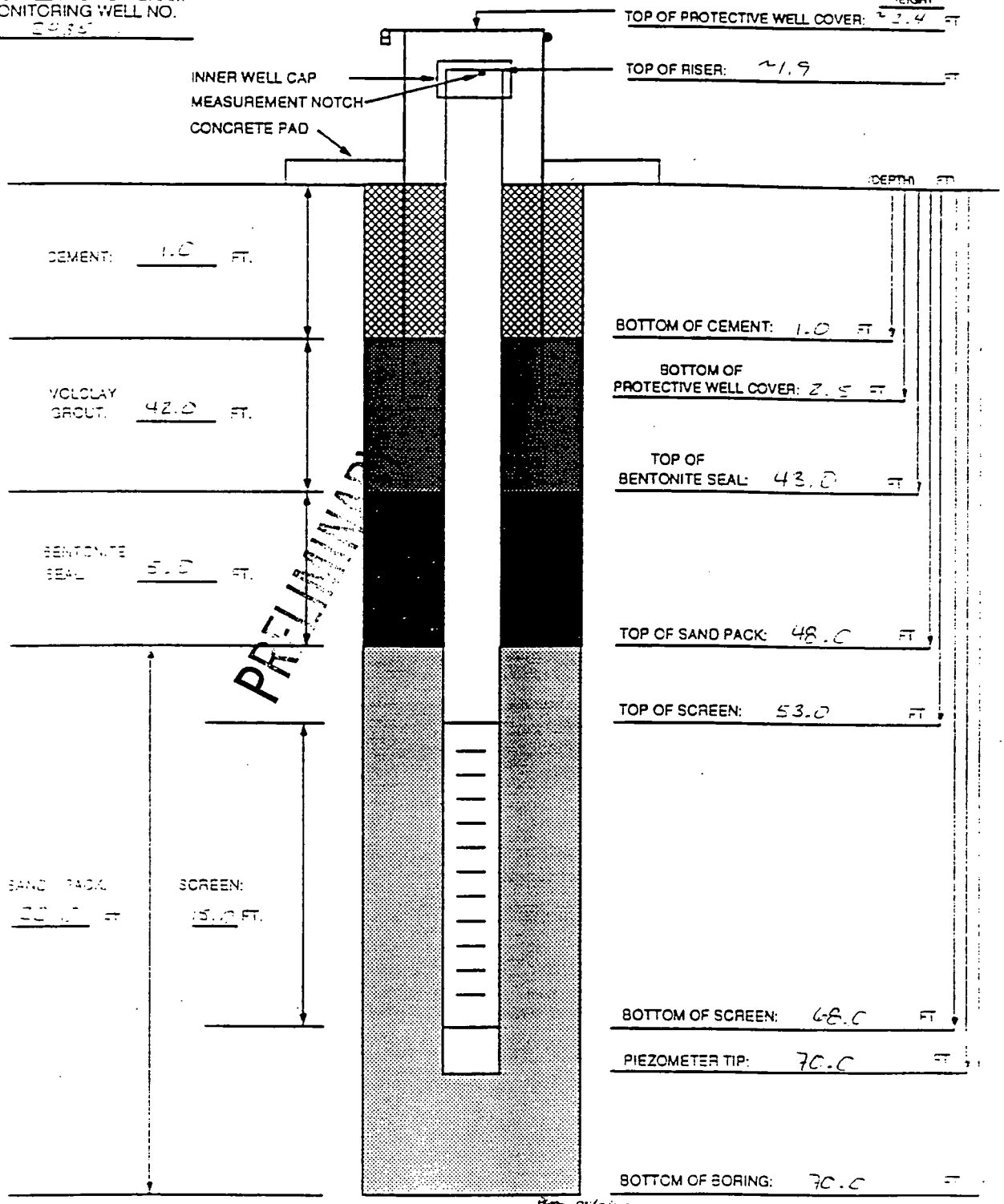
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2035

INSTALLATION DATE: 05/26-13/95



BOREHOLE DIAMETER: 8.0 IN. 10.0 in

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 F2 50 lbs bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5 Bkts
BAGS OF VOLCLAY GROUT: 2 1/2 50 lbs bags
AMOUNT OF CEMENT: 2 50 lbs bags
AMOUNT OF WATER USED: ~250 gallons
OTHER: [illegible]

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE [illegible]
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: Paul C McGreen

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME [illegible] PHASE 2 FIELD ENG./GEO. [illegible] DATE [illegible]
PROJECT NO. 30 03 05 (ROCH) CHECKED BY _____ DATE _____
BORING NO. 2935
PIEZOMETER NO. MW 2935 DATE OF INSTALLATION [illegible]

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL
DRILLING FLUID(S) USED:
FLUID WATER FROM 0.0 ft TO [illegible]
FLUID _____ FROM _____ TO _____

TYPE OF BIT HAMMER [illegible]
CASING SIZE(S) USED:
SIZE [illegible] FROM [illegible] TO [illegible]
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION [illegible] IN
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 15.0 ft²

RISER PIPE MATERIAL [illegible] STAINLESS [illegible]
RISER PIPE DIAMETERS:
O.D. [illegible] IN I.D. [illegible]
LENGTH OF PIPE SECTIONS [illegible]
JOINING METHOD [illegible] THREADED

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.0 IN

OTHER PROTECTION [illegible]

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	~1.9			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	~2.0			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM [illegible]		
CEMENT GROUT/~~SLURRY~~	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
BENTONITE PELLETS	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
SAND	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
PIEZOMETER TIP	[illegible]			
BOTTOM OF BOREHOLE	[illegible]			
GWL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS: [illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - SWL		
BORING NUMBER. 1952	COORDINATES.		DATE 4/30/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 4/30/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/1/93
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
	111652 1430 4/30	4	6	Stiff, 10YR3/3, silty fine sand, low plasticity, moist	ml	2.0	Bz = 60-80 cpm; α = 0 cpm; Mt = 0 ppm @ 1120
1	111653 1430 4/30	8	6	very stiff, 2.5Y 4/3, olive brown, 2.5Y 5/4 mottled, silty clay, slightly plastic, moist	cl	2.0	Bz = 60 cpm; α = 0 cpm; Mt = 0 ppm
	111654 1430 4/30	11	6	SAA	cl	2.0	
2	111655 1430 4/30	11	6	SAA	cl	2.0	
	111656 1435 4/30	5	6	SAA	cl	2.0	Bz = 80 cpm; α = 0 cpm; Mt = 0 ppm
3	111657 1435 4/30	6	6	SAA	cl	2.0	
	NA	6	0	NR	NA	NA	
	NA	9	0	NR	NA	NA	
4	111658 1450 4/30		NA	Shelby tube	NA	NA	Bz = NA; α = NA; Mt = NA
	NA		↓	↓	↓	↓	
5	NA	NA	↓	↓	↓	↓	
	NA		NA	Shelby tube	NA	NA	
6	111659 1500	7	6	very stiff, 2.5Y 5/4, silty clay, slightly plastic moist	cl	2.0	Bz = 0 cpm; α = 0 cpm; Mt = 0 ppm
	111660 1500	10	6	stiff, 2.5Y 5/4, silty clay, low plasticity, moist	cl	1.5	TOC Sample #
7	111676 1500	11	6	very stiff, 2.5Y 2/1, black, silty clay, low plasticity, moist	cl	2.0	Tomax Id. Sample #

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Acker Soil Sentry

Driller Martin Watral

Bob Dailey

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard [illegible]

Colors identified using Munsell Color [illegible]

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME: OU2 - SWL		
BORING NUMBER 1952	COORDINATES.		DATE 4/30/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 4/30/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/1/93
DRILLING METHODS Hollow Stem auger			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	111660 1500 4/30	19	6	very stiff, 2.5Y2/1, black, silty clay, low plasticity, moist	Cl	2.0	
	111661 1500 4/30	4	6	very stiff, 2.5Y5/4, silty clay, low plasticity moist	Cl	2.0	Bx = 60cpm
9	111662 1510 4/30	6	6	very stiff, 2.5Y2/1, black, silty clay, low plasticity, moist	Cl	2.0	α = 0cpm
	111663 1510 4/30	8	6	very stiff, 2.5Y5/4 silty clay, low plasticity, moist	Cl	2.0	mt 0ppm
	111664 1510 4/30	14	6	SAA	Cl	2.0	
10	111665 1515 4/30	5	6	very stiff, 2.5Y2/1, black, silty clay, low plasticity, moist	Cl	2.5	Bx - 60cpm
	111666 1515 4/30	9	6	very stiff, 2.5Y5/4, silty clay, medium plasticity, moist	Cl	3.0	α = 0 cpm
11	111667 1515 4/30	11	6	SAA	Cl	2.5	mt = 0 ppm
	111668 1515 4/30	16	6	very stiff, 2.5Y5/4, silty clay trace sand, low plasticity, wet	Cl	2.5	
12	111669 1530 4/30		NA	Shelby tube	NA	NA	Bx = NA
	~~111670~~		↓	↓	↓	↓	α =
13	↓	NA	↓	↓	↓	↓	mt =
	111669 1530 4/30		NA	Shelby tube	NA	NA	
14	111670 1545 4/30	5	6	very stiff, 2.5Y5/4, silty clay trace sand, low plasticity, moist	Cl	3.0	Bx = 100cpm α = 0cpm
	111670 1545 4/30	12	6	SAA	Cl	3.0	mt = 0ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller Marty Watral
Bob Dailey

SAA - Same as above
NA - Not Applicable

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

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - SWL		
BORING NUMBER 1952	COORDINATES.		DATE 4/30/93 5/1/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 4/30/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow Stem auger			PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	111671 1545 4/30	17	6	very stiff, 2.5Y5/4, silty clay trace sand, low plasticity, moist	cl	3.0	TOC Sample = 111671
	111677 1545 4/30	20	6	SAA	cl	3.0	Total C Sample = 116
16	111672 1600 4/30	5	6	very stiff, 2.5Y 5/4, 2.5Y 6/1 mottles clay, medium plasticity, moist, few gravels	cl	3.0	BZ = 400 ppm
	111673 1600 4/30	5	6	SAA	cl	2.5	α = 0 ppm
17	111674 1600 4/30	12	6	very stiff, 2.5Y 5/4, 2.5Y 6/1 and 10YR 5/4 mottles clay, medium plasticity moist	cl	2.5	Mt = 0 ppm
	NA	21	0	NR	NA	NA	
18	111675 840	16	6	very stiff, 2.5Y 5/1 gray, 2.5Y 6/4 mottles, silty clay, slightly plastic moist	cl	2.5	BZ = 80 ppm
	NA	36	NA	NR			α = 0 ppm
19	NA	50	NA	NR			Mt = 1.4 ppm
	NA	50	NA	NR			
20							5/1/93 Bore hole
							BZ 60-80 ppm
							Mt 1.4 ppm
							α = 0 ppm

NOTES

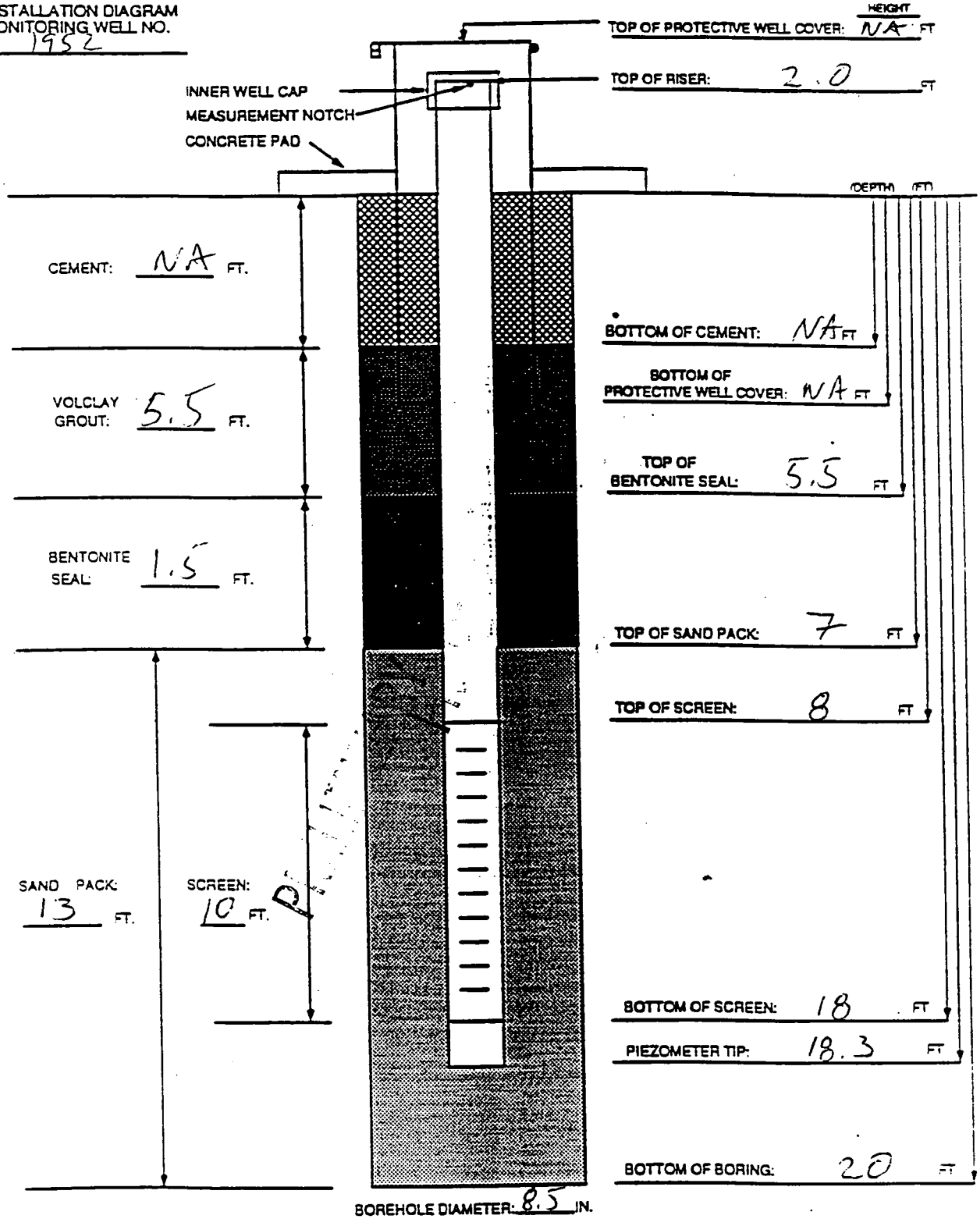
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller Marty Watral
Bob Calow / Bill Sibert

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration
Colors identified using Munsell color chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1952

INSTALLATION DATE: 5/1/93



MATERIALS USED

SAND TYPE AND QUANTITY: 10x20, 8 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1/2
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: None
AMOUNT OF WATER USED: 20
OTHER: NA
TASK: 20.03.05

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.01 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 18 FT 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: J. Reagan

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 - SWL
PROJECT NO. 20-03.05
BORING NO. 1952
PIEZOMETER NO. MW1952

FIELD ENG./GEO. J. Reagan DATE 5/1/9
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/1/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless
DIAMETER OF PERFORATED SECTION 2 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS .010 in
TOTAL PERFORATED AREA 10'

RISER PIPE MATERIAL Stainless
RISER PIPE DIAMETERS:
O.D. _____ I.D. 2 in
LENGTH OF PIPE SECTIONS 10
JOINING METHOD Flush joint

PROTECTION SYSTEM

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

OTHER PROTECTION clean overturned drum

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (~~FT~~)		ELEVATION ( )	
TOP OF RISER PIPE	2.0'		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 5.5	TOP NA	BOTTOM NA
BENTONITE	TOP 5.5	BOTTOM 7.0	TOP NA	BOTTOM NA
SAND	TOP 7.0	BOTTOM 20.0	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 8'	BOTTOM 18'	TOP NA	BOTTOM NA
PIEZOMETER TIP	18.3'		NA	
BOTTOM OF BOREHOLE	20'		NA	
GWL AFTER INSTALLATION	17.88'		NA	

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

REMARKS

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. LIME SLUDGE POND INVESTIGATION	
BORING NUMBER. MW 1934	COORDINATES:	DATE 01 MAY 93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 01 MAY 93
ENGINEER/GEOLOGIST B.F. MULLER	Depth Date/Time	DATE COMPLETED 04 MAY 93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	111176 01MAY93 1505	10	6	NA (10YR, 4/4) DARK YELLOWISH BROWN SANDY SILTY CLAY LOW PLASTICITY, MOIST	CL	NA	MT = 0 PPM BY = 70 CPM α = 0 CPM
	111176 01MAY93 1505	14	6	HARD (2.5Y, 5.6) LIGHT OLIVE BROWN SILTY CLAY, T. SAND LOW PLASTICITY MOIST	CL ~~2.5~~ TEM 01MAY93	24.5	
	111177 01MAY93 1505	12	4	SAA	CL ~~2.5~~ TEM 01MAY93	24.5	
2	~~01~~	5	0	NR	NA	NA	TIME: 1505
	111178 01MAY93 1510	10	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SANDY, SILTY CLAY, LOW PLASTICITY MOIST	CL	2	MT = 0 PPM BY = 90 CPM α = 0 CPM
3	111179 01MAY93 1510	14	6	V. STIFF (10YR, 4/3) BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.5	ALSO SHELBY TUBE 2-4 ANALYSIS - UC AND TAL-D
	111180 01MAY93 1510	14	6	SAA	CL	2.5	SHELBY TIME: 1520
	111181 01MAY93 1510	12	6	SAA	CL	3	114540 TIME: 1510
4	111182 111183 111184	15	6	V. STIFF (2.5Y, 6/3) LIGHT YELLOWISH BROWN SILTY CLAY, TRACE SAND, ORANGE MOTTLES, MEDIUM PLASTICITY MOIST	CL	3.0	MT = 0 PPM BY = 100 CPM α = 0 CPM
5	01MAY93 1530	15	6	SAA	CL	3.5	TOTAL U: 111182 TOC: 111183 TAL-D: 111184
		20	6	SAA	CL	3.0	
		21	6	SAA	CL	2.5	TIME: 1530
6	111185 01MAY93 1530	5	6	V. STIFF (2.5 ~~5/6~~ ~~2/3~~) LIGHT OLIVE BROWN SILTY CLAY, T. SAND, ORANGE MOTTLES LOW PLASTICITY MOIST	CL ~~2.0~~ TEM 01MAY93	3.0	MT = 0 PPM BY = 80 CPM α = 0 CPM
7	111186 01MAY93 1530	8	6	SAA	CL	3.5	
	111187 01MAY93 1530	5	6	SAA - INCREASE USE SILT AT 1" HORIZON	CL	2.0	TIME: 1552

NOTES
DRILLING CONTRACTOR: PENN DRILL
DRILLING RIG: MOBIL B80
DRILLER: DAN JAMISON
ASSISTANT: DON ARTHUR

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS:
MICROTIP: 0 PPM
BY: 60-70 CPM
α: 0 CPM

VERY.
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

402-11-86

FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. LIME SLUDGE POND INVESTIGATION	
BORING NUMBER. MW 1934	COORDINATES:	DATE 01MAY93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 01MAY93
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED: 02MAY93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	114518 01MAY93 1600	5	6	V. STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY, TRACE ORANGE MOTTLES MEDIUM PLASTICITY, MOIST	CL	2.5	MT: 0 PPM BY: 80 CPM α: 0 CPM
	114519 01MAY93 1600	5	6	SAA BEN 01MAY93	CL	4.0	
9	114518 01MAY93 1600	8	6	V. STIFF (2.5Y, 5/2) GRAYISH BROWN SILTY CLAY, ORANGE MOTTLES, INCREASING SILT TOWARD BOTTOM LOW PLASTICITY MOIST	CL	2.5	TIME: 1600
	114519 01MAY93 1606	4	6	STIFF (10YR, 5/4) YELLOWISH BROWN SILTY CLAY, LOW-MEDIUM PLASTICITY MOIST	CL	1.75	MT: 0 PPM BY: 60 CPM α: 0 CPM
	114520 01MAY93 1606	5	6	SOFT SAA	CL	0.5	
10	114521 01MAY93 1606	5	3	SOFT (2.5Y, 5/2) GRAYISH BROWN SILTY CLAY MEDIUM PLASTICITY MOIST	CL	0.25	TIME 1606
11	114522 01MAY93 1617	5	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, LOW PLASTICITY MOIST	CL	1.0	MT: 0 PPM BY: 80 CPM α: 0 CPM
	114523 01MAY93 1617	6	6	STIFF (5Y, 5/1) GREY SILTY CLAY, INCREASED SILT AT SOME HORIZONS, LOW PLASTICITY, VERY MOIST	CL	1.0	
12	01MAY93 1629	8	0	NR	NA	NA	TIME: 1617
	114524 01MAY93 1629	2	6	V. SOFT (2.5Y, 5/3) LIGHT OLIVE BROWN SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	<0.25	MT: 0 PPM BY: 70 CPM α: 0 CPM
13	114525 01MAY93 1629	3	6	STIFF (5Y, 5/2) OLIVE GRAY SILTY CLAY, LOW PLASTICITY, VERY MOIST	CL	1.5	
		3	0	NR	NA	NA	TIME: 1629
14	114526 02MAY93 0905	6	6	V. SOFT (2.5Y, 5/2) GRAYISH BROWN SILTY CLAY, MEDIUM PLASTICITY VERY MOIST	CL	<0.25	MT: 0 PPM BY: 50 CPM α: 0 CPM
	114527 02MAY93 0905	6	6	SAA	CL	<0.25	
	114528 02MAY93 0905	12	6	STIFF SAA MOIST	CL	1.0	TIME: 0905

NOTES

DRILLING CONTRACTOR: PENN DRILL

DRILLING RIG: B80 MOBIL

DRILLER: DAN JAMISON

ASSISTANT: DON ARTHUR

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS:

MICROTIP: 0 PPM

BY: 60-70 CPM

α: 0 CPM

VERY (V.)

NO RECOVERY (NR)

SAME AS ABOVE (SAA)

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

20.03.06

PROJECT NUMBER: ~~MW 1934~~ BEM 02MAY93	PROJECT NAME: LIME SLUDGE POND INVESTIGATION	
BORING NUMBER: MW 1934	COORDINATES:	DATE: 02 MAY 93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 01 MAY 93
ENGINEER/GEOLOGIST: B.E. MULLER	Depth Date/Time	DATE COMPLETED: 04 MAY 93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	114529 02MAY93 0512	4	6	VERY SOFT (2.5Y, 5/2) GREYISH BROWN, SILTY CLAY, MODERATE PLASTICITY, MOIST	CL	<0.25	MT: 0 PPM BY: 90-100 CPM α: 0 CPM
	114530 02MAY93 0512	8	6	STIFF SAA	CL	1.0	
16	114531 02MAY93 0512	8	6	STIFF SAA	CL	1.5	TIME: 0512
	114532 02MAY93 0520	5	6	SAA MEDIUM STIFF + 1" SILTY FINE SAND, WET HORIZON	CL	0.75	MT: 0 PPM BY: 80-50 CPM α: 0 CPM
17	114533 02MAY93 0520	8	6	STIFF SAA	CL	1.0	
	114534 02MAY93 0520	2	6	STIFF SAA	CL	1.5	TIME: 0520
18	114535 02MAY93 0528	1	6	V. SOFT (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	<0.25	MT: 0 PPM BY: 90 CPM α: 0 CPM
	114536 02MAY93 0528	1	6	SOFT (2.5Y, 5/2) GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	0.25	
19	X	3	0	NR	NA	NA	TIME: 0528
	114537 02MAY93 0540	3	6	VERY SOFT SAA	CL	<0.25	MT: 0 PPM BY: 70-80 CPM α: 0 CPM
20	114538 02MAY93 0540	3	6	VERY SOFT SAA	CL	<0.25	
	114539 02MAY93 0540	8	6	SOFT SAA	CL	0.25	TIME ~~0540~~ 0540
21							BEM 02MAY93

NOTES

DRILLING CONTRACTOR: PENN DRILL

DRILLING RIG: MOBIL B80

DRILLER: DAN JAMISON

ASSISTANT: DON ARTHUR

DESCRIPTION BASED ON MUNSELL

BACKGROUND READINGS:

MICROTIP: 0 PPM

BY: 50-70 CPM

α: 0 CPM

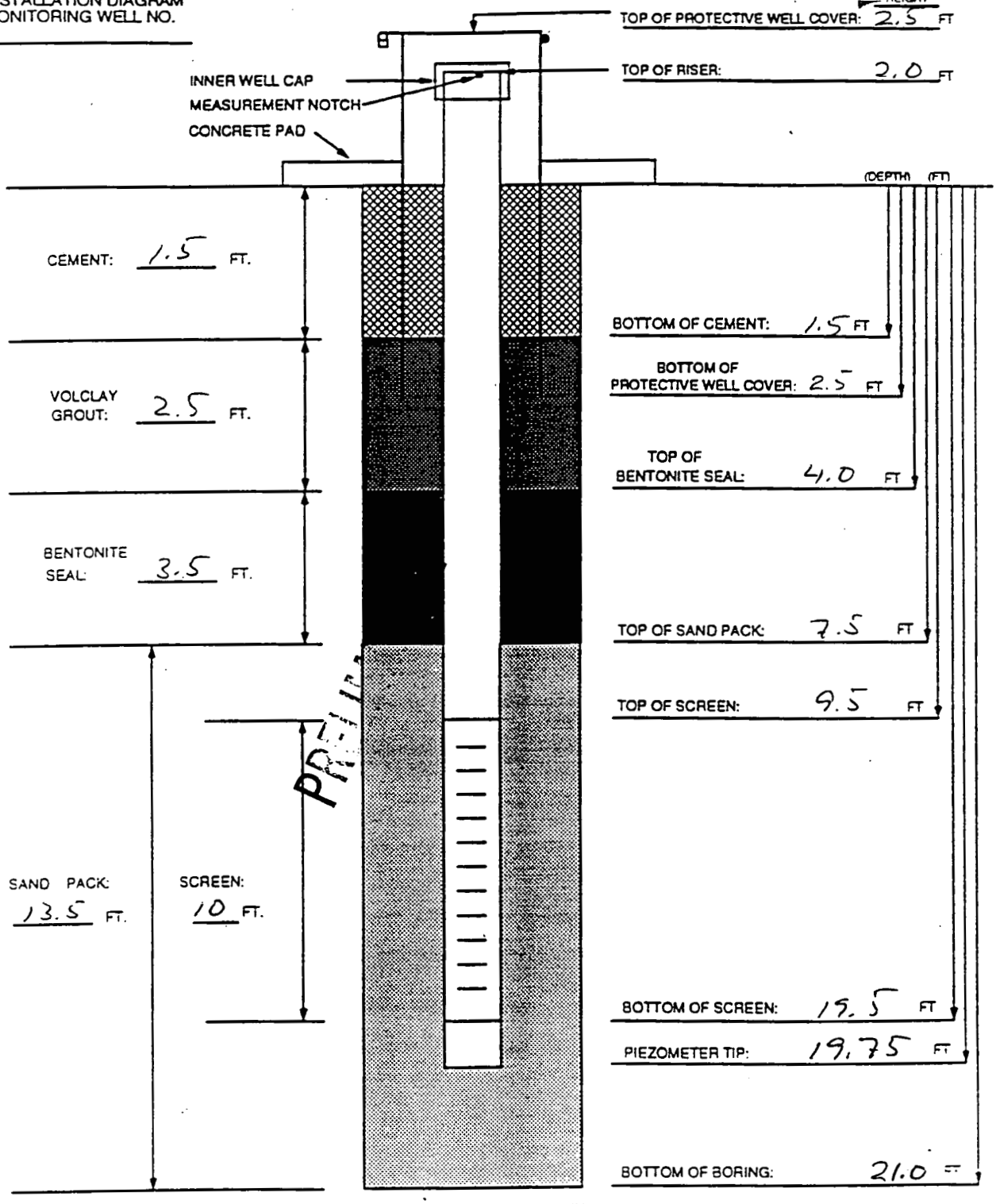
VERY (V.)

NO RECOVERY (NR)

SAME AS ABOVE (SAA)

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. _____

INSTALLATION DATE: 04MAY92 4529



BOREHOLE DIAMETER: _____ IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 6X50 # BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 1 BUCKET
BAGS OF VOLCLAY GROUT: 1/2 80# BAG
AMOUNT OF CEMENT: 1/2 94# BAG
AMOUNT OF WATER USED: 5 GALS
OTHER: NA
TASK: 20.03.05

NOTES:

1) RISER PIPE IS 2.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 2.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE ____ 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: R.E. MULLER

FERNALD
RI/FS

E-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 2 PHASE II
PROJECT NO. 20.02.05
BORING NO. MW 1934
PIEZOMETER NO. MW 1934

FIELD ENG./GEO. B.E. MULLER DATE 04MAY93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 04MAY93

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 NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE MONITORING WELL
DIAMETER OF PERFORATED SECTION 2.0 IN ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.010 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 2 3/8 IN I.D. 2.0 IN.
LENGTH OF PIPE SECTIONS 1 x 10 FT, 1 x 1.5 FT
JOINING METHOD SCREW TYPE - FLUSH JOINT

PROTECTION SYSTEM

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

OTHER PROTECTION HINGED, PROTECTIVE COVER, 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 1.5		
	TOP 1.5	BOTTOM 4.0	TOP	BOTTOM
BENTONITE	TOP 4.0	BOTTOM 7.5	TOP	BOTTOM
SAND	TOP 7.5	BOTTOM 21	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	19.75			
BOTTOM OF BOREHOLE	21			
GWL AFTER INSTALLATION	NOT TAKEN, WILL GET LATER			

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

REMARKS NONE

96 409-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 70.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1984	COORDINATES:	DATE: 05/01/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/01/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 05/01/93	
DRILLING METHODS: Hollow stem Auger w/ CME sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1100 05/01	NA	2.5	Hard (2.5Y 4/4) and 2.5Y 5/2 silty clay, slight plasticity, some small gravel, dry	CL	2.25	MT = 1.5 ppm BG = 100-110 cpm 111403 - D (TAL) 111404 - TOCD 111405 - Archive
2.5	1100 05/01	NA	2.5	(2.5'-3.0') obstruction (5Y 5/1) silty sand, well graded with (2.5Y 4/4) silty clay, some small gravel, dry	ML	NA	At 2.5' hit obstruction. Drilled through with augers. MT = 1.6 ppm BG = 100-110 cpm 111406 - TAL C
5.0	1400 05/01	NA	2.5	(5Y 5/1) silty sand, well graded, some small gravel, some (5Y 4/4) silty clay, low plasticity, dry	ML	NA	MT = 1.1 ppm BG = 100-110 cpm 111409 - Archive
7.5							

NOTES:

Drilling Co: Pennsylvania Drilling Co.
Driller: Chris Cuiter
Assistant: Bob Johnson

Background MT = 1.1 ppm
BG = 100-110 cpm

NA - Not Applicable
MT - Microtip

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1984	COORDINATES:	DATE: 05/01/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/01/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 05/01/93	
DRILLING METHODS: Hollow stem Auger w/ CME sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1400			SAA			MT = 1.1 ppm Bγ = 100-110 cpm
		NA	2.5	9.0 Hard (5Y 3/1) silty clay, low plasticity, some (5Y 4/1) silty clay, dry	CL	2.25	111467 - TAL D 111471 - TOC D 111472 - Archive (5Y 4/1) silty clay increased as sample advances
10.0	05/01						
	1430			Hard (2.5Y 5/6) and (2.5Y 5/0) silty clay, slight plasticity, dry			MT = 1.1 ppm Bγ = 100-110 cpm
		NA	2.5		CL	2.5	111470 - Archive
12.5	05/01						
	1430			Hard (2.5Y 5/6) silty clay, some (2.5Y 6/0) silty clay, slight plasticity, dry			MT = 1.1 ppm Bγ = 100-110 cpm
		NA	2.5		CL	2.75	111408 - Archive
15.0	05/01						

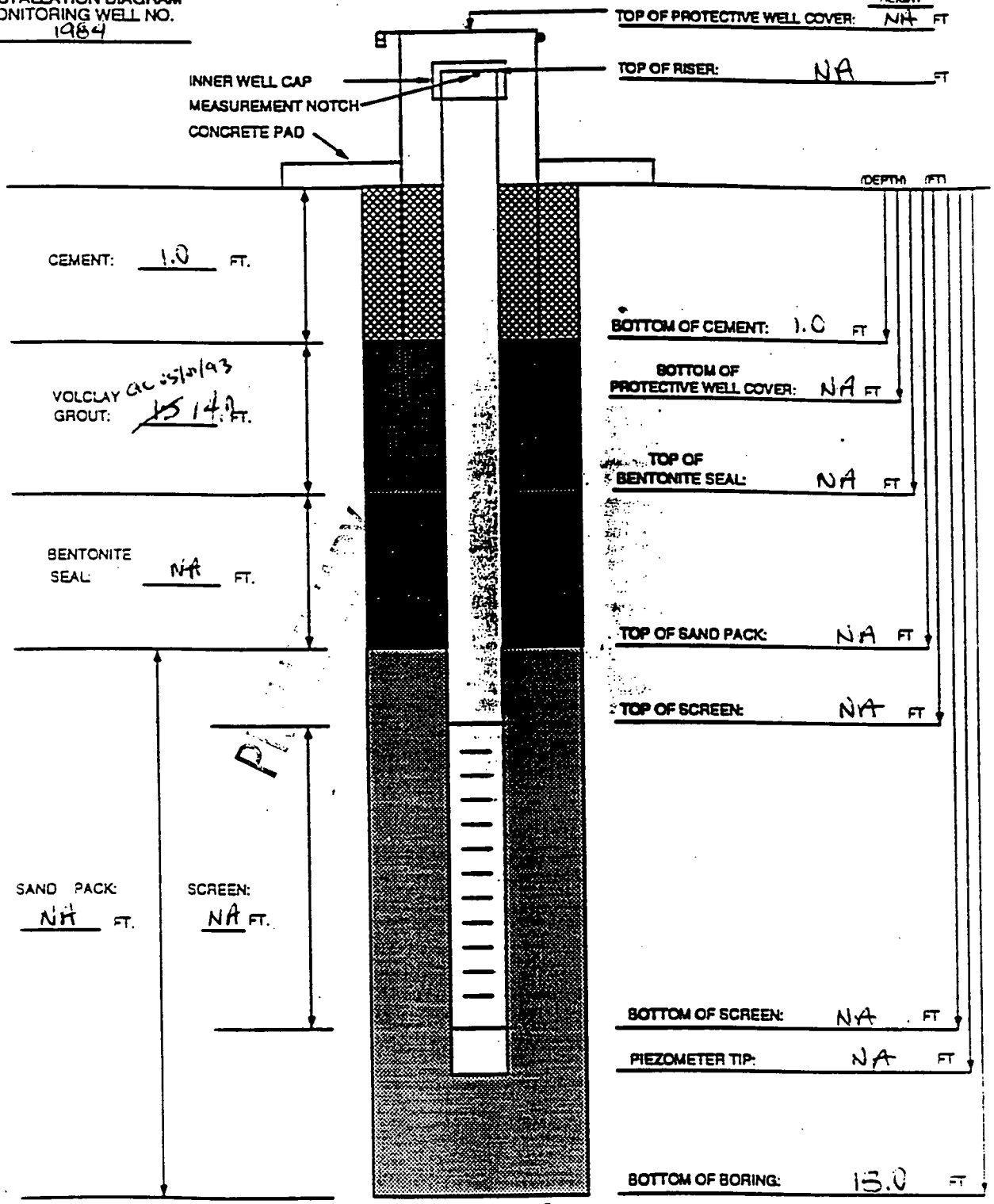
NOTES
Drilling Co.: Pennsylvania Drilling Co.
Driller: Chris Coulter
Assistant: Bob Johnson

Background: MT = 1.1 ppm
Bγ = 100-110 cpm

NA - Not Applicable
SAA - Same As Above
MT - Microrip

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1984

INSTALLATION DATE: 5/20/93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 9 bags
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 5 gallons
OTHER: NA
TASK: Install 2in Riser w/ CME sampler

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 ___ (FT)
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Lemi

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FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
PROJECT NO.: 20.03.05
BORING NO.: 1984
PIEZOMETER NO.: NA
FIELD ENG./GEO.: A. Como
CHECKED BY:
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow stem Auger w/ CME sampler
TYPE OF BIT: Hollow stem 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
SIZE NA FROM 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
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 (A)		ELEVATION
TOP OF RISER PIPE	NA		NA
GROUND SURFACE	0.0		NA
BOTTOM OF PROTECTIVE PIPE	NA		NA
BOREHOLE FILL MATERIALS:	0.0'	1.0'	
Cement GROUT SLURRY	TOP 1.0'	BOTTOM 15.0'	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		NA
BOTTOM OF BOREHOLE	15.0'		NA
SWL AFTER INSTALLATION	NA		NA

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS: Soil boring using hollow stem auger w/ CME sampler

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1983	COORDINATES:	DATE: 05/03/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/03/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 05/05/93	
DRILLING METHODS: Hollow Stem Auger with CME Sampler		PAGE 1 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N/A)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1400 111475 05/03	N/A	1.5	Firm (2.5Y 4/4) silty clay, medium plasticity, some small angular to rounded gravel, moist	CL	1.5	MT = 0.6 ppm Bγ = 60-70 cpm 111475 - Archive
1.5	1400 111476 05/03	N/A	1.0	Hard (2.5Y 5/4) silty clay, slight plasticity, some gravel, some black clay spots, moist	CL	3.25	MT = 0.6 ppm Bγ = 60-70 cpm 111476 - TALC
2.5	1400 111477 111478 05/03	N/A	2.5	Hard (2.5Y 5/6) and (5Y 5/1) silty clay, some gravel, medium plasticity, dry	CL	3.0	MT = 0.6 ppm Bγ = 70-80 cpm 111477 - TALC 111478 - TALH
5.0	NA 05/05	N/A	2.5	(2.5Y 5/6) clayey silt, some small black specs, dry 6.0' Hard (5Y 5/1) silty clay, slight plasticity, some vf sand, some gravel, dry	ML CL	NA 2.25	MT = 0.0 ppm Bγ = 70-80 cpm
7.5							

NOTES

Drilling Co: Pennsylvania Drilling Co.
Driller: Don Smith
Assisstant: Sam Smith

NA- Not Applicable

Background Readings:
05/03/93 { MT = 0.0 ppm, Bγ = 60-70 cpm
05/05/93 { MT = 0.0 ppm, Bγ = 70-80 cpm

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1983	COORDINATES:	DATE: 05/05/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/03/93	
ENGINEER/GEOLOGIST: A. Lomo	Depth Date/Time	DATE COMPLETED: 05/05/93	
DRILLING METHODS: Hollow Stem Auger w/ CME Sampler		PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (N/A)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	0915			ac 5/04/93 ~~Hard~~ (5Y 5/1) silty clay, slight plasticity, some gravel, dry			MT = 0.0 ppm Bq = 70-80 cpm
	NA	NA	2.5	8.5' SAA with some (5Y 5/4) clay, moist	CL	1.5	
10.0	05/05			9.0' Firm (5Y 4/1) silty clay, low plasticity, some gravel, some greenish silty clay, dry			
	0950			SAA	CL	1.5	MT = 0.0 ppm Bq = 70-80 cpm
	NA	NA	2.5	11.5' Very Hard (2.5Y 5/4) clayey silt with (10YR 4/6) discoloration along cleavage planes, some black specs, some gravel, no plasticity, dry	ML	ac 5/05/93 ~~4.5~~ NA	
12.5	05/05						
	0950			SAA	ML	NA	MT = 0.0 ppm Bq = 70-80 cpm
	NA	NA	2.5	14.0' Hard (2.5Y 5/6) clayey silt and (5Y 5/1) clay, some small gravel, dry	CL	3.25	Iron staining along cleavage planes
	05/05						

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller: Don Smith
Assistant: Sam Smith

Background Readings: MT = 0.0 ppm
Bq = 70-80 cpm

NA - Not Applicable
SAA - Same As Above

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1983	COORDINATES:	DATE: 05/05/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/05/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/05/93	
DRILLING METHODS: Hollow Stem Auger w/ OAE Sampler		PAGE 3 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1015			Hard (2.5Y 5/6) and (5Y 5/1) silty clay, slight plasticity, some small gravel, dry			MT = 0.0 ppm BZ = 70-80 ppm
NA	NA	NA	2.5		CL	3.5	The (5Y 5/1) silty clay decreases as the depth of the boring increases
17.5	05/05						
	1015			SAA	CL	3.5	MT = 0.0 ppm BZ = 70-80 ppm
	111460 111461 111462	NA	2.5		~~AAC~~ UC ~~NA~~ UC	~~NA~~	111460 - TAL 2 111461 - TAL 3 111462 - TAL 4
				(2.5Y 5/6) clayey silt, low plasticity, dry	ML	NA	
20.0	05/05						
				End of boring			

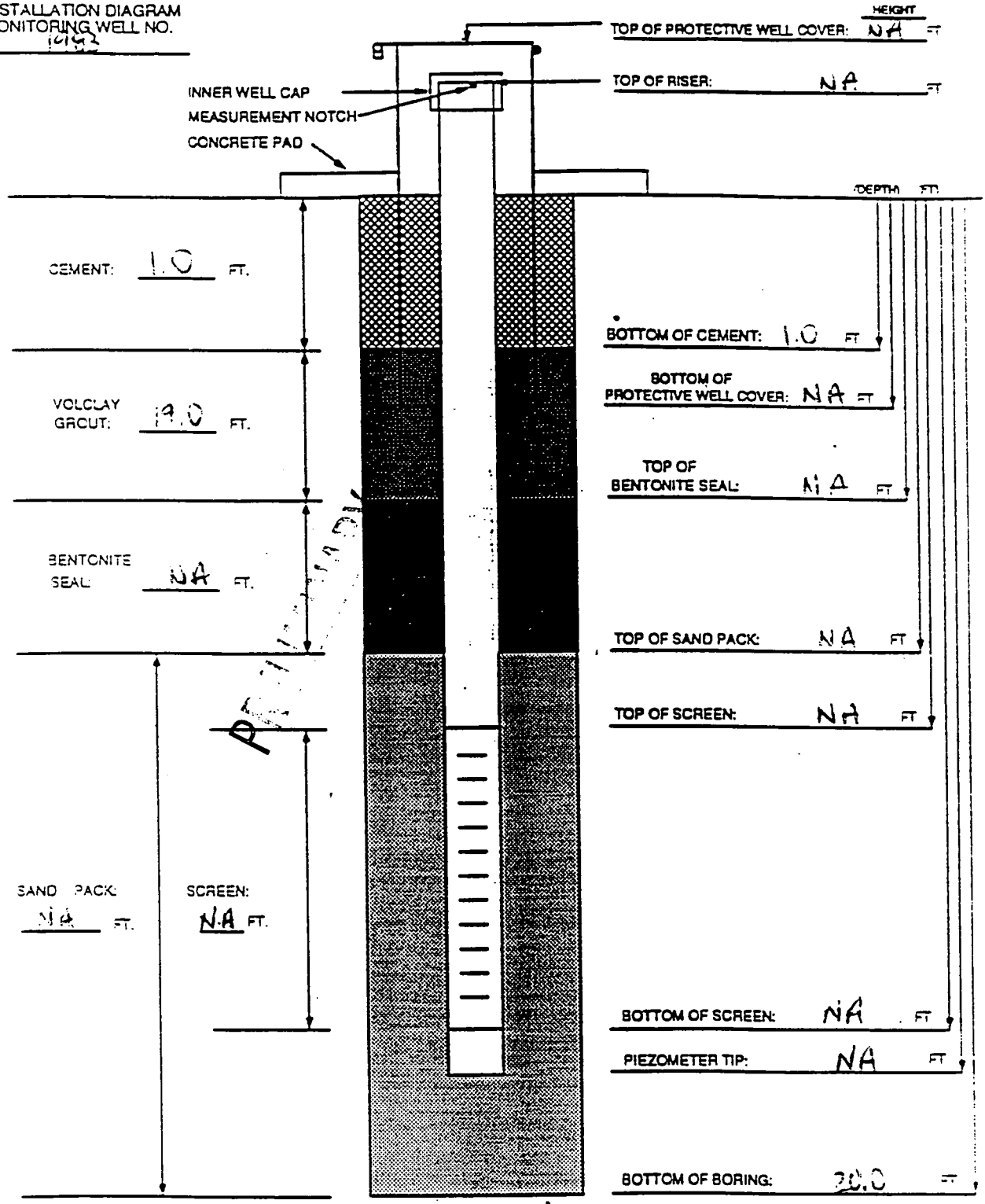
Notes:
Drilling Co. Pennsylvania Drilling Co.
Driller Dave Smith
Assistant Sam Smith

Background Reading MT = [illegible]
BZ = [illegible]

Not Applicable

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1092

INSTALLATION DATE: 05/05/93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 11
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 5 gallons
OTHER: NA
TASK: [illegible]

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 [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: A. Lewis

FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
PROJECT NO.: 20.03.05
BORING NO.: 1983
PIEZOMETER NO.: NA
FIELD ENG./GEO.: A. Gomez
CHECKED BY:
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow stem auger w/ core sampler
DRILLING FLUID(S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT: Hollow Stem
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM 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
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 (NA)		ELEVATION NA	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	0.0'	1.0'		
CEMENT GROUT SLURRY	TOP 1.0	BOTTOM 20.0	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	20.0			
DRILL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A DEVELOPMENT TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
IF SO: [illegible]

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2-SWL		
BORING NUMBER. 1950	COORDINATES.		DATE 5/5/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/5/93
ENGINEER/GEOLOGIST J. Reaga	Depth	Date/Time	DATE COMPLETED. 5/5/93
DRILLING METHODS auger - hollow stem			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	111678 1305	3	6	Stiff, 2.5Y 3/3, dark olive brown, silty fine sand, low plasticity, moist	cl	1.5	βγ = 50-70cpm α = 0cpm Mt = 0.5ppm
1	111679 1305	10	6	very stiff, 2.5Y 4/4, olive brown, silty clay, medium plasticity, moist	cl	3.5	βγ = 50cpm α = 0cpm Mt = 0ppm
	111680 1305	10	6	SAA	cl	3.0	
	111681 1305	14	6	SAA	cl	3.0	
2	111682 1310		NA	Shelby tube	NA	NA	βγ = 50cpm
	111682 1310		↓	↓	↓	↓	α = 0cpm
3	111682 1310	16" recovery	↓	Shelby tube	NA	NA	Mt = 0.4ppm
	111682 1310		NA	2.5Y 5/4, light olive brown, silty clay, some gravels, moist	cl	NA	2.0-4.0 Shelby tub sample
4	111683 1330	4	6	Stiff, 2.5Y 5/4 light olive brown, clay, some gravels moist	cl	2.0	βγ = 50cpm α = 0cpm Mt = 0.5ppm
	111683 1330	8	6	Hard, 2.5Y 5/4, light olive brown, clay, some gravels, moist	cl	4.5	
5	111684 1330	10	6	very stiff, 2.5Y 5/4, light olive brown, clay, some gravels, very moist	cl	2.5	
	111685 1330	16	6	hard, 2.5Y 5/4, light olive brown, clay, some gravels, ~~very~~ dry 5/5/93 moist	cl	4.0	
6	111686 1345	[illegible]	6	Very stiff, 2.5Y 5/4 light olive brown, silty clay, trace fine sand, low plasticity & moist	cl	3.0	βγ = 50cpm α = 0cpm Mt = 0.5ppm
	111687 1345	[illegible]	6	SAA	cl	3.0	
7	111688 1345	[illegible]	6	SAA	cl	3.0	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sampler
Driller M. Wadral
B. Dailey

SAA - Same as above
NA - Not Applicable
Mt - Minot.p
Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

FERNALD
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VISUAL CLASSIFICATION OF SOILS

-4520

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - SWL		
BORING NUMBER 1950	COORDINATES.		DATE 5/5/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/5/93
ENGINEER/GEOLOGIST L Reagan	Depth	Date/Time	DATE COMPLETED. 5/8/93
DRILLING METHODS Hollow stem auger			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3 8	115268 1345	25	6	very stiff 2.5Y 5/4, light olive brown, silty clay, trace fine sand, low plasticity, moist	Cl	3.0	
	115269 1400		NA	Shelby tube	NA	NA	βγ = 50 cpm
9	115269 1400	2 Ft Recover	↓	↓	↓	↓	α = 0 cpm
	115269 1400		↓	Shelby tube	NA	NA	Mt = 0.5 ppm
10	115269 1400		NA	~~SAA~~ 9/5/93 very stiff, 2.5Y 5/4, light olive brown, silty clay, trace fine sand, low plast., moist	Cl	3.5	8.0-10.0 ft - Shelby tube sample
	115270 1415	4	6	very stiff, 2.5Y 5/4, light olive brown, silty fine sand, low plasticity, moist	ml	2.5	βγ = 50-70 cpm
11	115270 1415	10	6	SAA	ml	2.5	α = 0 cpm
	115271 1415	18	6	SAA	ml	2.5	Mt = 1.0 ppm
12	115272 1415	29	6	very stiff, 2.5Y 5/4, light olive brown, 2.5Y 5/1, gray mottled, silty fine sand, ~~very stiff~~ low plasticity, moist 5/5/93	ml	2.0	
	115273 1430	4	6	SAA	ml	2.0	
	115274 1430	10	6	SAA	ml	2.0	βγ = 50 cpm
13	115275 1430	18	6	SAA	ml	2.0	α = 0 cpm
	115276 1430	18	6	very stiff, 2.5Y 5/1 gray, silty fine sand, low plasticity, moist, rock fragments.	ml	2.0	Mt = 0.7 ppm
14	115277 1440	10	6	Dense, (2.5Y 5/1) gray, poorly graded sand, low plasticity, moist	SP	NA	βγ = 20 cpm
15	115278 1440	14	6	SAA	SP	NA	α = 0 cpm Mt = 0.8 ppm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker soil sampler
Driller M. Watral
B. Dailey

SAA - Same as above
NA - Not Applicable
Mt = microtip
Samples collected per ASTM standard procedures
Colors identified using Munsell color chart

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2-SWL		
BORING NUMBER. 1950	COORDINATES.		DATE 5/5/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/5/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/5/93
DRILLING METHODS Hollow stem auger			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	115279 1440	18	6	Dense, 2.5Y5/1 gray, poorly graded sand, low plasticity, wet, some gravels	SP	NA	
	115280 1440	20	4	SAA	SP	NA	
16	115281 1450	0 0	6	Stiff, 2.5Y5/1 gray, silty clay, low plasticity moist	cl	1.5	βγ = 50cpm
	115282 1450	10	6	very stiff, 2.5Y 5/1 gray, silty clay, low plasticity, moist	cl	2.0	α = 0cpm
17	115283 1450	12	6	Stiff, 2.5Y 5/1 gray, silty clay, low plasticity, moist	cl	1.75	mt = 1.0ppm
	115284 1450	14	6	very stiff, 2.5Y 5/1 gray, silty clay, low plasticity, moist	cl	2.0	
18	115285 1500	6	6	very stiff, 2.5Y5/1 gray, silty clay, some gravels low plasticity, moist	cl	2.5	βγ = 100cpm
	115286 1500	0 0	6	SAA	cl	2.0	α = 0cpm
19	115287 1500	12	6	SAA	cl	2.0	mt = 1.0ppm
	115288 1500	14	6	SAA	cl	2.5	
20							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker soil sentry
Driller M. Watral
B. Dailey

SAA - Same as above
NA - Not Applicable
mt = micro t.p

Samples collected per ASTM standard procedure
Colors identified using Munsell color chart

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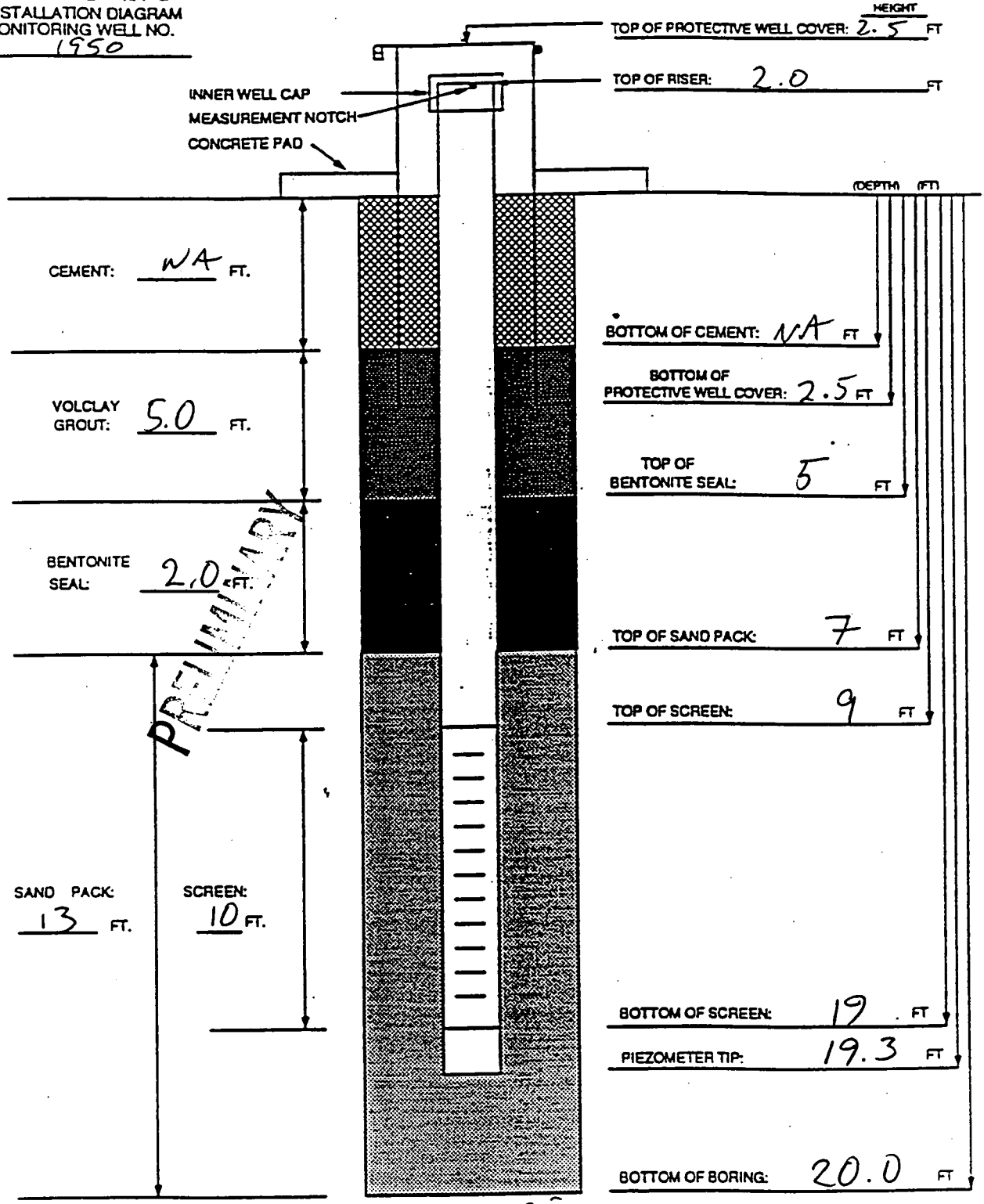
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1950

INSTALLATION DATE: 5/6/93



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10x20, 6 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: NA - for pad only
AMOUNT OF WATER USED: 15 gal.
OTHER:
TASK:

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.01 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 15.9 FT 5/6/93
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: J. Reagan

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ASI FORM 0157 REV. (0)

FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 - SWL
PROJECT NO. 20.03.05
BORING NO. 1950
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/6/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/6/93

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 monitoring well
DIAMETER OF PERFORATED SECTION 2.0 in
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.01 in
TOTAL PERFORATED AREA 10 ft

RISER PIPE MATERIAL Stainless
RISER PIPE DIAMETERS:
O.D. 2.3/8" I.D. 2.0
LENGTH OF PIPE SECTIONS 10 ft screen, 16 ft riser, 16 ft
JOINING METHOD flush thread joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA 4"

OTHER PROTECTION locked protective cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	2.5		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 5.0	TOP NA	BOTTOM NA
BENTONITE	TOP 5.0	BOTTOM 7.0	TOP NA	BOTTOM NA
SAND	TOP 7.0	BOTTOM 20.0	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.0	BOTTOM 19.0	TOP NA	BOTTOM NA
PIEZOMETER TIP	19.3			
BOTTOM OF BOREHOLE	20'			
GWL AFTER INSTALLATION	NA			

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

REMARKS

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HI/FS

VISUAL CLASSIFICATION OF SOILS

-4520

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/13/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/13/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0930 116136 5/13/93	3	6	V. STIFF. 2.5Y(5/4) Lt olive brown gravelly clay no plasticity moist	CL	2.25	HNU = 0ppm BG = 60cpm
	0950 116137 5/13/93	5	6	SAA, dry	CL	3.25	HNU = 0ppm BG = 60cpm
1		7	0	No Recovery	NA	NA	HNU = NA BG = NA
	0955 116138 5/13/93	4	6.	V. STIFF. 2.5Y(5/4) Lt olive brown gravelly clay no plasticity dry	CL	3.0	HNU = 0ppm BG = 60 cpm
2	0958 116139 5/13/93	6	4	SAA, mixed w/ black flyash moist	CL	2.5	HNU = 0ppm BG = 60cpm
		8	0	No Recovery	NA	NA	HNU = NA. BG = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Dr: Craig Coulter
Bobby Yost

Samples collected per ASTM standard penetration test

Colors identified using Munsell color chart

Key: HNU = ppm BG = cpm

PRELIMINARY

RI/FS

VISUAL CLASSIFICATION OF SOILS

-4529

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/5/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/5/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/5/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1/2 (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1000 116160 5/5/93	3	6	M. Dark Black flyash wet	NA	NA	HNU = 0ppm BS = 100 cpm
	1000 116161 5/5/93	6	5	SAA V. Stiff. 2.5Y(5/4) Light olive brown gravelly clay, no plasticity slightly moist	CL	2.25	HNU = 0ppm BS = 100 cpm
14		7	0	No Recovery	NA	NA	HNU = NA BS = NA
	1005 116162 5/5/93	7	6	Stiff. 2.5Y(5/6) Lt. olive brown gravelly clay, no plasticity slightly moist.	CL	1.75	HNU = 0ppm BS = 60cpm
15	1005 116163 5/5/93	9	6	SAA	CL	2.0	HNU = 0ppm BS = 60cpm
		11	0	No Recovery	NA	NA	HNU = NA BS = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

D. ... Craig Carter
Bobby Post

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

Key: HNU = ppm BS = cpm

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/5/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/5/93
ENGINEER/GEOLOGIST: D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/5/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1030 116164 5/5/93	11	6	V. Stiff. 2.5Y(5/2) Grayish brown silty clay w/organics, no plasticity, dry	CL	3.0	HNU = 0ppm BS = 80cpm
	1030 116165 5/5/93	14	3	SAA	CL	3.0	HNU = 0ppm BS = 60cpm
7		21	0	No Recovery	NA	NA	HNU = NA BS = NA
	1040 116166 5/5/93	9	6	V. Stiff 2.5Y(5/6) Lt olive brown silty clay w/organics, no plasticity dry	CL	3.25	HNU = 0 ppm BS = 80cpm
8	1040 116167 5/5/93	10	6	SAA, 2.5Y(4/4) Olive brown	CL	3.0	HNU = 0ppm BS = 80cpm
	1040 116168 5/5/93	16	3	Stiff 2.5Y(4/4) Olive brown silty clay w/organics low plasticity moist	CL	1.5	HNU = 0ppm BS = 80cpm

PRELIMINARY

NOTES:

SAA - same as above soil
NA - not applicable

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: ACKER SENTRY

Driller: Chris Coulter, Bobby Hart

Samples collected per ASTM standard practice D-1587

Colors identified using Munsell Color Chart

Key: HNU = ppm BS = cpm

01 201 113

VISUAL CLASSIFICATION OF SOILS - 4520

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/13/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/13/93
ENGINEER/GEOLOGIST: D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 4 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1/2 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1042 116169 5/13/93	6	6	STAFF 2.5Y(8/1) Gray silty clay w/organics, low plasticity slightly moist	CL	1.25	HNU = 0ppm BS = 60cpm
	1042 116170 5/13/93	8	4	SAA	CL	1.5	HNU = 0ppm BS = 60cpm
10		10	0	No Recovery	NA	NA	HNU = NA BS = NA
	1045 116171 5/13/93	9	25	STAFF 2.5Y(4/1) Dark gray silty clay, little gravel, low plasticity slightly moist.	CL	1.25	HNU = 0ppm BS = 60cpm
11		11	0	No Recovery	NA	NA	HNU = NA BS = NA
		21	0	No Recovery	NA	NA	HNU = NA BS = NA

SAA - same as above
NA - not applicable

NOTES:

Drilling Contractor: PENNSYLVANIA DRILLING CO.

Drilling Equipment: ACKER SENTRY

D...: Craig Cattin, Bobby Yost

Samples collected per ASTM standard practice - colors identified using Munsell Color Chart

Key: HNU = ppm BS = cpm

VISUAL CLASSIFICATION OF SOILS - 4527

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/5/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/5/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/5/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1050 116172 5/5/93	5/5/93 2 4	6	DSO 5/5/93 K Silty 2.5Y(4/1) Dk gray sandy clay, low plasticity moist	CL	1.5	HNU = 0ppm BG = 100 cpm
	1050 116173 5/5/93	5/5/93 4 3	3	Silty 2.5Y(4/1) Dk gray mixed w/ 1% olive brown gravelly clay no plasticity moist	CL	1.0	HNU = 0ppm BG = 100 cpm
13	5/5/93	5/5/93 5 0	0	No Recovery	NA	NA	HNU = NA BG = NA
		15	0	No Recovery	NA	NA	HNU = NA BG = NA
14		15	0	No Recovery	NA	NA	HNU = NA BG = NA
		20	0	No Recovery	NA	NA	HNU = NA BG = NA

NOTES.

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: Greg Coutre
Bobby Post

Samples collected per KTM standard procedure. Colors identified using Munsell Color Chart

Note: HNU = ppm BG = cpm

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HI/FS

VISUAL CLASSIFICATION OF SOILS

-4520

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 11002	COORDINATES:	DATE 5/5/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/5/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1245 116174 5/5/93	10	6	Stiff 2.5Y(3/1) Gray clay w/gravel, low plasticity, wet on top dry at the end	CL	1.5	HNU = 0ppm BS = 60cpm
		50/2	0	No Recovery	NA	NA	HNU = NA BS = NA
16			0	No Recovery	NA	NA	HNU = NA BS = NA
	1320 116175 5/5/93	15	5	V. Stiff 2.5Y(3/1) Gray gravelly clay no plasticity dry. Dense 2.5Y(3/6) Lt olive brown coarse sand, poorly graded, moist	CL / SP	3.5 / NA	HNU = ~~NA~~ 0ppm BS = ~~NA~~ 60cpm
17		20	0	No Recovery	NA	NA	HNU = NA BS = NA
		25	0	No Recovery	NA	NA	HNU = NA BS = NA

Boring terminated at 18 ft

NOTES.

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: [illegible]

[illegible]

Samples collected per ASTM standard practice for [illegible]

Colors identified using Munsell color chart

Key: HNU = ppm BS = cpm

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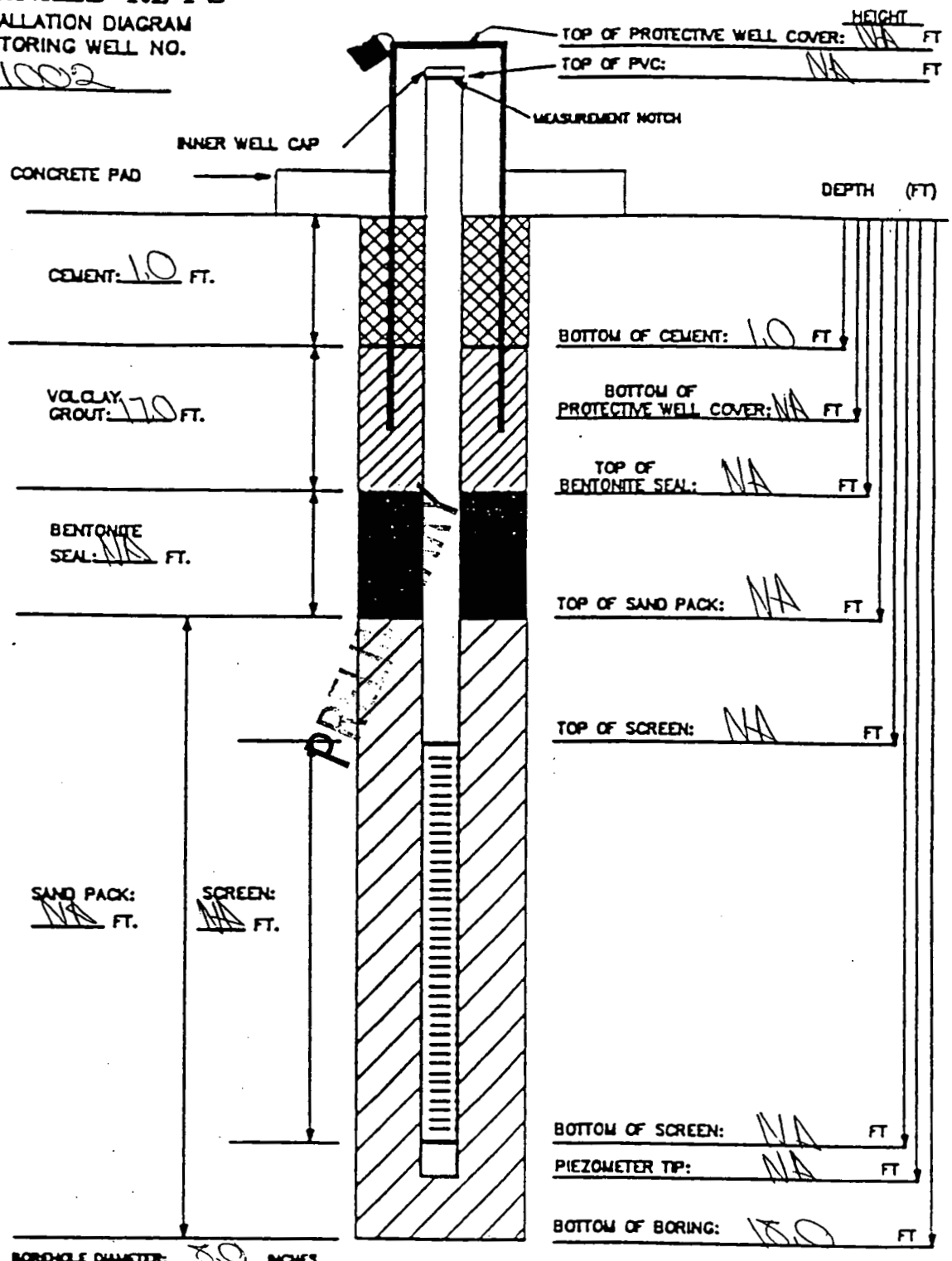
INSTALLATION DIAGRAM
MONITORING WELL NO. 11002

INSTALLATION DATE: 3/5/93



BOREHOLE DIAMETER: 8.0 INCHES

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 25 gal
OTHER:

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

Soil, Water drum TASK: 20.08.03 GEOLOGIST/ENGINEER: D. O'Brien

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RI/FS

B-4529 8018

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 phase 2 FIELD ENG./GEO. D. O'Brien DATE 5/6/93
PROJECT NO. 20.08.03 CHECKED BY _____ DATE _____
BORING NO. 11002
PIEZOMETER NO. — DATE OF INSTALLATION 5/5/93

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

TYPE Hydropunch Boring
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				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 8.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	12.2			

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

REMARKS _____

-4520

FERNALD
RI/FS

WATER QUALITY FIELD COLLECTION REPORT

Date: 5-5-93
Time: 1245
Page: 1 of 1

FADL REF # 5/5/93

PROJECT NAME	OU2 phase 2	SAMPLE LOCATION	11002
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	11617le
DATE COLLECTED	5/5/93	RFA NUMBER	
TIME COLLECTED	1300	C/C NUMBER	72045
COLLECTED BY	DDIDK	SAMPLE TYPE	ground water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.39 in hg
AIR TEMPERATURE	68°F
DO SATURATION IN AIR	NA
WATER TEMPERATURE	16.3°F C
DEPTH OF SAMPLE	13.0-17.0 ft
WATER LEVEL	12.2 ft

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.05	NA	NA
SPEC. COND. uMHOS/cm	1000	NA	NA
D.O. MG/L	1.55	NA	NA

050593	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
~~HNU~~ Microtip	0ppm	0ppm	0ppm

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
20°c	4	7				N/A	20°c	1000	10000	Isobutylene	060927	0ppm	0ppm
OK	✓	✓	OK			N/A	OK	980	9000				

WEATHER CONDITIONS: p.cloudy

ADDITIONAL REMARKS: BZ = 60-80 cpm

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME	EQUIP.	NUMBER
003702	ORION 250A PH METER	BAILER	NA
92542760	YSI MODEL 33 SCT METER	HOSE/S	NA
859132	Hydropunch II	PUMP	NA
859053	Masterflex model 7518	FILTER KIT	Geotech Disposable

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NA NA NA NA Ht. of Water Column x NA = NA (3 Volumes)

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: IFP OU-2		
BORING NUMBER: 1997	COORDINATES:	DATE 050593	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 050593	
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	DATE COMPLETED: 050793	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	116177	4	6	LOOSE, (2.5Y, 5/6) Light olive brown, clayey silt moist trace gravel, no plasticity,	ml	NA	BG = 60cp
		4	6	SAA	ml	NA	MT = 0.0ppm
	116177	4	6	very stiff (5Y, 5/6), olive, silty clay, trace gravel, low plasticity, moist	cl	3.0	
2	116178 116179	8	4	SAA	cl	2.75	
3	116180	5	6	SAA	cl	2.75	BG = 60cp
		7	6	SAA	cl	2.75	MT = 0.0ppm
	116180	5	6	Stiff, (5Y, 7/4) olive, silty clay, with flyash, trace gravel, low plasticity, moist	cl	1.5	
4	116181 116182	7	3	SAA	cl	1.5	
5	116183	7	6	very stiff (2.5YR 5/6) light olive brown, silty clay, with gravel, trace flyash, low plasticity moist	cl	3.5	BG = 60cpm
		11	6	SAA	cl	2.75	MT = 0.0ppm
	116183	13	6	(10YR, 2/1) Black, flyash, dry	NA	NA	
6	116184 116185	15	6	SAA	NA	NA	
7	116186	11	6	(10YR, 2/1) Black, flyash, slightly moist.	NA	NA	BG = 60cpm
		17					MT = 0.0ppm
		22	6	SAA	NA	NA	
	116186	34	6	SAA	NA	NA	

NOTES

Drillers:
Joe Raab (Driller)
Roger Davis (Helper)

MT = microrip
BG = Beta Gamma meter
SAA = Same As Above

402-11-88

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: ~~FP 00 050593~~	IFP-OU-2	
BORING NUMBER: 1997	COORDINATES:	DATE 050593	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 050593	
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	DATE COMPLETED 052793	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF	

TIME	DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0920	8	116187 116188		6	(10YR, 2/1) BLACK, FLYASH, SLIGHTLY MOIST	NA	NA	
		116189	2	6	SAA			BG = 60cpm
			2					MT = 0.0ppm
			2	6	SAA			
	9		2					
1030		116189		6	SAA			
		116190 116191		2	SAA			
	10	116192	3	6	SAA			BG = 40cpm
			2					MT = 0.0ppm
			3	6	SAA			
	11		1					
1300		116192		6	SAA			
		116193 116194		3	SAA	NA	NA	
	12	116195	2	6	SAA	NA	NA	BG = 60cpm
			2					MT = 0.0ppm
			2	6	SAA			
1325	13		2					
		116195		6	SAA			
		116196 116197		2	SAA	NA	NA	
	14	116198	4	6	SAA			BG = 60cpm
			3	6				MT = 0.0ppm
1335		116198			SAA	NA	NA	
	15							

SAA = SAME AS ABOVE
MT = MICROTIP

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME:	
BORING NUMBER: 1997	COORDINATES:	DATE 050593
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 050593
ENGINEER/GEOLOGIST: J. BOYER	Depth Date/Time	DATE COMPLETED: 050793
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF

TIME	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	15	116198	2	6	(10YR, 2/1) BLACK, FLY ASH, Slightly moist	NA	NA	
1335		116199	3	6	SAA			(page 2)
	16	116200						
		116201	4	6	SAA			Bγ = 60cpm
			3	6	SAA			MT = 0.0ppm
1350	17		3	6	SAA			
		116201	2					
		116202		2	SAA	NA	NA	
	18	116203						
		116204	4	6	SAA			Bγ = 60cpm
			2	6	SAA			MT = 0.0ppm
1400	19		2	6	SAA			
		116204	3					
		116205		6	SAA	NA	NA	
	20	116206						
		116207	5	6	SAA			Bγ = 60cpm
			3	6	SAA			MT = 0.0ppm
1450	21		2	6	SAA			
		116207	2					
		116208		3	SAA			
		116209						
	22	116210	5	6	SAA	NA	NA	

NOTES

Bγ = BETA GAMMA
MT = MICROTIP
SAA = SAME AS ABOVE

402-11-86

FERNALD
RI/FS

F -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.07.05	PROJECT NAME:		
BORING NUMBER: 1997	COORDINATES:	DATE 050593	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 050593	
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	DATE COMPLETED: 050793	
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 4 OF	

TIME	DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1500	23	116210	3	6	(10YR 2/1) BLACK, FLYASH, Slightly moist	NA	NA	Bq = 60cpm
			2					
		116210	1	6	SAA	↓	↓	MT = 0.0ppm
		116211 116212		4	SAA 050593	NA	NA	
1510	24	116213	2	6	SAA			Bq = 60cpm
			2					
	25		2	6	SAA			MT = 6.0ppm
		116213	2	6	SAA			
		116214 116215		4	SAA			
1515	26	116216	2	6	(10YR 2/1), BLACK, FLYASH, moist			Bq = 60cpm
			3					
	27		2	6	SAA			MT = 0.0ppm
		116216	4	6	SAA	↓	↓	
		116217 116218		3	SAA	NA	NA	
0900 050693	28	116241 116242	5	6	SAA			Bq = 60cpm
		116243	4	6	LOOSE, (5Y, 4/4) OLIVE, SILT, MOIST, NO PLASTICITY	ML	NA	MT = 0.0ppm
	29		5	6	SAA	↓	↓	
		116243	1	6	SAA	ML	NA	
	30							

MT = MICROTIP
SAA = SAME AS ABOVE

402-11-86

FERNALD
RI/FS

-4590

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: IFP OU-2		
BORING NUMBER: 1997	COORDINATES:	DATE 050693	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 050593	
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	DATE COMPLETED: 050793	
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF	

TIME	DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION 050593	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	30	116244 116245	7	6	MEDIUM DENSE, (3.5Y, 3/2) DARK OLIVE GRAY, CLAYEY SILT, TRACE COARSE SAND, SLIGHT PLASTICITY, MOIST	ML	NA	Bf = 60 cpm MT = 0.0 ppm
		116246	9	6	SAA	↓	↓	
0925	31	116247	11 14	6	SAA	↓	↓	
		116248		4	SAA	Ml	NA	
	32	116249	Shelby tube	24	SAA	Ml	NA	NA
1020	33				UNKNOWN	NA	NA	
					UNKNOWN	NA	NA	
	34	116249			(10YR, 4/3) BROWN, CLAYEY SILT WITH COARSE SAND, SLIGHT PLASTICITY, MOIST	Ml	NA	
		116252	4	6	SHPF (2.5Y, 4/2) DARK GRAYISH BROWN SILTY CLAY WITH FLYASH MOIST, LOW PLASTICITY	Cl	1.0	Bf = 60 cpm MT = 0.0 ppm
0930	35		6 8	6	SAA	Cl	1.0	
		116257	9	6	MEDIUM DENSE, (10YR, 4/3) BROWN, CLAYEY SILT WITH GRAVEL, MOIST SLI. PLASTICITY	Ml	NA	
		116253 116254		6	SAA	Ml	NA	
	36	116255 116256	4		SAA	Ml	NA	Bf = 60 cpm MT = 0.0 ppm
950	37		9 12		MEDIUM DENSE, 93 (2.5Y 5/4) ~~SAA~~ SILT, WITH GRAVEL AND FLYASH, MOIST	Ml	NA	
		116255 116256	12		MEDIUM DENSE, 93 SILT WITH GRAVEL AND COARSE SAND, MOIST NO PLASTICITY ~~SAA~~			

MT = MICROTIP
SAA = SAME AS ABOVE

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

-4529

PROJECT NUMBER: 20.03.05	PROJECT NAME: IFP OU-2		
BORING NUMBER: 1997	COORDINATES:	DATE 050793	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 050593	
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	DATE COMPLETED: 050793	
DRILLING METHODS: Hollow Stem Auger		PAGE 6 OF	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
38	116255 116256			MEDIUM DENSE (2.5Y 5/6) light olive brown, SILT with coarse sand, moist	ml	NA	
	116257	9	6	MEDIUM DENSE (2.5Y 5/6) light olive brown, silty gravel with coarse sand, moist	GM	NA	BZ = 60 cpm
	116257	11	6	SAA	GM	NA	MT = 0.9 ppm
39	116258 116259	13 13	6	SAA	GM	NA	
40	NA		0	NO RECOVERY[1]	NA ~~GM~~	NA	
				BOTTOM OF BORING 39 1/2 FEET	050693		
41							
42							

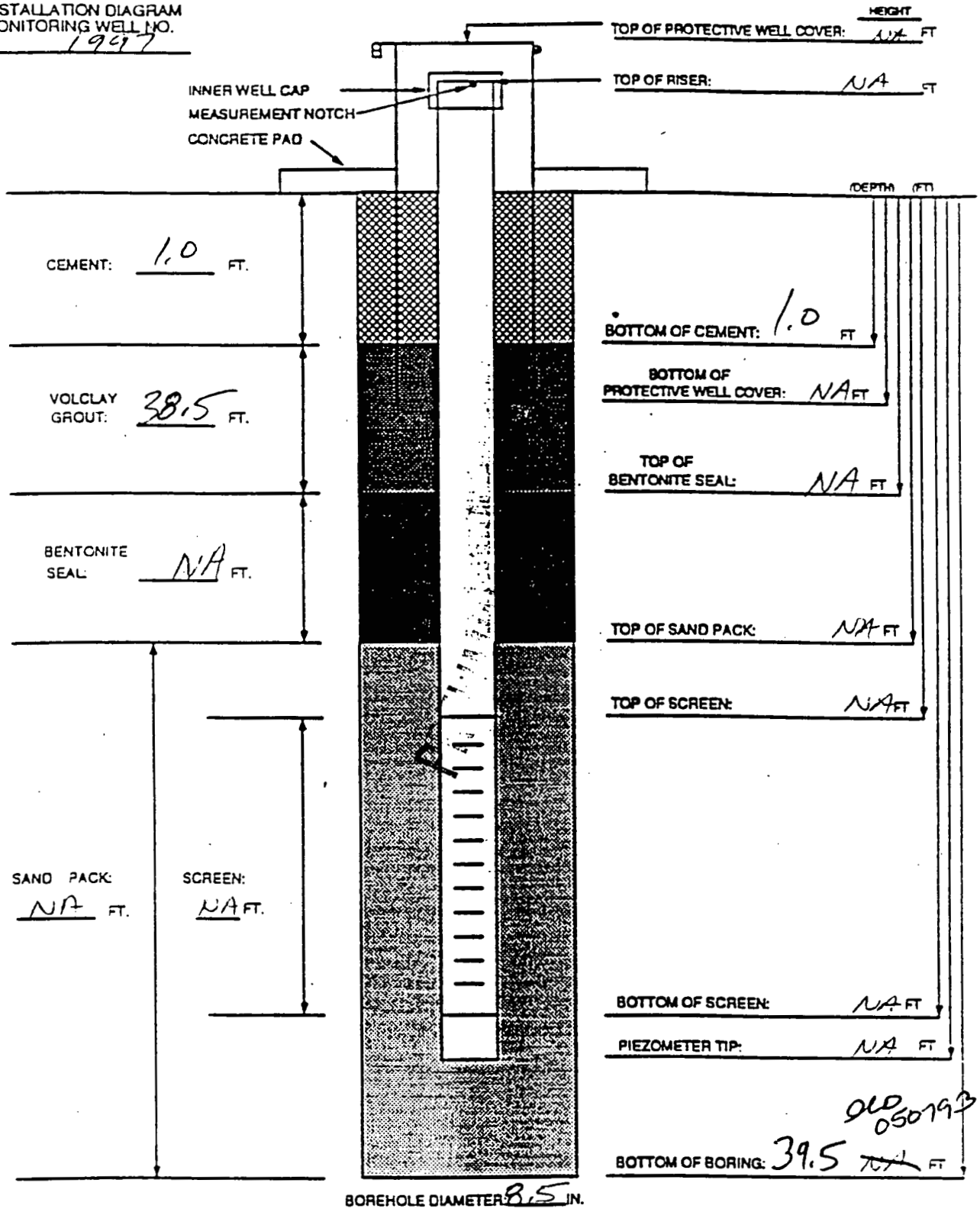
NOTES

[1] - AT 39 1/2 FEET THE SHOE HAD APPROXIMATELY 1 INCH OF POORLY GRADED SAND, which is not like THE TOP OF THE Aquifer SAND. THEREFORE, FURTHER drilling was not

-45298

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1997

INSTALLATION DATE: 050793



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~30 GALLONS
OTHER: 1 DRUM STILL, 1 DRUM [illegible]
TASK: [illegible]

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 [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: J. Boyer

FERNALD RI/FS

-43298

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 08
PROJECT NO. 20.03.05 CHECKED BY _____ DATE ____
BORING NO. 1997
PIEZOMETER NO. NA DATE OF INSTALLATION 050793

BOREHOLE DRILLING

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

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
2A ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM
2B ~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 39.5	TOP NA	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	39.5		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

ROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1982	COORDINATES:	DATE: 05/06/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/06/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 05/06/93	
DRILLING METHODS: Hollow Stem Auger w/ CME sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0850 111484 111485 111486 05/06	NA	2.5	Hard (2.5Y 5/3) light olive brown and (10 YR 5/6) yellowish brown silty clay, slight plasticity, some gravel, dry	CL	3.75	MT = 0.7 ppm BG = 50-70 cpm
2.5	0850 NA 05/06	NA	2.5	SAA	CL	2.5	MT = 0.7 ppm BG = 50-70 cpm
5.0	0910 NA 05/06	NA	2.5	Very Hard (5Y 6/1) gray and (2.5Y 5/6) light olive brown silty clay, no plasticity, some small gravel, dry	CL	4.5	MT = 0.7 ppm BG = 50-70 cpm
7.5							

PRELIMINARY

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT = 0.7 ppm
BG = 50-70 cpm

SAA - Same As Above
NA - Not Applicable

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER:	20.03.05	PROJECT NAME:	OU2 Phase II		
BORING NUMBER:	1982	COORDINATES:		DATE:	05/06/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED:	05/06/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED:	05/06/93
DRILLING METHODS:	Hollow stem Auger w/ CME sampler			PAGE	2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0910			Hard (2.5Y 5/4) light olive brown, silty clay, no plasticity, dry			MT = 0.7 ppm BZ = 50-70 cpm
	111487	NA	2.5		CL	3.15	Iron staining on cleavage surfaces
	0930			END of Boring			
10.0				Push Shelby tube from 10.0' to 12.0' @ 0920 sample # 111488			Determined that borehole contains no waste material.
12.5							

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

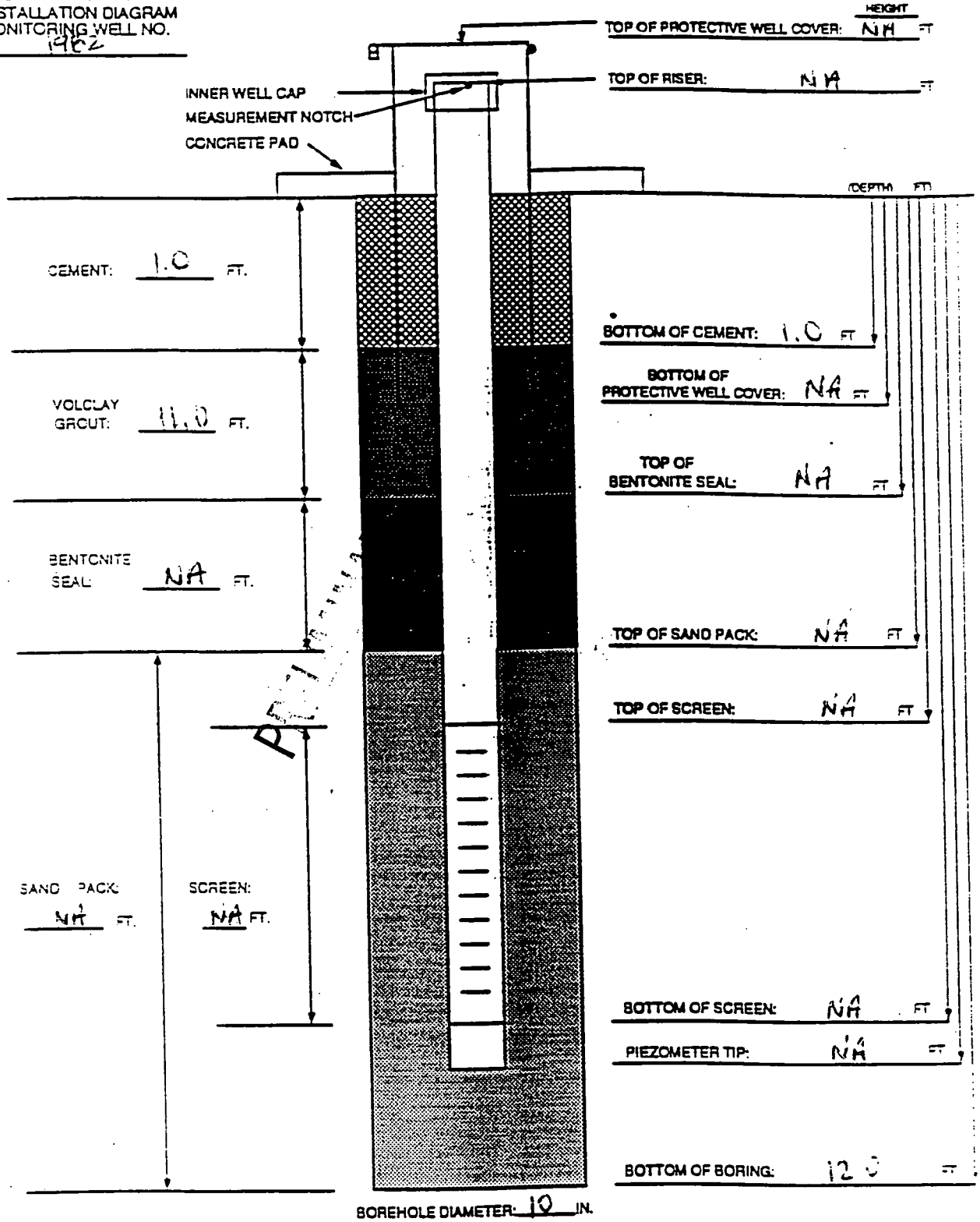
Background MT = 0.7 ppm
BZ = 50-70 cpm

SAA - Same As Above
NA - NOT Applicable

PRELIMINARY

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1962

INSTALLATION DATE: 05/06/92



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 11
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: NA
TASK: [illegible] using [illegible] sampler

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 [illegible] 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: A. Lomo

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FERNALD
RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase I
PROJECT NO. 20.03.05
BORING NO. 1982
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Lomo DATE [illegible]
CHECKED BY DATE
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow stem auger w/ core sampler
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 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 (NA)	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	0.0	1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 12.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	12.0	[illegible]		
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Sampled to 10.0' w/ [illegible] samples. [illegible] from 10.0' to 12.0'

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU 2 Phase II		
BORING NUMBER: 1991	COORDINATES:	DATE: 05/06/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/06/93	
ENGINEER/GEOLOGIST: A. Lomio	Depth Date/Time	DATE COMPLETED: 05/06/93	
DRILLING METHODS: Hollow stem Auger w/ CME Sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1330 NA 05/06	NA	2.5	Firm (2.5Y 5/6) light olive brown and (5Y 5/1) gray silty clay, low plasticity, some gravel, dry	CL	2.0	MT= 0.0 ppm BG= 50-70 cpm Styrofoam mixed with soil to an approximate depth of 3.0'
2.5	1330 NA 05/06	NA	2.5	Hard (5Y5/1) gray and (5Y 5/6) olive silty clay, slight plasticity, some gravel, dry	CL	3.0	MT= 0.0 ppm BG= 50-70 cpm
5.0	1345 NA 05/06	NA	2.5	SAA	CL	3.0	MT= 0.0 ppm BG= 50-70 cpm
				6.0 Firm (5Y 5/1) gray silty clay, medium plasticity, some gravel, moist	CL	1.75	
7.5							

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT= 0.0 ppm
BG= 50-70 cpm

SAA- Same As Above
NA- Not Applicable

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 1991	COORDINATES:	DATE: 05/06/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/06/93	
ENGINEER/GEOLOGIST: A. Lomo	Depth Date/Time	DATE COMPLETED: 05/06/93	
DRILLING METHODS: Hollow Stem Auger w/ CME Sampler		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 FT	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1345			Firm (5Y5/1) gray silty clay, medium plasticity, some gravel, moist			MT = 0.0 ppm BG = 50-70 cpm
	115341	TAKE NA	2.5	9.0'	CL	1.75	Between 8.0'-9.0' found small piece of strip metal, plastic, and some black waste material
	115320	TAKE		Hard (2.5Y 5/6) light olive brown silty clay, some (5Y5/1) gray silty clay, slight plasticity, dry	CL	2.5	Native till contact at 9.0'
10.0	05/06 1400	NA	2.5	Hard (2.5Y 5/6) light olive brown silty clay with some (5Y 6/1) gray silty clay, some small gravel, low plasticity, dry	CL	2.5	MT = 0.0 ppm BG = 50-70 cpm
12.5	05/06 1400			SAA			MT = 0.0 ppm BG = 50-70 cpm
	115322	TAKE NA	2.5		CL	4.0	@1415 inserted steel tube from 15.0'-17.0' Sample # 115322 END OF BORING

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.0 ppm
BG = 50-70 cpm

SAA- Same As Above
NA- Not Applicable

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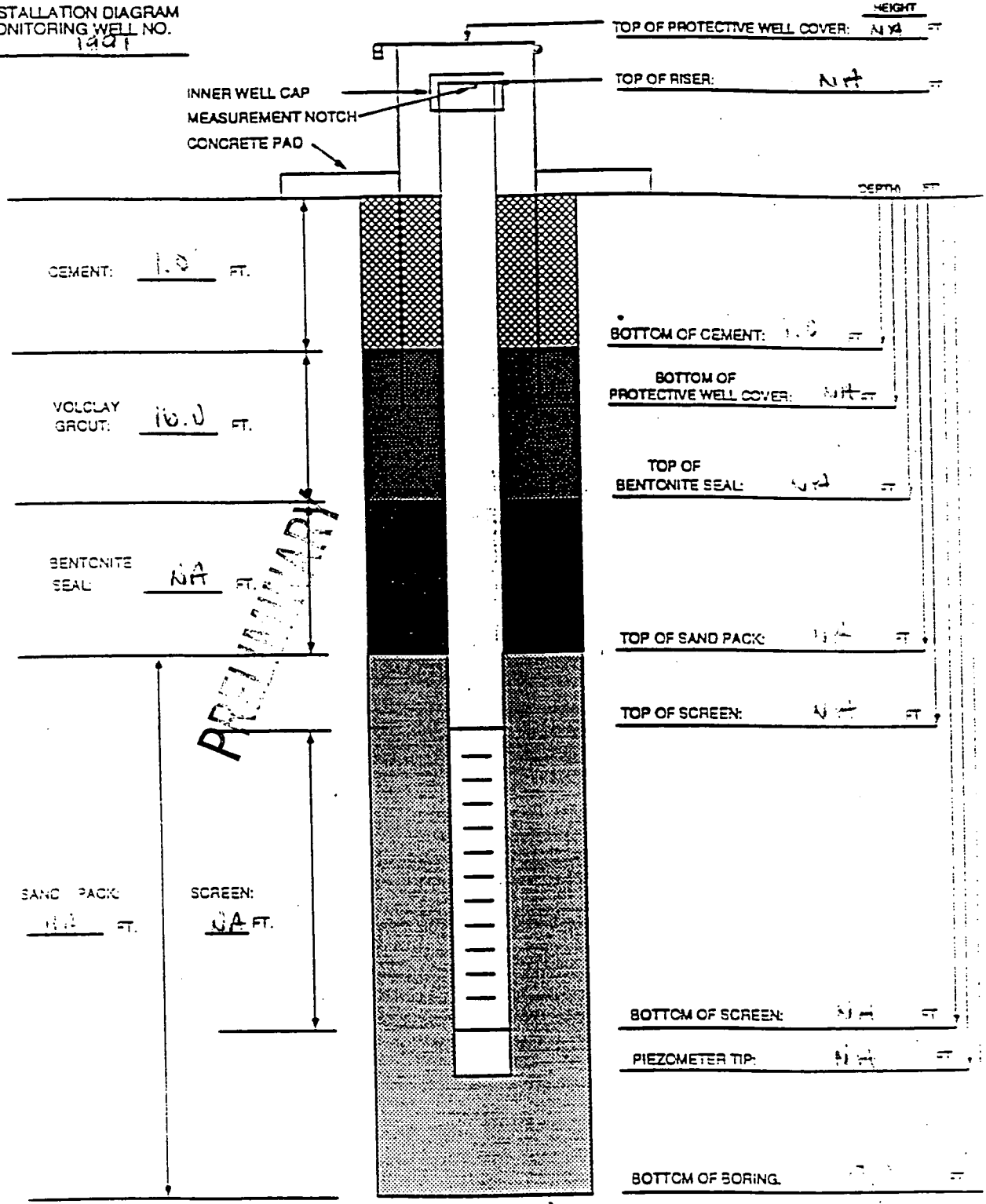
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1001

INSTALLATION DATE: 05/06/92



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 6
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: 3 gallons
OTHER: NA
TASK: [illegible]

NOTES:

1) RISER PIPE IS 2.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0.[illegible] IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE [illegible] 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: [illegible]

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
FIELD ENG./GEO.: A. Lemo
DATE: [illegible]
PROJECT NO.: 20.05.05
CHECKED BY:
DATE:
BORING NO.: 1991
PIEZOMETER NO.: NA
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow stem Auger w/ CME sampler
TYPE OF BIT: Hollow stem 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: 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 (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	0.0	1.0		
GROUT (Cement)/SLURRY	TOP 1.0	BOTTOM 17.0	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		NA	
BOTTOM OF BOREHOLE	17.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS: Hollow stem auger w/ CME sampler used to install piezometer to 15.0' slightly wet [illegible]

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS-04.33	PROJECT NAME: 12 Well - South Plume		
BORING NUMBER: MW 2899	COORDINATES:	DATE: 5-7-93	
ELEVATION:	GWL: Depth 70.1 ft Date/Time 5-3-93 0815	DATE STARTED: 4-29-93	
ENGINEER/GEOLOGIST: B. Yearsley	Depth 69.3 Date/Time 5-5-93 1030	DATE COMPLETED: 5-6-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				For Description see logs for MW 3899			βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
60.0							

PRELIMINARY

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Saccani
Helper : Jeff Chechian

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

* 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

PROJECT NUMBER: WBS04.33	PROJECT NAME: 12 Well - South Plume		
BORING NUMBER: MW 2899	COORDINATES:	DATE: 5-1-93, 5-2-93	
ELEVATION:	GWL: Depth 70.1 Date/Time 5-3-93 0915	DATE STARTED: 4-29-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 69.3 Date/Time 5-5-93 1030	DATE COMPLETED: 5-6-93	
DRILLING METHODS: Cable Tool		PAGE 2 OF 5	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0 61.0	1500 5-1-93	40 50/3	9	V. Dense 2.5Y(5/4) lt. olive brown fine sand w/ gravel to a 10YR(5/6) yellowish brown fine sand w/ clay and gravel	SP SW	NA	βγ: 40-60 cpm HNU: 0 ppm
62.0 63.0	1515 5-1-93	24 50/3 50/3	17	V. Dense 2.5Y(5/4) lt. olive brown fine sand w/ some gravel, poorly graded, dry and 10YR(5/6) yellowish brown fine sand w/ some gravel, well graded, dry	SP SW	NA	βγ: 20-40 cpm HNU: 0 ppm
64.0	1600 5-1-93	23 21 23	15	Dense 10YR(5/6) yellowish brown fine to coarse sand w/ some gravel, well graded, dry	SW	NA	βγ: 20-40 cpm HNU: 0 ppm
65.0 66.0	0940 5/1/93	48 50/4	8	very dense (10 YR 5/6) yellowish brown gravelly fine to coarse sand w/ broken cobble, moist / 10 YR 5/1) gray poorly graded medium sand, moist	SW SP	NA	βγ: 40/40 cpm 5-2-93 ~~HNU~~: 08/0.8 ppm MIP
67.0	1005 5-1-93	38 50/4	7	very dense (10 YR 5/3) brown, gravelly fine to coarse sand well graded, moist to wet / bottom 1" yellowish brown	SW	NA	βγ: 40/40 cpm HNU: 0.2/0.2 ppm
68.0 69.0				bailed out sample			βγ: HNU: NA ppm
70	1030	6 7 9	7	medium dense (10 YR 5/6) yellowish brown, fine to coarse sand w/ some gravel, wet / bottom 2" dark yellowish brown (well graded)	SW	NA	βγ: 40/40 cpm HNU: 0/0 ppm
71 72	1105	34 35 36	8	very dense (10 YR 5/1) gray gravelly, fine to coarse sand well graded, wet	SW	NA	βγ: 40/40 cpm HNU: 0/0 ppm
73	1410	9 21 23	13	Dense (10 YR 5/2) grayish brown, gravelly, medium to coarse sand w/ some pebbles, poorly graded, wet bottom 2" medium sand	SP	NA	βγ: 40/40 cpm HNU: 0/0 ppm
74 75	1430	9 12 12	14	Medium dense (10 YR 5/1) gray gravelly, medium to coarse sand poorly graded w/ some pebbles, wet	SP	NA	βγ: 50/50 cpm HNU: 0/0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable tool
Driller: Tim Salconi
Helper: Joe Barrill

SAA = Same As Above
N/A = Not Applicable

Background = 20-40 cpm

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

actual reading of bac gr

-4529

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 04.33	PROJECT NAME: 12 Well - South Plume	
BORING NUMBER: MW 2899	COORDINATES:	DATE: 5-3-93
ELEVATION:	GWL: Depth 70.24 Date/Time 5-3-93 0815	DATE STARTED: 4-29-93
ENGINEER/GEOLOGIST: B. Yearsley	Depth 69.3 Date/Time 5-5-93 1030	DATE COMPLETED: 5-6-93
DRILLING METHODS: Cable Tool		PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	* REMARKS
750 760	NA	NA	NA	NO SAMPLE LOST Casing (measurement off)	NA	NA	βγ: HNU: NA
77	0950	16 31	18	V Dense 2.5Y(5/2) Grayish brown fine to crse sand w/ gravel, well graded, wet	SW	NA	βγ: 40-60cpm HNU: 0 ppm
78	5-3-93	32					
74	0910 5-3-93	14 23 23	14	V DENSE 2.5Y(5/2) Grayish brown fine to crse sand w/ gravel, well graded, wet V DENSE 2.5Y(5/2) Grayish brown, fine to crse gravel w/ sand, well graded, wet	SW GW	NA	βγ: 40-60cpm HNU: 0 ppm
80							βγ: HNU:
81 82				Drilled to 82.0			βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:
							βγ: HNU:

PRELIMINARY

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : 38 Cyclone
Driller : Jim Sauer
Helper : Jeff Chechan

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

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

402-11-86

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FERNALD
RI/FS

E-4529.5

PIEZOMETER INSTALLATION SHEET

PROJECT NAME 12 well South Plume FIELD ENG./GEO. [illegible] DATE [illegible]
PROJECT NO. 6035 04 33 CHECKED BY _____ DATE _____
BORING NO. 2899
PIEZOMETER NO. 2899 DATE OF INSTALLATION 11-29-93 to 5-6

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer Percussion B
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID water FROM 0.0 TO 69.0	SIZE 10.0 in FROM 0.0 ft TO 83.0
FLUID – FROM – TO –	SIZE – FROM – TO –

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Ste
DIAMETER OF PERFORATED SECTION 4.0 in In	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 6-10 ft, 1-5 ft,
AVERAGE SIZE OF PERFORATIONS 0.01 in	JOINING METHOD Screw-type flush joi
TOTAL PERFORATED AREA 15.0 ft	threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Hinged locking co
PROTECTIVE PIPE O.D. 10 in	with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.1			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.4			
BOREHOLE FILL MATERIALS:	TOP 0.0	BOTTOM 1.0		
CEMENT GROUT / ~~SLURRY~~ 5-11-93	TOP 1.0	BOTTOM 51.0	TOP	BOTTOM
BENTONITE	TOP 51.0	BOTTOM 59.0	TOP	BOTTOM
SAND 16/30	TOP 59.0	BOTTOM 80.0	TOP	BOTTOM
~~GRAVEL~~ 5-11-93	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 65.0	BOTTOM 80.0	TOP	BOTTOM
PIEZOMETER TIP	83.0			
BOTTOM OF BOREHOLE	85.0			
GWL AFTER INSTALLATION	69.3 at ground level			

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

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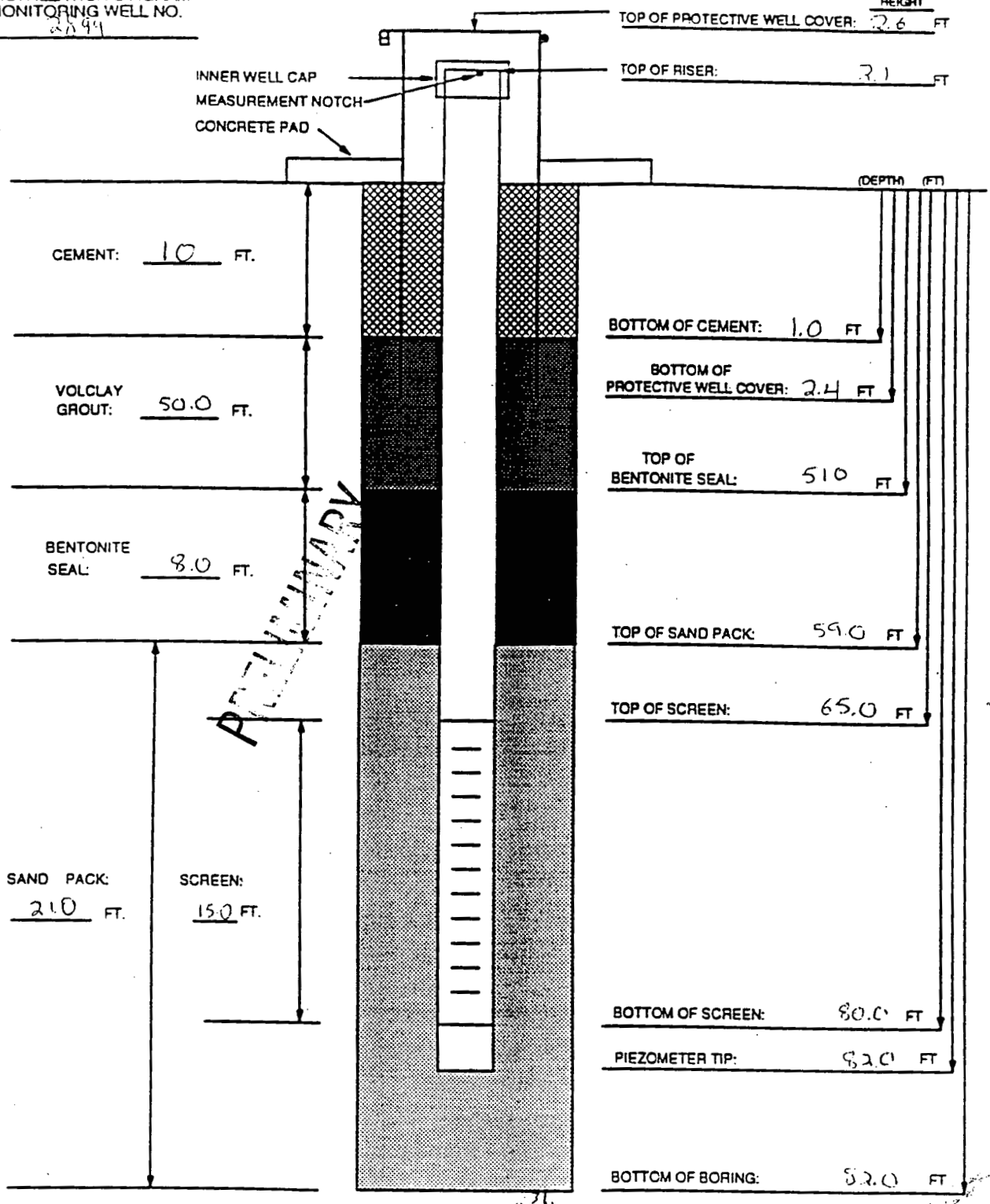
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2099

INSTALLATION DATE: 1-21-93 - 5-6-93



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MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 24 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6
BAGS OF VOLCLAY GROUT: 10
AMOUNT OF CEMENT: 4 bags
AMOUNT OF WATER USED: 700 gal
OTHER: 11 drums soil, 1 drum H_2O
TASK: WBS 04.33

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.01 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 61.3 FT/ 5/6
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Brian Yeamans

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ASI FORM 0157 REV. (0)

FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH INVESTIGATION	
BORING NUMBER 1979	COORDINATES	DATE 10 MAY 93
ELEVATION	GWL: Depth Date/Time	DATE STARTED 10 MAY 93
ENGINEER/GEOLOGIST B. E. MULLER	Depth Date/Time	DATE COMPLETED 11 MAY 93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 5

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 18 (IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (11 MAY 93 BEM)
0.5	112051 10MAY 1322	2	6 BEM	V. LOOSE (2.5 YR, 10) BLACK FLY ASH, DRY	NA	NA	MT: 0 ~~CPM~~ PPM BY: 70 ~~PPM~~ CPM
1	112051 10MAY 1322	2	6 BEM	SAA DAMP	NA	NA	TAL-C 112051
1.5	112051 10MAY 1322	4	5 BEM	SAA	NA	NA	
2	X	10	0	NR	NA	NA	TIME 1322 BEM
	112052 10MAY 112053	10	0	LOOSE SAA	NA	NA	MT: 0 PPM BY: 80 CPM
3	10MAY 1326	7	6	SAA	NA	NA	TAL-C 112052
		8	6	SAA	NA	NA	
4		11	6	MEDIUM DENSE SAA	NA	NA	BEM 10MAY93 TAL-C.I → 112093 TIME: 1325
	112054 10MAY 1400	NA	6	SHELBY	NA	NA	MT: 0 PPM BY: 80 CPM
5		NA	6	SHELBY	NA	NA	
		NA	6	SHELBY	NA	NA	SHELBY TUBE 112094
6		NA	6	SAA SHELBY	NA	NA	TIME: 1400
	112055 10MAY 1416	1	+6	V. LOOSE SAA	NA	NA	MT: 0 PPM BY: 60 CPM
	112055 10MAY 1416	1	+6	SAA	NA	NA	112055 TAL-C, W.S.
	112055 10MAY 1416	2	2 6	SAA	NA	NA	TIME 1416

NOTES:

DRILLING FIRM: PENN DRILL

DRILLERS: DAN JAMESON, DON ARTHUR

RIG: MOBIL B80

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = PPM, BY = CPM, α = CPM

BACKGROUND READINGS:

MICROTIP: 0 PPM

BY: 50 CPM

α: NA CPM

NO RECOVERY (NR)

SAME AS ABOVE (SAA)

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH INVESTIGATION	
BORING NUMBER 1979	COORDINATES	DATE 10MAY93
ELEVATION	GWL. Depth Date/Time	DATE STARTED 10MAY93
ENGINEER/GEOLOGIST B. F. MULLER	Depth Date/Time	DATE COMPLETED 10MAY93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 2 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	11MAY93 BSH REMARKS
8	112095 10MAY 1416	4	6	V. LOOSE (2.5YR, 10) BLACK FLY ASH, MOIST	NA	NA	
	112096 10MAY 1426	NA	6	SHELBY	NA	NA	MT: 0 BY: 70
9		NA	6	SHELBY	NA	NA	
		NA	6	SHELBY	NA	NA	SHELBY 112096
		NA	6	SAA SHELBY	NA	NA	TIME: 1425
10	112097 10MAY 1515	6	6	LOOSE SAA	NA	NA	MT: 0 BY: 90
11	112098 10MAY 1515	7	6	SAA	NA	NA	ARCHIVE
	112099 10MAY 1515	8	6	SAA	NA	NA	
	112100 10MAY 1515	12	6	SAA MEDIUM DENSE	NA	NA	TIME: 1515
12	112101 10MAY 1527	9	6	LOOSE SAA	NA	NA	MT: 0 BY: 80
	112102 10MAY 1527	11	6	MEDIUM DENSE SAA	NA	NA	
13	112103 10MAY 1527	7	6	LOOSE SAA	NA	NA	ARCHIVE
	112104 10MAY 1527	16	6	MEDIUM DENSE SAA	NA	NA	TIME: 1527
14	112105 10MAY 1527	11	6	SAA	NA	NA	MT: 0 BY: 100
	112106 10MAY 1535	2	6	SAA	NA	NA	

NOTES

DRILLING FIRM: DEAN DRILL

DRILLERS: DAN JAMSON DON ARTHUR

RIG: MARL. RQA

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP: 0 ppm
BY: 50 CPM
α: NA CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH INVESTIGATION		
BORING NUMBER 1979	COORDINATES		DATE 10 MAY 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED
DRILLING METHODS HOLLOW STEM AUGER			PAGE 3 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15	112102 10MAY 1535	10	6	LOOSE (2.5YR, 10) BLACK FLY ASH, MOIST	NA	NA	ARC
	112108 10MAY 1535	9	6	SAA	NA	NA	TIME
16	112109 10MAY 1538	2	6	VERY LOOSE SAA	NA	NA	MT: 0 BY: 100
	112110 10MAY 1543	2	6	SAA	NA	NA	
17	112111 10MAY 1543	2	6	SAA	NA	NA	ARC
	112112 10MAY 1547	3	6	SAA	NA	NA	TIME
18	112113 10MAY 1553	1	6	SAA	NA	NA	MT: 0 BY: 70
	112114 10MAY 1556	1	6	SAA	NA	NA	
19	112115 10MAY 1556	1	6	SAA	NA	NA	ARC
	112116 10MAY 1551	1	3	SAA	NA	NA	TIME: 1551
20	112117 10MAY 1551	1	6	SAA	NA	NA	MT: 0 BY: 90
		1	6	SAA	NA	NA	BALL 12 IN
21		1	5	SAA	NA	NA	
			0	SAA	NA	NA	TIME
22		1	6	SAA	NA	NA	

NOTES

DRILLING FIRM: FEAR DRILL

DRILLERS: DAN WILKINSON

RIG: [illegible] B57

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP: 2 PPM
BY: [illegible] CPM
α: [illegible] CPM

NO RECOVERY (NR) SAME AS ABOVE (SAA)

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.01	PROJECT NAME ACTIVE FLY ASH INVESTIGATION	
BORING NUMBER 1525	COORDINATES	DATE 10 MAY 87
ELEVATION	GWL. Depth Date/Time	DATE STARTED 10 MAY 87
ENGINEER/GEOLOGIST DE MULLER	Depth Date/Time	DATE COMPLETED 11 MAY 87
DRILLING METHODS HOLLOW STEM AUGER		PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	112119 10 MAY 1611	1	6	V. LOOSE (2.5 YR, 1/0) BLACK FLY ASH MOIST	NA	NA	MT: 0 BY: 110
23	112120 10 MAY 1611		6	SAA	NA	NA	ARCHIVE
	112121 10 MAY 1611		6	SAA	NA	NA	TIME: [illegible]
24	112122 10 MAY 1620	1	6	SAA	NA	NA	MT: 0 BY: 90-110
	112122 10 MAY 1620	1	6	SAA	NA	NA	TAL-0, SA 112122
25	112122 10 MAY 1620	1	6	SAA	NA	NA	
	112123 10 MAY 1620	3	6	V. STIFF (5Y, 3/6) OLIVE SILTY CLAY, VERY MOIST	CL	2.5	TAL-C TIME 1620
10 MAY / 11 MAY 26	112123 11 MAY 0550	24	6	V. STIFF (5Y 5/4) LIGHT OLIVE BROWN T. GREY MOTTLES SILTY CLAY MOIST T. GRAVEL LOW PLASTICITY	CL	2.75	MT: 0.2 BY: 60
27	112123 11 MAY 0500	34	6	HARD SAA	CL	4.5	TAL-C 112123 TIME 0500
	112123 11 MAY 0500	47	6	SAA	CL	>4.5	
28	112124 11 MAY 0924	24	6	SAA	CL	>4.5	MT: 0.7 BY: 80 GROUND
	112125 11 MAY 0925	37	6	HARD (5Y 4/1) DARK GRAY SILTY CLAY TRACE GRAVEL, MOIST	CL	>4.5	
29	112125 11 MAY 0925	26	6	SAA TRACE COBBLE	CL	>4.5	TAL-0 112124, TOC 112125 TIME 0925
		50/4	0	11 MAY 87 BEN	CL	X	
	112126 11 MAY 0945	7	6	SAA T. BROWN MOTTLES	CL	3	112126 TAL-C

NOTES

DRILLING FIRM: PENN DRILL

DRILLERS: DAN JAMISON, DON ARTHUR

RIG: MORIL 150

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = PPM, BY = CPM, α = CPM

BACKGROUND READINGS:
MICROTIP: 0 PPM
BY: 50 CPM
α: NA CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20-03.05	PROJECT NAME ACTIVE FLY ASH INVESTIGATION	
BORING NUMBER SB 1679	COORDINATES	DATE 11 MAY 0[illegible]
ELEVATION	GWL. Depth Date/Time	DATE STARTED [illegible]
ENGINEER/GEOLOGIST R. E. MULLER	Depth Date/Time	DATE COMPLETED [illegible]
DRILLING METHODS HOLLOW STEM AUGER		PAGE 5 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	112126 11MAY 0945	12	6	HARD (5Y, 4/1) DARK GRAY SILTY CLAY, TRACE FINE GRAVEL MOIST IRON MOTTLING [illegible]	CL	3.5	MT. [illegible] BY [illegible]
31	112126 11MAY 0945	21	6	SAA	CL	4.5	TR [illegible]
	112126 11MAY 0945	28	62	11MAY92 DEM SAA	CL	3.5	[illegible] TIME [illegible]
				BOTTOM OF SOIL BORING			

PRELIMINARY

NOTES

DRILLING FIRM: [illegible] DRILL

DRILLERS [illegible]

RIG: [illegible]

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP: [illegible] PPM
BY: [illegible] CPM
α: [illegible] CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

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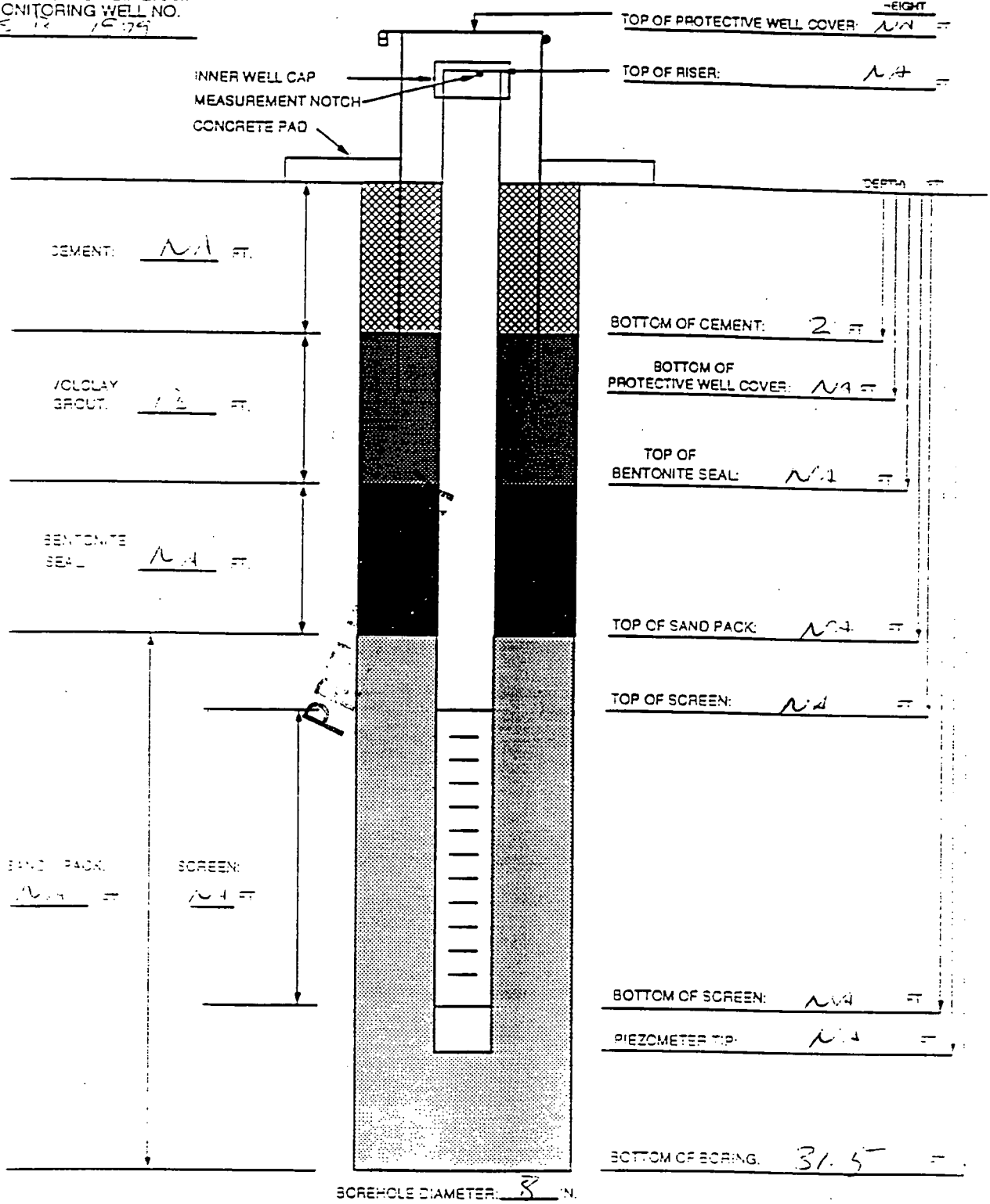
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
[illegible]

INSTALLATION DATE: [illegible]



WATER AS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF /OLCLAY GROUT: 2 (3.1 C.
WEIGHT OF CEMENT: N/A
DRINKING WATER USED: [illegible] GALLONS
OTHER: [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: [illegible]
5) TOP OF CASING IS SECURED [illegible] STAINLESS STEEL CAP
6) PARENTHESIS [illegible] GROUND LEVEL
7) WELL CAS [illegible]

GEOLOGIST ENGINEER: B. E. MULLER

FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME [illegible] FIELD ENG./GEO. B.E. [illegible] DATE [illegible]
PROJECT NO. 20.02.05 CHECKED BY [illegible] DATE [illegible]
BORING NO. 1679
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 [illegible]
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO [illegible]
SIZE N/A FROM N/A TO [illegible]

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. [illegible]
LENGTH OF PIPE SECTIONS [illegible]
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 [illegible]	BOTTOM [illegible]	TOP	BOTTOM
BENTONITE	TOP [illegible]	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	[illegible]			
SWL AFTER INSTALLATION	N/A			

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

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 1083 [illegible]	PROJECT NAME RI/FS [illegible]	
BORING NUMBER [illegible]	COORDINATES	DATE 5/10/93
ELEVATION:	GWL: Depth [illegible] Date/Time [illegible]	DATE STARTED 5/10/93
ENGINEER/GEOLOGIST [illegible]	Depth [illegible] Date/Time [illegible]	DATE COMPLETED 5/10/93
DRILLING METHODS Cable Tool		PAGE 1 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	[illegible] 1000 5/10/93	2 3 4	9	Stiff Dark Yellowish Brown (10YR 4/4) silty clay with some roots medium plasticity slightly moist	CL	1.5	MT .2ppm BZ 40cpm α 0cpm
	[illegible] 1005 5/10/93	4 7 12	11	Medium stiff Dark Yellowish Brown (10YR, 4/4) silty clay with some gravel, medium plasticity, slightly moist	CL	1.0	MT .2ppm BZ 40cpm α 0cpm
11.0	116872 1010 5/10/93	12 20 25	12	Medium stiff, Dark Yellowish Brown (10YR, 4/4) sandy silty clay with some gravel, low plasticity, slightly moist	CL	1.0	MT .2ppm BZ 40cpm α 0cpm
6.0	116873 1100 5/10/93	28 50 50/3	8	Very soft, Yellowish Brown (10YR, 5/4) sandy silty clay with some gravel, low plasticity, slightly moist	CL	.25	MT .2ppm BZ 40cpm α 0cpm
7.5	116874 1315 5/10/93	50/1	5	Very dense Yellowish Brown (10YR 5/4) well graded sand with a trace of gravel + clay dry	SW	N/A	MT .2ppm BZ 40cpm α 0cpm
9.0	116875 0930 5/11/93	38 38 42	18	Very stiff, Yellowish Brown (10YR, 5/4) silty clay with a trace of sand and gravel, low plasticity, slightly moist	CL	3.25	MT .4ppm BZ 40cpm α 0cpm
10.5	116876 0945 5/11/93	38 28 19	18	Very stiff, Yellowish Brown (10YR, 5/4) silty clay with a trace of sand and gravel, low plasticity, slightly moist	CL	2.25	MT .4ppm BZ 40cpm α 0cpm
12.0	116877 1025 5/11/93	6 9 15	12	Very stiff, Dark Gray (2.5Y, 4/1) sandy silty clay with some gravel, medium plasticity, slightly moist	CL	2.5	MT .4ppm BZ 40cpm α 0cpm
13.5	116878 1035 5/11/93	5 9 12	10	Soft, Dark Gray (2.5Y, 4/1) sandy silty clay with some gravel, medium plasticity, slightly moist	CL	.5	MT .3ppm BZ 40cpm α 0cpm
15.0	116879 1045 5/11/93	6 10 17	13	Stiff, Dark Gray (2.5Y, 4/1) sandy silty clay with some gravel, medium plasticity, slightly moist	CL	1.25	MT .3ppm BZ 40cpm α 0cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Rig [illegible] Driller [illegible]

Samples collected per ASTM Standard Penetration Test [illegible]

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WUS 20 03.09	PROJECT NAME FIES Active Flash	
BORING NUMBER 210 33	COORDINATES	DATE 5/17/93
ELEVATION:	GWL: Depth 32.0' Date/Time 5-24-93/1330	DATE STARTED 5/17/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 51.1' Date/Time 5-19-93/1110	DATE COMPLETED 5/17/93
DRILLING METHODS Cable Tool		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	116880	8		VERY STIFF, DARK GRAY (2.5Y, 4/1)			MT = .4 ppm
	1100	18	14	Sandy Silty Clay with some	CL	3.25	BZ = 40 cpm
16.5	5/11/93	27		Gravel, medium plasticity, slightly moist.			Z = 0 cpm
	116881	11					
	1345	28	12	S.A.A.	CL	3.25	MT = .3 ppm
19.0	5/11/93	27					BZ = 40-60 cpm
	116882	11					Z = 0 cpm
	1400	15	17	VERY STIFF, DARK GRAY (2.5Y, 4/1)			MT = .4 ppm
	5/11/93	25		Silty Clay with some Sand and Gravel, medium plasticity, slightly moist.	CL	3.25	BZ = 40-60 cpm
19.5	116883	13		VERY STIFF, Yellowish BROWN (10YR 5/6)			Z = 0 cpm
	0830	32	18	Silty Clay with some Sand and Gravel, medium plasticity, slightly moist.	CL	4.0	MT = .2 ppm
	5/12/93	41		VERY DENSE, Yellowish BROWN (10YR, 5/4) poorly			BZ = 40-60 cpm
21.0				graded Sand with some Gravel, dry	SP	4/13	Z = 0 cpm
				No samples taken. Samples to be taken every 5' starting at 25.0'.			
25.0	116884	30		Very Dense Yellowish Brown (10YR 5/4)			
	0905	41	15	poorly graded Sand with some	SP		
26.5	5/12/93	50		Gravel, dry			
30.0							

NOTES

See Page 1

Background Levels
MT = .4 ppm
BZ = 40-60 cpm
Z = 0 cpm

Background Levels
MT = .3 ppm
BZ = 40-60 cpm
Z = 0 cpm

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RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 2003 05	PROJECT NAME RI/FS Picture Flyers	
BORING NUMBER 2033	COORDINATES	DATE 5/12/93
ELEVATION:	GWL: Depth 52.0' Date/Time 5-14-93/1330	DATE STARTED 5/10/93
ENGINEER/GEOLOGIST Ken Geiger	Depth 51.1' Date/Time 5-19-93/1110	DATE COMPLETED 5/17/93
DRILLING METHODS Cable Tool		PAGE 3 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0 – 31.5	116885 1025 5/12/93	34 50/4	8	Very Dense, Yellowish Brown (10YR, 5/4) Poorly Graded Sand with Some Gravel, Dry.	SP	N/A	MT = .2 ppm BZ = 40 cpm L = 0 cpm
35.0 – 36.5	116886 0945 5/13/93	48 50/3	8	Very Dense, Yellowish Brown (10YR 5/4) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	MT = .4 ppm BZ = 40-60 cpm L = 0 cpm
40.0 – 41.5	116887 1045 5/13/93	43 31 32	12	Very Dense, Light Yellowish Brown (10YR, 6/4) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	MT = .4 ppm BZ = 40-60 cpm L = 0 cpm
45.0							

NOTES

See Page 1

5/12/93 Background Levels
MT = .2 ppm
BZ = 40-60 cpm
L = 0 cpm

5/13/93 Background Levels
MT = .4 ppm
BZ = 40-60 cpm
L = 0 cpm

PRELIMINARY

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RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER [illegible]	PROJECT NAME [illegible]	
BORING NUMBER [illegible]	COORDINATES	DATE [illegible]
ELEVATION:	GWL: Depth [illegible] Date/Time 5-14-93/1330	DATE STARTED [illegible]
ENGINEER/GEOLOGIST Ken Gaspar	Depth 51.1' Date/Time 5-14-93/1110	DATE COMPLETED 5-14-93
DRILLING METHODS Cable Tool		PAGE 4 OF 7

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0	116888 1440 5/13/93	50/4	4	Very Dense, Light Yellowish Brown (10YR, 6/4) Well Graded Sand with Some Gravel, Dry	SW	N/A	MT = 4ppm BT 40-60 cpm L = 0 cpm
46.5	116889 1530 5/13/93	50/3	3	Very Dense, Yellowish Brown (10YR, 5/6) Poorly Graded Gravelly Sand with Rock Fragments, Moist	SP	N/A	MT = 17ppm Moisture Appears to be Low BT = 40-60 cpm L = 0 cpm Drilling Fluid
48.0	116890 1555 5/13/93	25 50/3	6	Very Dense, Yellowish Brown (10YR, 5/6) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	MT = 16ppm BT = 40-60 cpm L = 0 cpm
49.5	116891 1610 5/13/93	15 31 32	14	Very Dense, Yellowish Brown (10YR, 5/6) Poorly Graded Sand with Some Gravel, Dry	SP	N/A	MT = 14ppm BT = 40-60 cpm L = 0 cpm
51.0	116892 1625 5/13/93	12 16 28	12	Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Wet	SP	N/A	MT = 15ppm BT = 40-60 cpm L = 0 cpm
52.5	116893 0930 5/14/93	29 50/3	9	Very Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand, with Some Gravel, Wet	SP	N/A	MT = [illegible] BT = [illegible] L = [illegible]
54.0	116894 0945 5/14/93	12 32 35	12	Very Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Wet	SP	N/A	[illegible]
55.5	116895 1010 5/14/93	17 24 [illegible]	10	Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Wet	SP	N/A	[illegible]
57.0	116896 1030 5/14/93	[illegible] 19 20	[illegible]	Dense, Dark Yellowish Brown (10YR, 4/4) Well Graded Sand with Some Gravel, Wet	SW	N/A	[illegible]
58.5	116897 1050 5/14/93	12 [illegible] [illegible]	8	Dense, Dark Yellowish Brown (10YR, 4/4) Poorly Graded Sand with Some Gravel, Wet	SP	N/A	[illegible]
60.0							

NOTES

See Page 1

Background Levels

MT = 4ppm
BT = 40-60 cpm
L = 0 cpm

[illegible]

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	PROJECT NAME	
BORING NUMBER	COORDINATES	DATE
ELEVATION:	GWL: Depth 32.0' Date/Time 5-19-93/1330	DATE STARTED
ENGINEER/GEOLOGIST	Depth 51.1' Date/Time 5-19-93/1110	DATE COMPLETED
DRILLING METHODS Cable Tool		PAGE 5 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60.0				Split Spoon Sampled To 60' Bottom of Boring at 65'			Composite Sample # 116595

PRELIMINARY

NOTES

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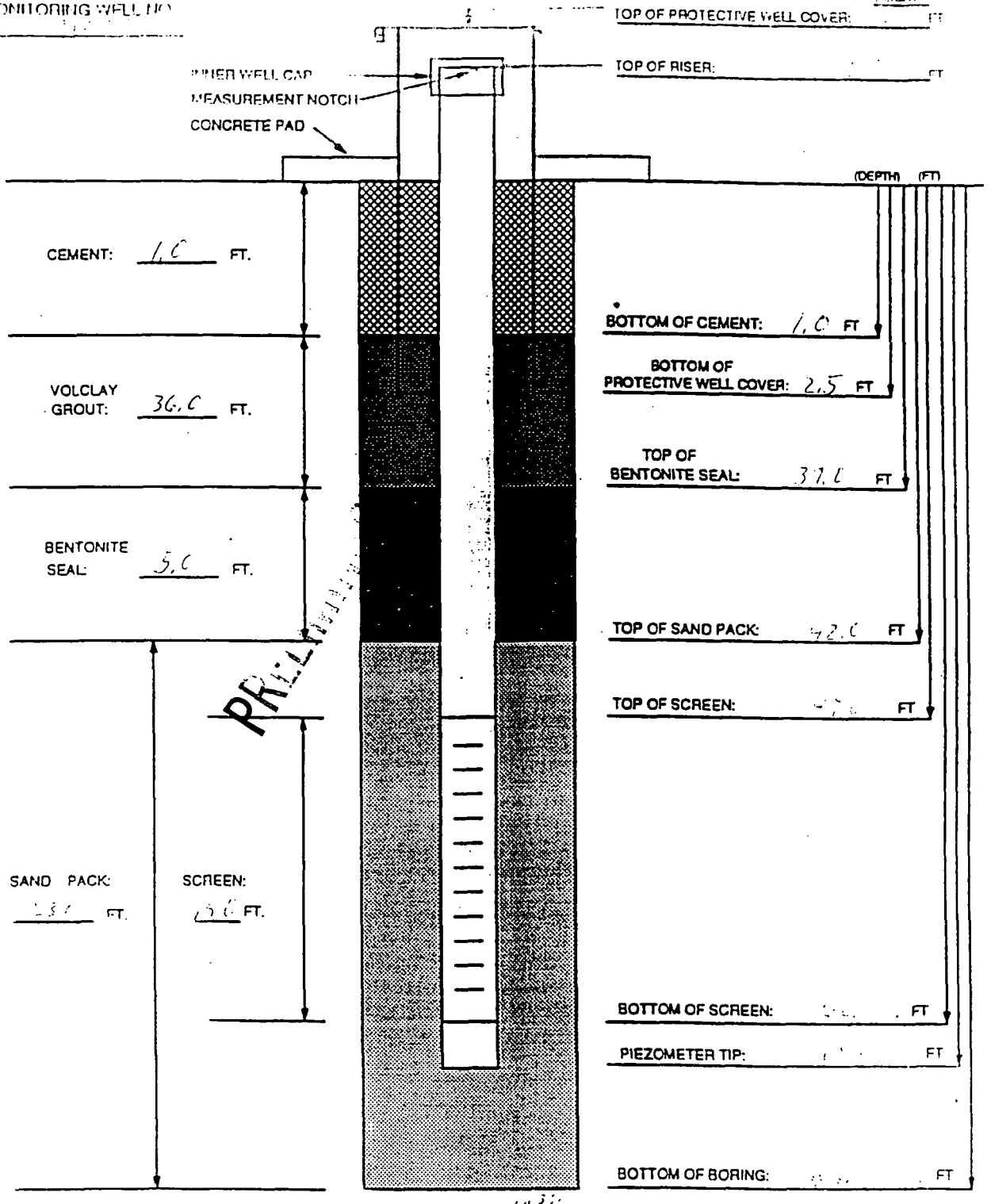
-4529

TERRALEX

INSTALLATION DIAGRAM

MONITORING WELL NO.



BOREHOLE DIAMETER: 10 3/4 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 20 - 40 sand bags

BENTONITE PELLETS (5-GALLON BUCKETS): 6 Buckets

BAGS OF VOLCLAY GROUT: 10, 50 lb bags

AMOUNT OF CEMENT: 1 Bag

AMOUNT OF WATER USED: 505 gallons

OTHER: 15' Screen with 2' Sump, 4-10', 1-5', 2-2'

TASK: WBS 20 03.05

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.

GEOLOGIST/ENGINEER: Ken Geiger

4) WATER DEPTH AND DATE 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.

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ASI FORM 0157 REV. (0)

FERNALD
RI/FS

-4520

PIEZOMETER INSTALLATION SHEET

PROJECT NAME _____ FIELD ENG./GEO. _____ DATE _____
PROJECT NO. _____ CHECKED BY _____ DATE _____
BORING NO. _____
~~PIEZOMETER~~ Monitoring Well NO. _____ DATE OF INSTALLATION _____

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 52.0'	SIZE 10" FROM 0.0' TO 65.0'
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 4-10' 1-5' 2-2'
AVERAGE SIZE OF PERFORATIONS .010"	JOINING METHOD Screw Type - Flush
TOTAL PERFORATED AREA 15.04 sq.ft	Joint threaded

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: CONCRETE GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 39.0	BOTTOM 42.0	TOP	BOTTOM
SAND	TOP 42.0	BOTTOM 65.0	TOP	BOTTOM
GRAVEL	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
PERFORATED SECTION	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
PIEZOMETER TIP	[illegible]			
BOTTOM OF BOREHOLE	[illegible]			
GWL AFTER INSTALLATION	3.1			

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

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER.	1990	COORDINATES.		DATE	05/10/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/10/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED:	05/10/93
DRILLING METHODS:	Hollow Stem Augers w/ CME Sampler			PAGE	1 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1320 115327 115328 05/10	NA	2.5	Firm (2.5Y 4/3) olive brown silty clay, low plasticity, some gravel, dry	CL	1.5	MT = 0.6 ppm Bq = 80-100 cpm Sample taken from 1.0' to 3.0'
2.5	1320 05/10	NA	0.5	SAA 3.0'	CL	1.5	MT = 0.6 ppm Bq = 80-100 cpm
	1330 115324 05/10	NA	NA	@ 1330 Pushed shelby tube from 3.0' to 5.0'. Augered from 3.0' to 5.0' then resumed sampling w/ CME sampler	NA	NA	Piece of plastic (coffee cup lid) at end of shelby tube
5.0	1350 NA 05/10	NA	1.0	Firm (2.5Y 4/3) olive brown silty clay, low plasticity, some gravel, dry	CL	1.5	MT = 0.6 ppm Bq = 80-100 cpm
	1350 115329 115330 115331 05/10	NA	1.5	Hard (5Y 5/1) gray to (5Y 4/1) dark gray silty clay, low plasticity, some gravel, some black flyash, glass, plastic cup lid, dry	CL	2.0	MT = 1.8 ppm Bq = 200 cpm in some areas 05/10/93 Sample collected from 6.0' to 9.0'

NOTES

Drilling co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT = 0.6 ppm
Bq = 80-100 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

E-4529

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	20.03.05	PROJECT NAME	OU2 Phase II		
BORING NUMBER	1990	COORDINATES		DATE	05/10/93
ELEVATION		GWL: Depth	Date/Time	DATE STARTED	05/10/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED	05/10/93
DRILLING METHODS	Hollow Stem Auger w/ CME sampler			PAGE	2 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1350 115324 115330 115331 ~~NA~~ 05/10/93			SAA, moist	CL	1.5	MT= 0.6 ppm BG= 300 cpm in some areas
	05/10 1350	NA	2.5	9.0'			
	115332 115333 05/10			SAA, moist - no. waste material @ 1405 push shelby tube from 10.0' to 12.0' sample #- 115325	CL	1.5	MT = 0.6 ppm BG= 80-100 cpm
10.0	1500 115334 05/10	NA	2.5	SAA, dry	CL	1.0	MT= 0.6 ppm BG= 80-100 cpm pieces of glass, plastic, styrofoam
12.5	1500 NA	NA	2.5	Very Hard (2.5Y 5/6) light olive brown silty clay, some (5Y 6/1) gray clay, slight plasticity, dry	CL	4.5	MT= 0.6 ppm BG= 80-100 cpm
15.0	05/10						

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT= 0.6 ppm
BG= 80-100 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1990	COORDINATES.	DATE 05/10/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/10/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/10/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 3 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1530 05/10	NA	2.5	Hard (2.5Y5/6) light olive brown clayey silt with some (5Y5/1) gray silty clay, low plasticity some gravel, some well graded fine sand, dry	ML	4.0	MT= 0.6 ppm BG= 80-100cpm
17.5	1530 115335 115336 115337 05/10	NA	2.5	SAA	ML	4.0	MT= 0.6 ppm BG= 80-100cpm - iron staining along cleavage planes
20.0				@ 1540 pushed shelby tube from 20.0' to 22.0' Sample # 115326			

PRELIMINARY

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT= 0.6 ppm
BG= 80-100cpm

NA- Not Applicable
SAA- Same As Above

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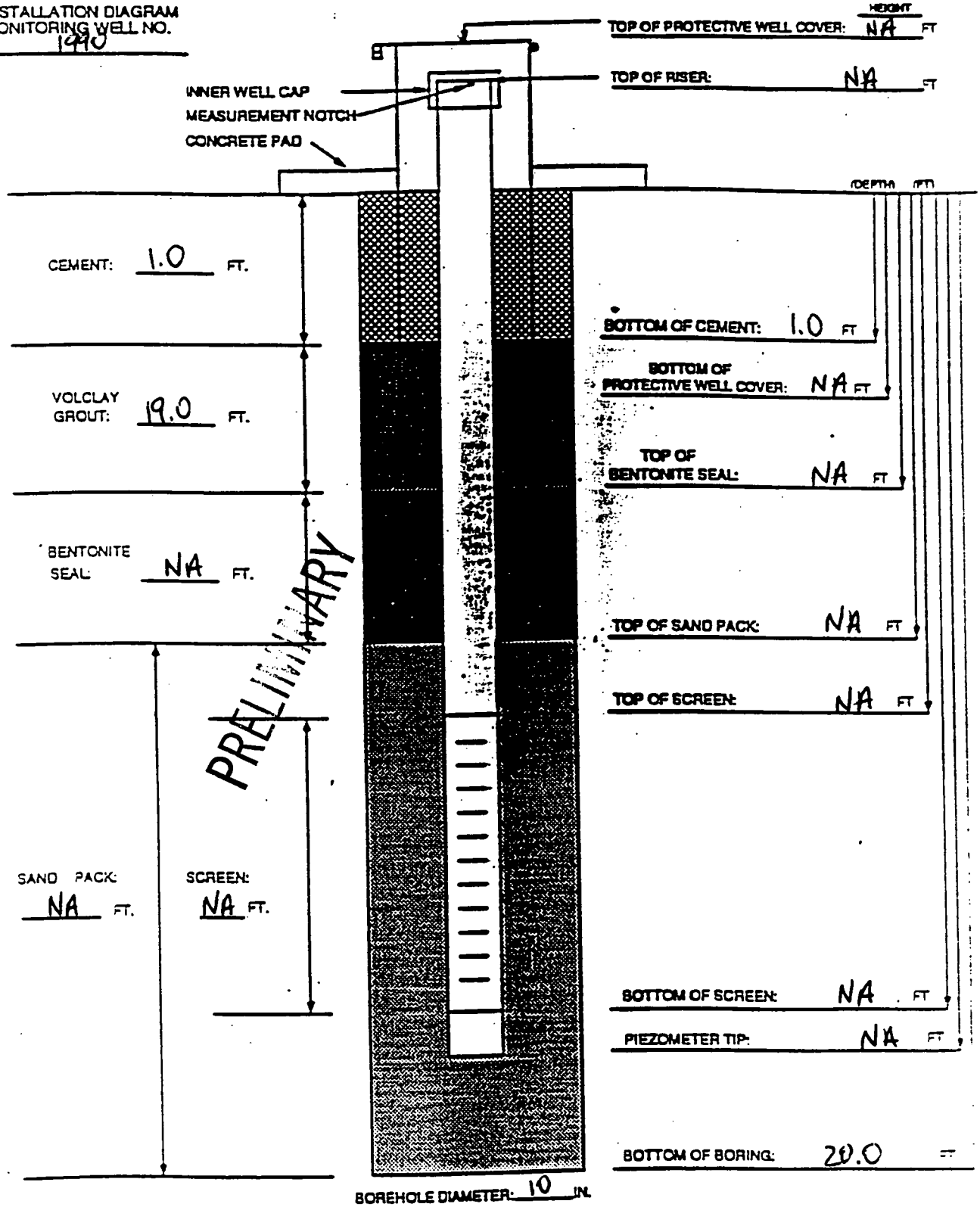
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1990

INSTALLATION DATE: 05/10/93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 11
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Pulled final Shelby tube from 20.5' to 22.0'
TASK: Soil Boring Using CME Sampler

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
5) TOP OF CASING IS SECURED WI STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH GROUND LEVEL
7) WELL CASING HAS A PROTECTIV COVER WITH PADLOCK

GEOLOGIST/ENGINEER: A. Lowe

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
FIELD ENG./GEO.: A. Como
DATE: 05/10/
PROJECT NO.: 20.03.05
CHECKED BY:
DATE:
BORING NO.: 1990
PIEZOMETER NO.: NA
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow Stem Auger w/CME sampler
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 NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION: NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
	TOP 1.0	BOTTOM 20.0		
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS: Used CME sampler to 20.0'. Pushed Shelby tube from 20.0' to 22.0'

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 Southfield	
BORING NUMBER. L1019	COORDINATES.	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 5/11/93
ENGINEER/GEOLOGIST S. Reagan	Depth Date/Time	DATE COMPLETED.
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 (ISF)	REMARKS
							Background βγ - 60cpm α - 0cpm mt - 0ppm
	NA	NA	NA	Auger 1-20'	NA	NA	NA
20							
	113047 1500 113048 1500 113049 1500	8 15 19	6 6 6	Dense, 10YR 4/3 brown ~~SAAC~~ JR 5/11/93 poorly graded sand, low plasticity wet	SP	NA	βγ - 60cpm mt = 0ppm ~~γ~~ JR 5/11/93 α = 0cpm
21.5				Hydropunch driven to 25' pulled back to 21'.			

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker soil sentry
Driller M. Watral
B. Oeiley

SAA - Same as above
NA - Not Applicable
mt - microrip

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

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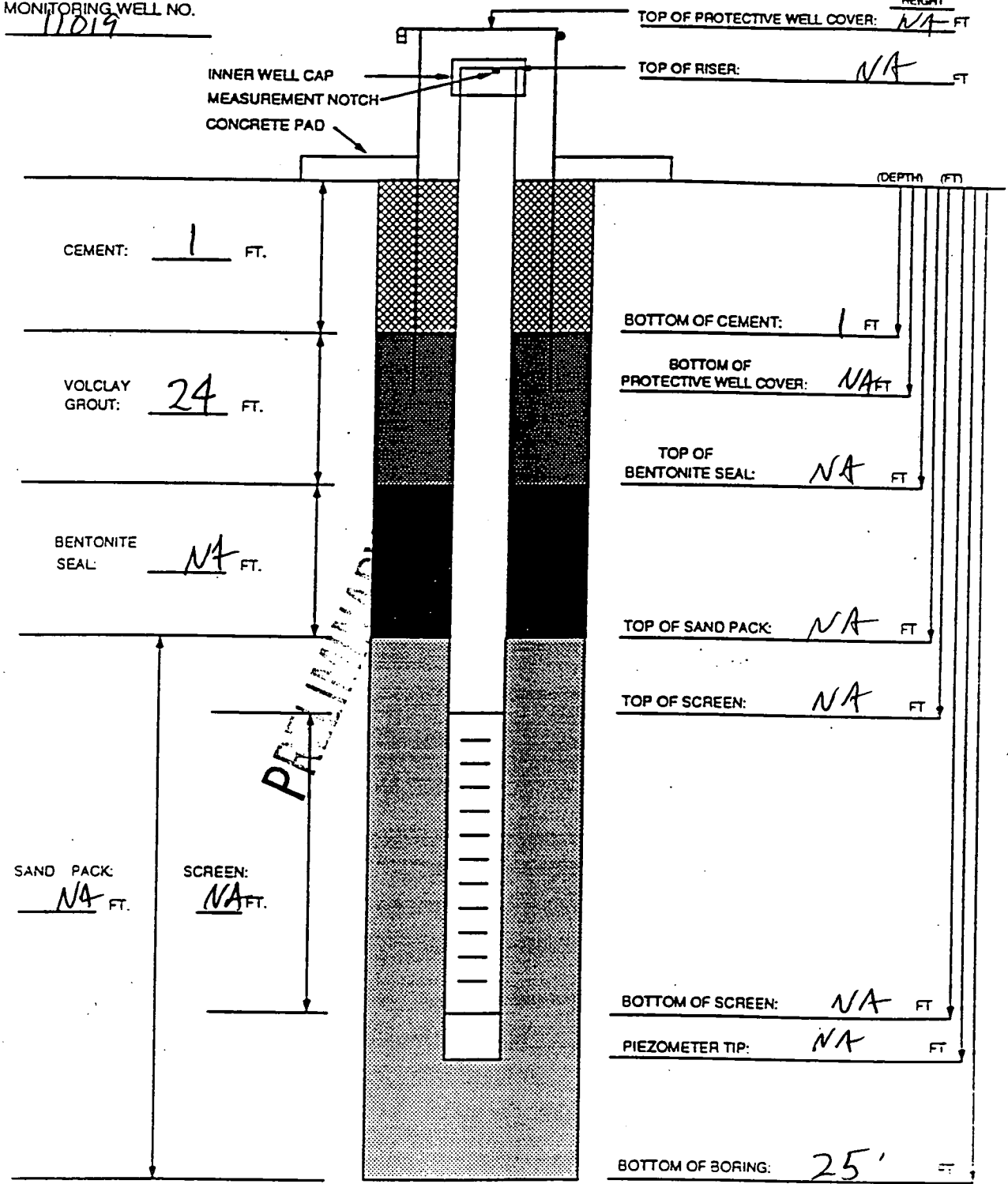
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11019

INSTALLATION DATE: 5/12/93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8.5' IN.

ATERIALS USED

ND TYPE AND QUANTITY: NA
NTONITE PELLETS (5-GALLON BUCKETS): NA
GS OF VOLCLAY GROUT: 2
MOUNT OF CEMENT: 1 bag
MOUNT OF WATER USED: 20 gal
THER: NAD
SK: 20.03.05

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 21.73 FT. 5/12/93
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. Reagan

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-Southfield FIELD ENG./GEO. J. Reagan DATE 5/12/93
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11019
PIEZOMETER NO. NA DATE OF INSTALLATION 5/12/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 25	TOP NA	BOTTOM NA
~~BENTONITE~~ CEMENT	TOP 0	BOTTOM 1	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	25'		NA	
GWL AFTER INSTALLATION	21.73		NA	

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

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FERNALD
RI/FS

WATER QUALITY
FIELD COLLECTION REPORT

4529

Date: 5-12-93
Time:
Page: ___ of ___

FADL REF #

PROJECT NAME	OU2-Southfield	SAMPLE LOCATION	11019
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113050
DATE COLLECTED	5/12/93	RFA NUMBER	73037
TIME COLLECTED	815	C/C NUMBER	NA
COLLECTED BY	S. Leage	SAMPLE TYPE	water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.10
AIR TEMPERATURE	65° F
DO SATURATION IN AIR	NA
WATER TEMPERATURE	13.8°C
DEPTH OF SAMPLE	21-25 Ft
WATER LEVEL	21.73'

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.01		
SPEC. COND. uMHOS/cm	750		
D.O. MG/L	NA		

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU			

PRELIMINARY

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
23°c	4	7				N/A	23°c	1000	10000				
OK	✓	✓	OK			N/A	OK	1000	9500				

WEATHER CONDITIONS

ADDITIONAL REMARKS

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
003702	ORION 250A PH METER
92542760	YSI MODEL 33 SCT METER
	Hydropunch

EQUIP.	NUMBER
BAILER	
HOSE/S	Tygon
PUMP	
FILTER KIT	7533-40

251

(T.D. ___ - (W.L. ___) = ___ Ht. of Water Column ___ Ht. of Water Column x ___ = ___ (3 Volumes) 163

(5 Volumes)

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 70.03.05	PROJECT NAME. OU2 – Southfield		
BORING NUMBER. 11020	COORDINATES.		DATE 5/11/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/11/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/11/93
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 (ISF)	REMARKS Background Mt = 0.0 ppm α = 0cpm βγ = 60 cpm
1	NA	NA	NA	10YR 3/3, s. lty Fine sand, low plasticity, dry,	ml	NA	NA
	NA	NA	NA	10YR 4/3 brown, poorly graded sand, low plasticity moist	SP		NA
20	113042 113043 113044 (4:30)	12 17 17 28	6 6 6 6	Dense, 10YR 4/3 brown, poorly graded sand, low plasticity, wet !	SP		βγ = 60cpm α = 0cpm Mt = 0ppm
22.0	113046 1030	NA	NA	Hydropunch from 22.0-23 ft pulled back 4 ft Sample 19 – 23 ft water level 17.0 ft	NA	NA	NA

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker soil Sentry
Driller M. Wafral
B. Deiley

SAA - Same as above
NA - Not Applicable
Mt - Microtip
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Char-

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FERNALD
RI/FS

= -4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 - Southfield
PROJECT NO. 20.03.05
BORING NO. 11020
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/11/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/11/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 23	TOP NA	BOTTOM NA
CEMENT ~~BENTONITE~~	TOP 0	BOTTOM 1	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	23'		NA	
GWL AFTER INSTALLATION	17.08'		NA	

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

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-409-11-86

-4529

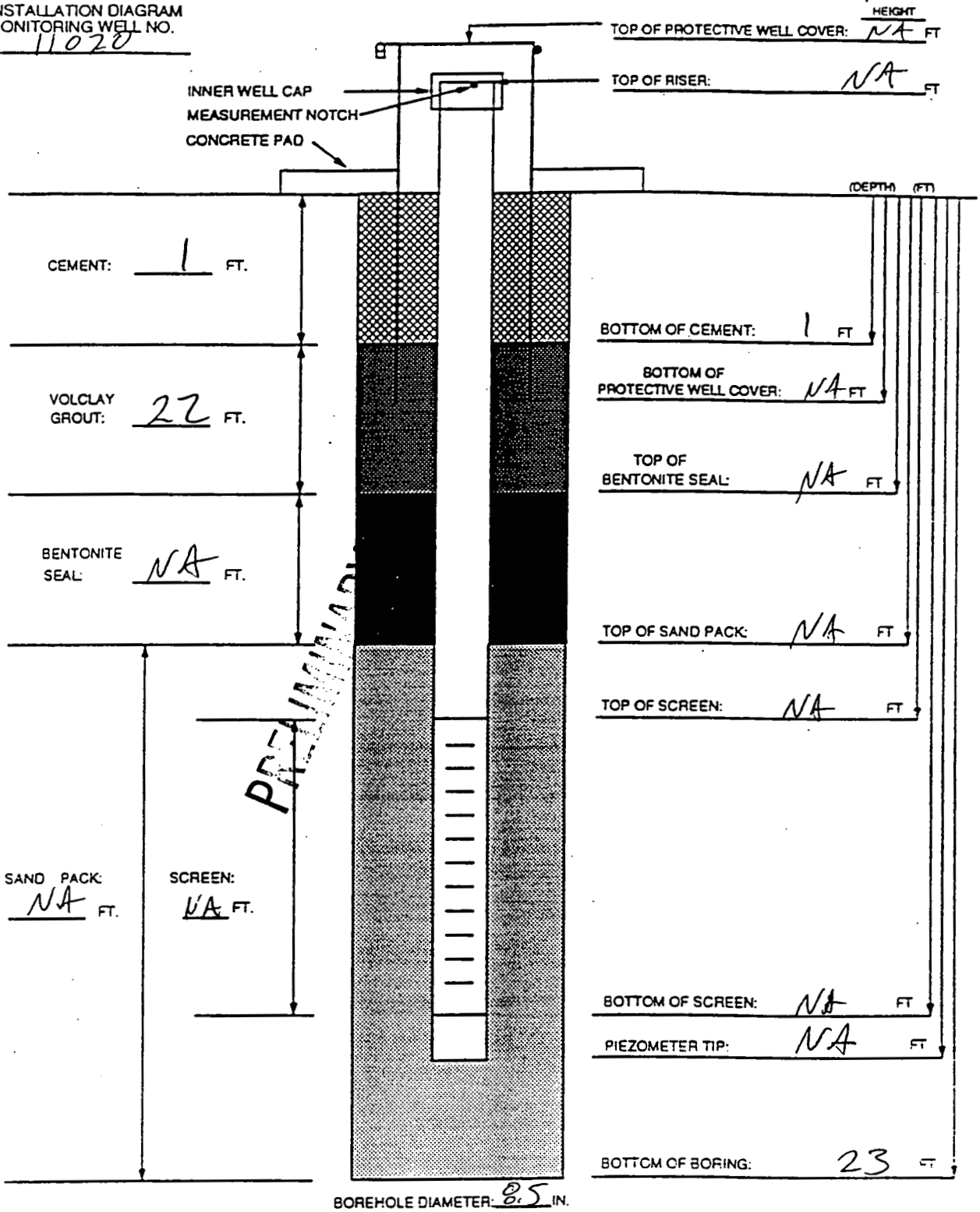
3 of 3

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11020

INSTALLATION DATE: 5/11/93

HEIGHT
TOP OF PROTECTIVE WELL COVER: NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8.5 IN.

ATERIALS USED

ND TYPE AND QUANTITY: NA
NTONITE PELLETS (5-GALLON BUCKETS): NA
GS OF VOLCLAY GROUT: 2
IOUNT OF CEMENT: 1/3
IC OF WATER USED: 20gal
HER:
SK:

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: J. Reagan
4) WATER DEPTH AND DATE ~~NA~~ FT. 5/11/93 5/11/93
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.

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FORM 0157 REV. 0

FERNALD
RI/FS

WATER QUALITY FIELD COLLECTION REPORT

Date: 5-11-93
Time:
Page: ___ of ___

FADL REF #

PROJECT NAME	OU2 - Southfield	SAMPLE LOCATION	19-23 ft
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113046
DATE COLLECTED	5/11/93	RFA NUMBER	B030
TIME COLLECTED	10 30	C/C NUMBER	NA
COLLECTED BY	J. Logan	SAMPLE TYPE	Water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.35
AIR TEMPERATURE	66° F
DO SATURATION IN AIR	NA
WATER TEMPERATURE	12.8°C
DEPTH OF SAMPLE	19-23.0
WATER LEVEL	17.08'

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.85		
SPEC. COND. uMHOS/cm	750		
D.O. MG/L	NA		

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU			

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
25.5°C	4	7				NA	25.5°C	1000	10000				
OK	—	—	OK			NA	OK	1000	9200				

WEATHER CONDITIONS: cloudy, mild

ADDITIONAL REMARKS:

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
003689	ORION 250A PH METER
916030817	YSI MODEL 33 SCT METER
	Hydro punch

EQUIP.	NUMBER
BAILER	
HOSE/S	Tygon
PUMP	
FILTER KIT	#7533-40

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(T.D. ___) (W.L. ___) = ___ Ht. of Water Column ___ Ht. of Water Column x ___ = ___ (3 Volumes)

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER	1992	COORDINATES.		DATE	05/11/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/11/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED.	05/11/93
DRILLING METHODS	Hollow stem Auger w/CME Sampler			PAGE	1 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1515	NA	2.5	Hard (2.5Y 6/4) light yellowish brown and (5Y 5/1) gray silty clay, no plasticity, some small gravel, dry	CL	4.0	MT = 0.6 ppm Bq = 40-80 cpm *CME sampler drilled to 3.0' then sampled with shelby tube
2.5	05/11 1515		0.5	SAA, dry	CL	4.0	MT = 0.6 ppm Bq = 40-80 cpm
		NA	2.0	3.0 @ 1520 pushed shelby tube from 3.0' to 5.0'	NA	NA	*AT 5.0' sampling continued with CME sampler
5.0	05/11 1535	NA	2.5	Firm (5Y 5/3) olive silty clay, medium plasticity, some small gravel, dry	CL	1.25	MT = 0.6 ppm Bq = 40-80 cpm -AT 6.0' pieces of burnt wood ~~From 7.5' to 9.0' material which looks to be pieces of mica~~ ac 05/11/93
7.5	05/11						

PRELIMINARY

Background MT = 0.6 ppm
Bq = 40-80 cpm

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

NA- Not Applicable
SAA- Same As Above

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1992	COORDINATES.	DATE 05/11/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/11/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/11/93	
DRILLING METHODS Hollow stem Auger w/CME sampler		PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1535	NA	2.5	SAA, dry	CL	1.25	MT= 0.0 ppm BT= 40-80 cpm - From 7.5' to 9.0' material which looks to be pieces of mica
10.0	05/11						
	1550	NA	2.5	Firm (5Y5/1) gray silty clay, low plasticity, some (5Y 2.5/1) black clay, some (2.5Y 5/4) light olive brown silt, some gravel, dry 12.0'	CL	1.0	MT= 0.0 ppm BT= 40-80 cpm
12.5	05/11			(2.5Y5/4) light olive brown clayey silt, some (5Y5/1) gray silty clay, few pieces of gravel, dry	ML	NA	MT= 0.0 ppm BT= 40-80 cpm
	1550	NA	2.5	SAA, dry	ML	7.45	MT= 0.0 ppm BT= 40-80 cpm
15.0	05/11						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT= 0.0 ppm
BT= 40-80 cpm

NA- Not Applicable
SAA- Same As Above

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. 1992	COORDINATES.		DATE 05/11/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 05/11/93
ENGINEER/GEOLOGIST A. Lamo	Depth	Date/Time	DATE COMPLETED 05/11/93
DRILLING METHODS Hollow stem Auger w/CME sampler			PAGE 3 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1635 05/11	NA	2.5	(2.5Y 5/4) light olive brown clayey silt, slight plasticity, few pieces of gravel, dry	ML	NA	MT = 0.6 ppm BZ = 40-80 ppm
17.5	1635 05/11	NA	2.5	SAA, dry	ML	NA	MT = 0.6 ppm BZ = 40-80 ppm - Evidence of iron staining on cleavage planes
20.0				@ 1645 pushed shelby tube from 20.0' to 22.0'			END OF BORING

PRELIMINARY

NOTES

Drilling by Pennsylvania Drilling Co
Driller: Don Smith
Assistant: Sam Smith

Background: MT = 0.6 ppm
BZ = 40-80 ppm

NA - NOT Applicable
SAA - Same as above

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 1992
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Como DATE
CHECKED BY DATE
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger w/CME sampler
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 NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	0.0	1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 20.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Soil boring using CME sampler Shelby [illegible]

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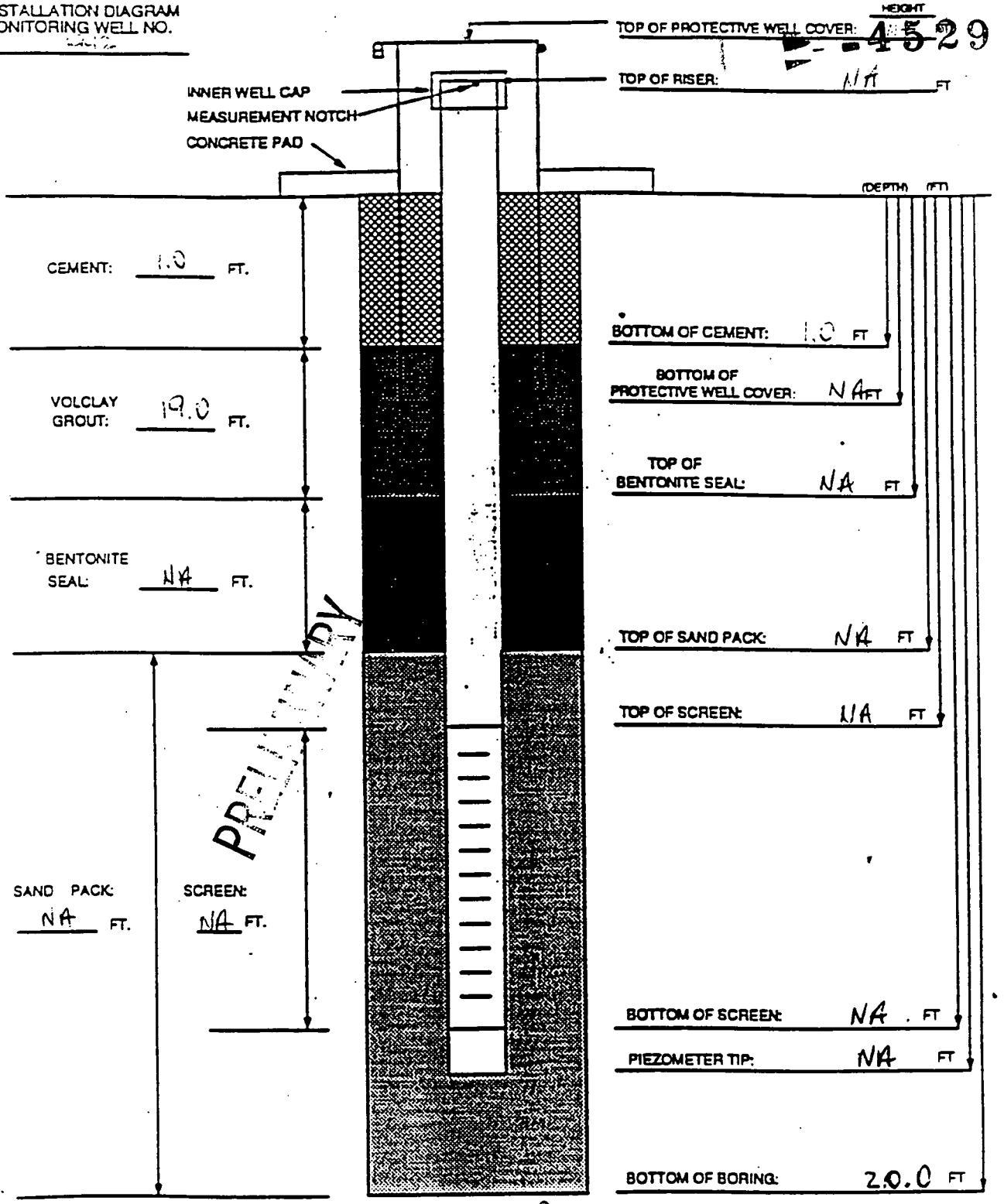
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. [illegible]

INSTALLATION DATE: _____

TOP OF PROTECTIVE WELL COVER: HEIGHT 4529

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 10
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Pushed Shelby tube from 20.0 to 22.0
TASK: Soil boring using CME Sampler

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.
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BE GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Como

ASI FORM 0157 REV (0)

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS -4529

PROJECT NUMBER 20 03 05	PROJECT NAME. OU2 Southfield		
BORING NUMBER 11019	COORDINATES.		DATE 5/11/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/11/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow stem auger			PAGE 1 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS Background
	NA	NA	NA	Auger 1-20'	NA	NA	NA
20	113047 1500 113048 1500 113049 1500	8 15 19	6 6 6	Dense, 10YR 4/3 brown ~~same~~ JR 5/11/93 poorly graded sand, low plasticity wet	SP	NA	BZ - 60cpm α - 0cpm MT - 0cpm
21.5				Nycloprinch driven to 25' pulled back to 21'.			BZ - 60cpm MT - 0cpm ~~Z~~ JR 5/11/93 α = 0cpm
				Bottom of BORING 25'			

PRELIMINARY

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Tulen Sal Sanity
Driller M. Watral
B. Perley

SAA - Same as above
NA - Not Applicable
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME [illegible] FIELD ENG./GEO. J. Rogers DATE 5/2/9
PROJECT NO [illegible] CHECKED BY [illegible] DATE
BORING NO. [illegible]
PIEZOMETER NO [illegible] DATE OF INSTALLATION [illegible]

BOREHOLE DRILLING

DRILLING METHOD [illegible]	TYPE OF BIT [illegible]
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID [illegible] FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID [illegible] FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

PRELIMINARY

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 25	TOP NA	BOTTOM NA
~~BENTONITE~~ CEMENT	TOP 0	BOTTOM 1	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	25'		NA	
GWL AFTER INSTALLATION	21.73		NA	

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

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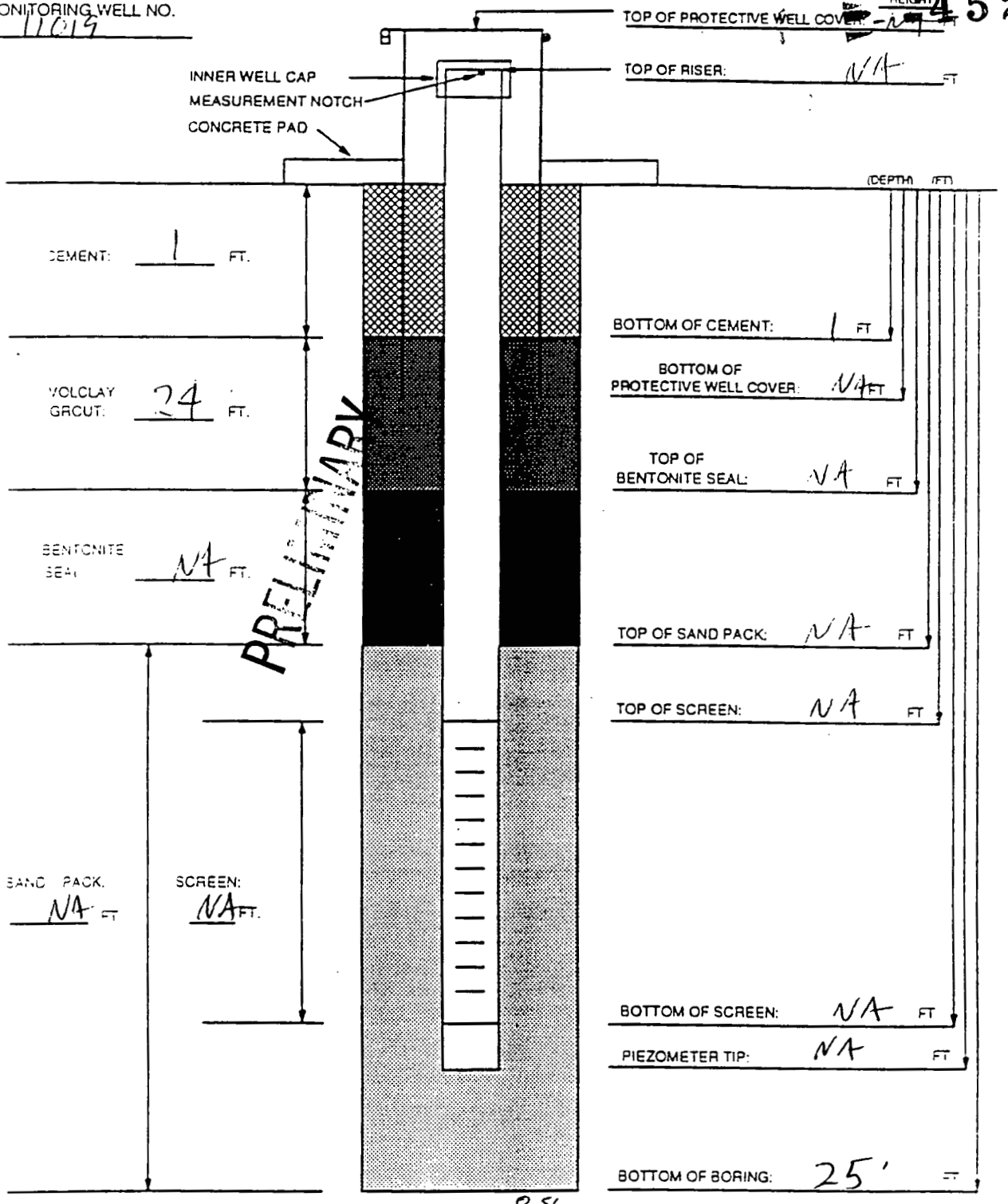
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1019

INSTALLATION DATE: 5/12/93

4529



BOREHOLE DIAMETER: 8.5' IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 70 gal
[illegible]: NA
[illegible]: 2 x 5 gal

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 11.73 – 5/12/9[illegible]
5) TOP OF CASING IS SECURED WITH [illegible] STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH [illegible] GROUND LEVEL
7) WELL [illegible] HAS A PROTECTIVE COVER [illegible]

GEOLOGIST ENGINEER: J. Regan

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 phase 2	
BORING NUMBER: HP-12	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth 42.8 Date/Time 5/6/93 1330	DATE STARTED 5/11/93
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 5/7/93
DRILLING METHODS:		PAGE 1 OF 3

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
				No sampling required from 0-40.0 ft			
40	1345 113000 5/6/93	10 13 8	18	M. Dark 2.5Y 4/1 moist coarse sand poorly graded, wet	SP	NA	HNu=0 ppm RD=60 cpm
				Boring terminated at 42.0 ft			

PRELIMINARY

NOTES:

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Acker

Driller: Craig Coulter
Paul Elliott

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Bkgd: HNu=0ppm RD=40-60cpm

402-11-86

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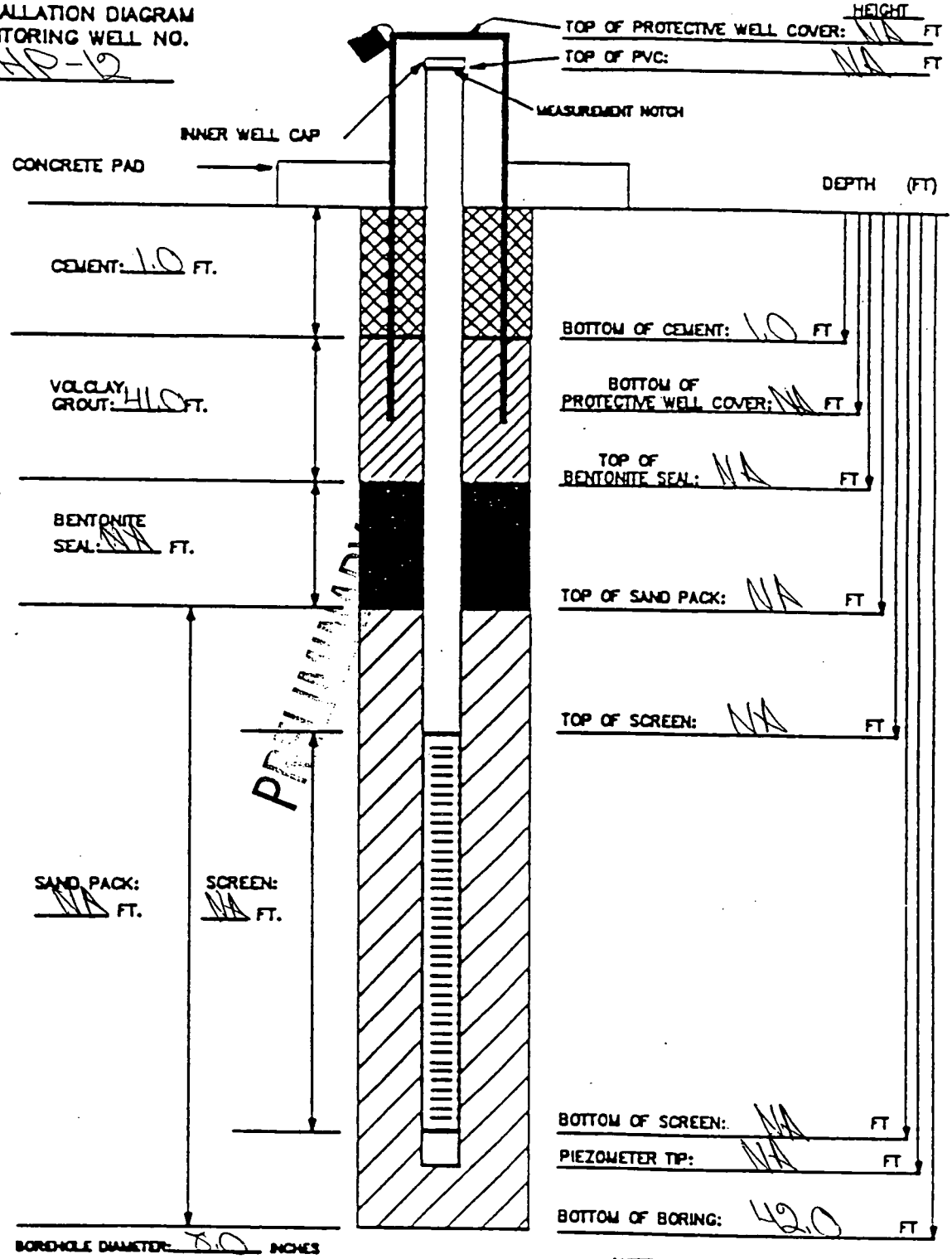
2013-4529

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. HP-12

INSTALLATION DATE: 5/1/93



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 50 gal
OTHER:
DS 5/11/93
2 50 gal drum

NOTES:
1) RISER PIPE IS 2-INCH SCHEDULE 40 PVC PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2-INCH I.D. SCHEDULE 40 PVC PIPE WITH 0.020-INCH SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH/DATE: 42.0 ft 5/6/93

TASK: 20.03.05

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

3013

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 phase 2 FIELD ENG./GEO. D. O'Brien DATE 5/7/93
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. HP-2
PIEZOMETER NO. — DATE OF INSTALLATION 5/7/93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augers	TYPE OF BIT Augers
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

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

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 42.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	42.0			
GWL AFTER INSTALLATION	42.8			

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

REMARKS _____

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409-11-86

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-4529

FERNALD
RI/FS

WATER QUALITY
FIELD COLLECTION REPORT

Date: 5-6-93
Time: 1330
Page: 1 of 1

FADL REF # 5/11/93

PROJECT NAME	OU2 Phase 2	SAMPLE LOCATION	HP-12
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113007
DATE COLLECTED	5/11/93	RFA NUMBER	
TIME COLLECTED	5/6/93 1130	C/C NUMBER	72340
COLLECTED BY	DO	SAMPLE TYPE	ground water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.44
AIR TEMPERATURE	75°F
DO SATURATION IN AIR	NA
WATER TEMPERATURE	16.4°C
DEPTH OF SAMPLE	40.0-42.0
WATER LEVEL	42.8

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.20	NA	NA
SPEC. COND. uMHOS/cm	850	NA	NA
D.O. MG/L	NA	NA	NA

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0ppm	0ppm	0ppm

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
22°c	4	7				N/A	22°c	1000	10000	Isobutylene	360492-[illegible]	0ppm	0ppm
OK	✓	✓	OK			N/A	OK	1000	9300				

WEATHER CONDITIONS: clear

ADDITIONAL REMARKS: BD = 40-40-pm

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
004032	ORION 250A PH METER
92J427559	YSI MODEL 33 SCT METER
859132	Hydrolab II

EQUIP.	NUMBER
BAILER	NA
HOSE/S	NA
PUMP	NA
FILTER KIT	Gelman disposable

267

17

NA Ht. of Water Column x NA = NA (3 Volumes)

(T.D. NA - W.L. NA) = NA Ht. of Water Column

7/21/94 (1) ARV 0551 0 MW

HI/FO

VISUAL CLASSIFICATION OF SOILS - 4520

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 19KH	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
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
	0935 113092 5/11/93	9	4	V.Stiff. 2.5Y (5/6) Olive yellow gravelly clay, no plasticity dry	CL	3.5	HNU = 0 ppm BS = 60 cpm
		11	0	No Recovery	NA	NA	HNU = NA BS = NA
1		15	0	No Recovery	NA	NA	HNU = NA BS = NA
	0940 113093 5/11/93	15	6	V.Stiff. 2.5Y (5/4) Lt. olive brown silty clay w/gravel, no plasticity, dry	CL	2.0	HNU = 0ppm BS = 60cpm
2		16	3	SAA	CL	2.0	HNU = 0ppm BS = 60cpm
		18	0	No Recovery	NA	NA	HNU = NA BS = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: Jeff Berthley
Kyle Schmidt

Samples collected per ASTM standard practice D-2488
Colors identified using Munsell Color Chart

Key: HNU = ppm BS = BC cpm

HI/FS

VISUAL CLASSIFICATION OF SOILS - -4529

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 1984	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/12/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 2 OF 7

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1/2 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0948	12	0	No Recovery	NA	NA	HNU = NA BS = NA
		13	0	No Recovery	NA	NA	HNU = NA BS = NA
4		12	0	No Recovery	NA	NA	HNU = NA BS = NA
	1003 113094 5/11/93	4	6	Stiff. 2.5Y (5/4) Lt olive brown sandy clay with gravel, low plasticity, moist	cl	1.0	HNU = 0ppm BS = 60cpm
5		4	6	SAA	cl	1.0	HNU = 0ppm BS = 60cpm
		6	0	No Recovery	NA	NA	HNU = NA BS = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: Bill Bothun
Bill Sturm

Samples collected per ASTM standard practice and colors identified using Munsell Color Chart

Key: HNU = ppm BS = cpm

HI/FS

VISUAL CLASSIFICATION OF SOILS - 4529

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 PHASE 2	
BORING NUMBER: B54	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 3 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1020 113095 5/11/93	2	5	V. Stiff, 2.5Y (5/6) Lt olive brown clay, trace gravel, low plasticity moist	CL	3.25	HNU = 0ppm BS = 60cpm
		2	0	No Recovery	NA	NA	HNU = NA BS = NA
7		4	0	No Recovery	NA	NA	HNU = NA BS = NA
	1030 115091 5/11/93	1	3	Stiff 2.5Y (5/4) Lt olive brown clay, trace gravel, no plasticity slightly moist	CL	1.0	HNU = 0ppm BS = 60cpm
8		1	0	No Recovery	NA	NA	HNU = NA BS = NA
		1	0	No Recovery	NA	NA	HNU = NA BS = NA

NOTES:

NA - sample or soil
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Logger: JILL BARTHEL
BILL SUMMERS

Samples collected per ASTM standard practice D1587

Colors determined using Munsell Color Chart

Key: HNU = ppm BS = cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
HOLE NUMBER: 19B4	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 4 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1040 13097 5/11/93	2	6	Loose. 2.5Y (4/6) Olive yellow silt & sand mixture, fine to medium grained, wet	SM	NA	HNU = 0ppm BG = 60cpm
		3	4	SAA	SM	NA	HNU = 0ppm BG = 60cpm
10		3	0	No Recovery	NA	NA	HNU = NA BG = NA
	1310 13098 5/11/93	4	5	STIFF ~~MEDIUM DENSE~~ 2.5Y (4/6) Lt olive brown CLAY mixed w/ silt & sand coarse grain no plasticity wet.	CL	1.0	HNU = 0PPM BG = 60 CPM
11		5	0	No Recovery	NA	NA	HNU = NA BG = NA
		5	0	No Recovery	NA	NA	HNU = NA BG = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: Bill Bartley
Bill Gilbert

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Key: HNU = 0ppm BG = 60cpm

MI/FS

VISUAL CLASSIFICATION OF SOILS

-4520

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 1954	COORDINATES:	DATE 5/11/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 5 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1320 13099 5/11/93	5	6	V. Stiff 2.5Y (6/6) Olive yellow silty clay w/gravel, no plasticity, wet	cl	2.0	HNU = 0ppm BG = 60cpm
		8	4	M. Dense 2.5Y silt w/gravel, wet.	ml	NA	HNU = 0ppm BG = 60cpm
13		14	0	No Recovery	NA	NA	HNU = NA BG = NA
	0820 13100 5/12/93	1	3	Soft. 2.5Y (6/6) Olive yellow clay, no plasticity, wet	cl	2.5	HNU = 0ppm BG = 60cpm
14		1	0	No Recovery	NA	NA	HNU = NA BG = NA
		2	0	No Recovery	NA	NA	HNU = NA BG = NA

NOTES:

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: [illegible]

Key: HNU = ppm BG = cpm

NA - sample not taken
NA - not applicable

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

RI/FS

4520

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 PHASE 2	
BORING NUMBER: 1954	COORDINATES:	DATE 5/12/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/11/93
ENGINEER/GEOLOGIST. D. O'BRIEN	Depth Date/Time	DATE COMPLETED: 5/13/93
DRILLING METHODS: HOLLOW STEM AUGER		PAGE 6 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0840 113101 5/12/93	3	4	Soft. 2.5Y(5/1) Gray silty clay w/gravel, low plasticity wet	cl	.25	HNU = 0ppm BS = 40cpm
		3	0	No Recovery	NA	NA	HNU = NA BS = NA
16		4	0	No Recovery	NA	NA	HNU = NA BS = NA
	0905 113102 5/12/93	16	6	V.Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity, dry	cl	3.0	HNU = 0ppm BS = 60cpm
17		23	5	SAA	cl	3.0	HNU = 0ppm BS = 60cpm
		50	0	No Recovery	NA	NA	HNU = NA BS = NA

NOTES:

SAA - same as above
NA - not applicable

Drilling Contractor PENNSYLVANIA DRILLING CO.

Drilling Equipment ACKER SENTRY

Driller: Bill Sibert
Jeff Bentley

Samples collected per ASTM standard practice for collection and classification of soils. Colors identified using Munsell color chart.

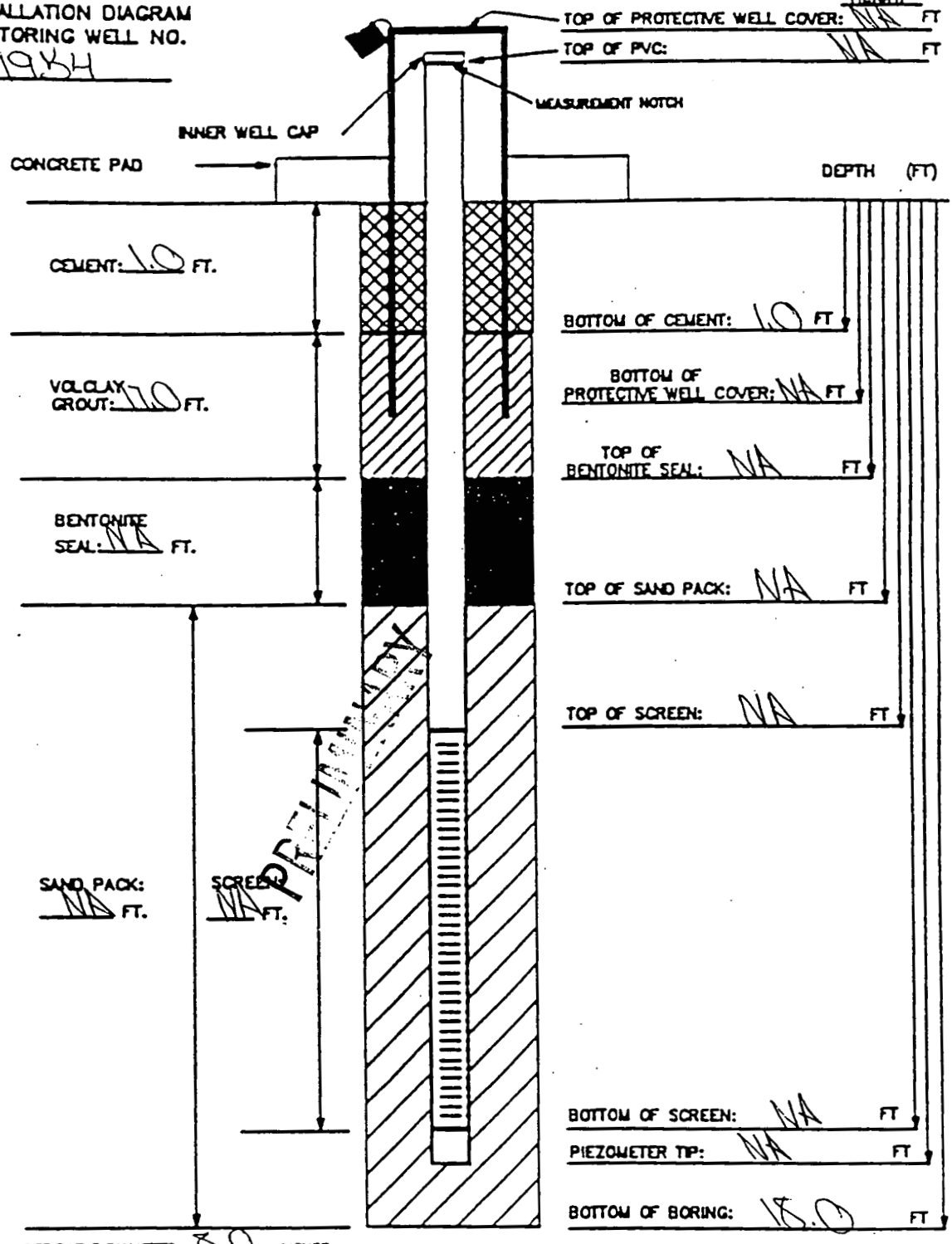
Key: HNU = ppm BS = cpm

7018

INSTALLATION DATE: 5/13/93 4529

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1934



PRELIMINARY

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: 20 gal
OTHER:

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

1 soil drum TASK: 20.03.03 GEOLOGIST/ENGINEER: D.O'Brien

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FERNALD
RI/FS

-4529

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase 2 FIELD ENG./GEO. D. O'Brien DATE 5/13/93
PROJECT NO. 20.03.03 CHECKED BY _____ DATE _____
BORING NO. 1084
PIEZOMETER NO. — DATE OF INSTALLATION 5/13/93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augs	TYPE OF BIT Augs
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID — FROM — TO —	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

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

PROTECTION SYSTEM

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

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 15.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	NA			

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

REMARKS _____

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RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1993	COORDINATES.	DATE 05/11/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/11/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/11/93	
DRILLING METHODS: Hollow Stem Auger w/CME Sampler		PAGE 1 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0915	NA	2.5	Very Hard (2.5Y 4/4) light olive brown and (5Y 5/1) gray silty clay, no plasticity, some small gravel, dry	CL	74.5	MT= 0.0 ppm BG= 40-60 cpm
				2.0' Firm (5Y 5/1) gray silty clay, some (5Y 5/3) olive silty clay, some gravel, dry	CL	1.75	- Pieces of concrete, metal, plastic cup lids, black ash
2.5	05/11 0915	NA	2.5	SAA, dry	CL	1.75	MT = 0.0 ppm BG= 40-60 cpm
5.0	05/11 0930	NA	2.5	Firm (5Y 5/1) gray silty clay, some (5Y 5/3) olive silty clay, some gravel, dry	CL	1.0	MT= 0.0 ppm BG= 40-60 cpm - No waste material
7.5	05/11						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.0 ppm
BG = 40-60 cpm

NA - Not Applicable
SAA - Same As Above

PRELIMINARY

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RI/FS

VISUAL CLASSIFICATION OF SOILS - 4529

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1993	COORDINATES.	DATE 05/11/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/11/93	
ENGINEER/GEOLOGIST A. Lomo	Depth Date/Time	DATE COMPLETED: 05/11/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	0930	NA	2.5	Hard (5Y5/1) gray to (5Y4/1) dark gray silty clay, slight plasticity, dry	CL	2.5	MT= 0.0 ppm BT= 40-60 cpm
10.0	05/11 0950	NA	2.5	Hard (2.5Y5/6) light olive brown and (5Y5/1) gray silty clay, medium plasticity, some small gravel, dry	CL	2.5	MT= 0.0 ppm BT= 40-60 cpm (5Y5/1) gray silty clay decreases as depth increases
12.5	05/11 0950	NA	2.5	Hard (2.5Y5/6) light olive brown clayey silt, no plasticity, some (5Y5/1) gray clay, few pieces of gravel, dry	ML	3.0	MT= 0.0 ppm BT= 40-60 cpm
15.0	05/11						

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT= 0.0 ppm
BT= 40-60 cpm

NA- Not Applicable

PRELIMINARY

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER.	1993	COORDINATES.		DATE	05/11/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/11/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED:	05/11/93
DRILLING METHODS	Hollow Stem Auger W/ CME Sampler			PAGE	3 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1015	NA	2.5	Very Hard (2.5Y 5/4) light olive brown clayey silt, no plasticity, few pieces of gravel, dry	ML	74.5	MT= 0.0ppm Bg= 40-60 cpm
17.5	05/11	NA	1.5	Very Hard (2.5Y 5/6) light olive brown and (5Y 5/1) gray clayey silt, no plasticity, few pieces of gravel, dry	ML	74.5	MT= 0.0 ppm Bg= 40-60cpm
				19.0'			
				@ 1025 drove Shelby tube from 19.0' to 21.0'			

NOTES

Background MT= 0.0ppm
Bg= 40-60cpm

NA- Not Applicable

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RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 1993
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Como DATE 9 Sept
CHECKED BY _____ DATE _____
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger w/cone sampler
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 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

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 19.0	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	19.0			
SWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Soil Boring using cone sampler. Pushed thinwall tube from 19.0' to 21.0'.

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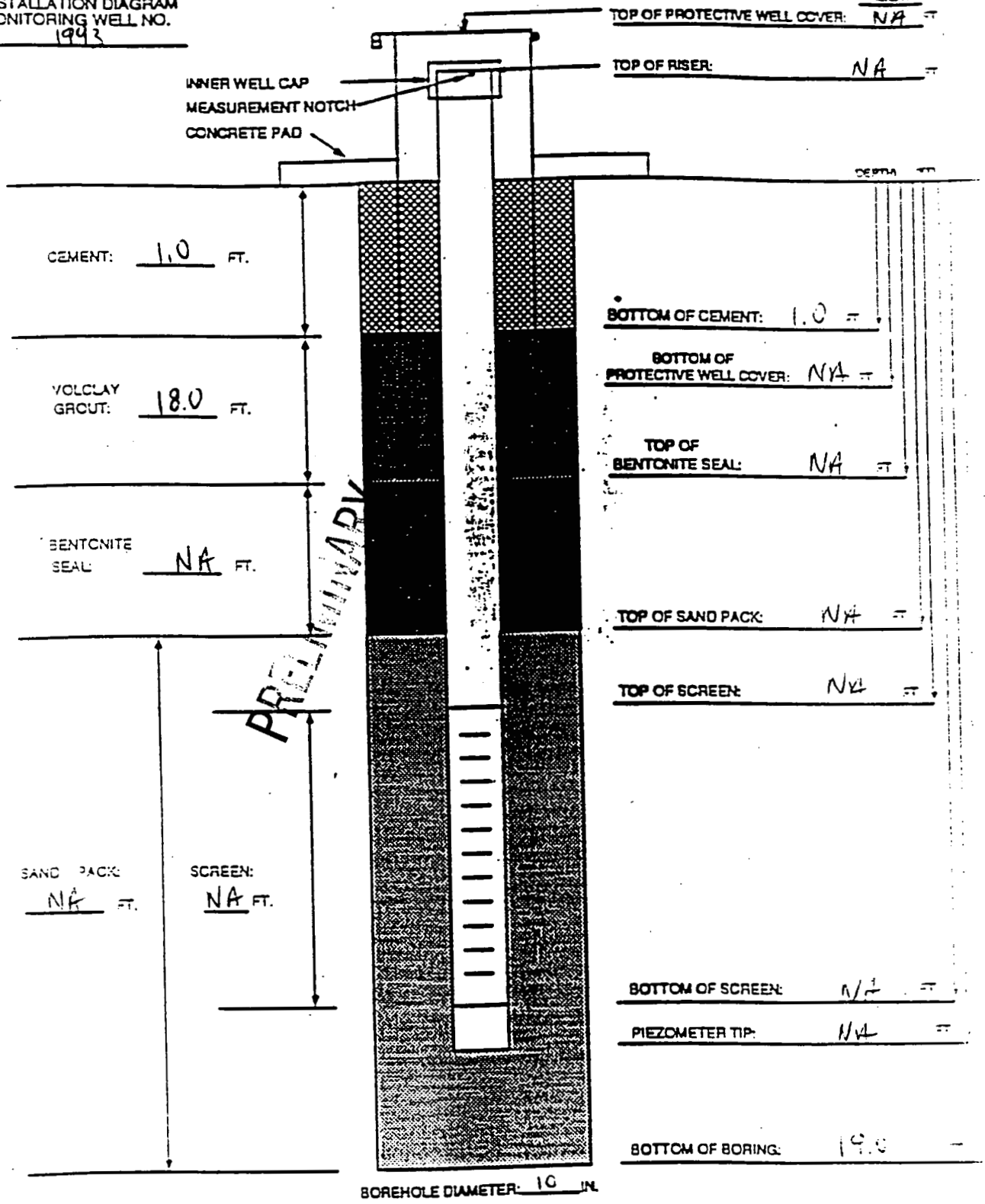
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1993

INSTALLATION DATE: 05/11/93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



MATERIALS USED

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 9

AMOUNT OF CEMENT: 1

AMOUNT OF WATER USED: 5 gallons

OTHER: Pushed Shelby tube from 19.0' to 21.0'

CASING: Soil Boring using CME Sampler

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: A. [illegible]

4) WATER DEPTH AND DATE NA FT

5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

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RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20. 05. 05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. 1988	COORDINATES.		DATE 05/12/93
LEVATION:	GWL: Depth	Date/Time	DATE STARTED 05/12/93
ENGINEER/GEOLOGIST A. Como	Depth	Date/Time	DATE COMPLETED. 05/12/93
DRILLING METHODS Hollow Stem Auger W/ CME Sampler			PAGE 1 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1000 05/12	NA	2.5	Very hard (2.5Y 4/2) dark grayish brown silty clay, no plasticity, some gravel, some (2.5Y 4/0) dark gray silty clay, dry	CL	4.5	MT = 1.6 ppm BZ = 80-100 cpm
2.5	1000 05/12	NA	2.0	Firm (5Y 4/1) dark gray to (5Y 3/1) very dark gray silty clay, medium plasticity, some gravel, dry	CL	1.0	MT = 4.2 ppm BZ = 180-200 cpm * 4.0' BZ = 300 cpm Can see waste material in soil; plastic, red pieces of plastic, black burnt material, mica
5.0	1015 05/12	NA	2.5	Firm (5Y 4/1) dark gray silty clay, low plasticity, some small gravel, some (5Y 3/1) very dark gray silty clay, few pieces of organic material, moist	CL	1.5	MT = 1.6 ppm BZ = 80-100 cpm
7.5							

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 1.6 ppm
BZ = 80-100 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1988	COORDINATES.		DATE 05/12/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 05/12/93
ENGINEER/GEOLOGIST. A. Lamo	Depth	Date/Time	DATE COMPLETED. 05/12/93
DRILLING METHODS Hollow Stem Auger w/ CME sampler			PAGE 2 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1015	NA	2.0	Hard (5Y 3/1) very dark gray clayey silt, some (5Y5/2) olive gray clay, slight plasticity, few pieces of gravel, dry	CL	2.25	MT = 1.6 ppm BZ = 80-100 cpm
10.0	05/12 1030	NA	2.5	Hard (5Y5/1) gray clay, some (10YR 5/6) yellowish brown silty clay, medium plasticity, dry	CL	3.0	MT = 1.6 ppm BZ = 80-100 cpm As the depth increases the (5Y5/1) clay decreases in amount
12.5	05/12 1030	NA	2.5	Hard (10YR 5/6) yellowish brown and (2.5Y5/4) light olive brown silty clay, some (5Y5/1) gray clay, low plasticity, dry	CL	3.0	MT = 1.6 ppm BZ = 80-100 cpm
15.0	05/12						

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 1.6 ppm
BZ = 80-100 cpm

NA- Not Applicable
SAA- Same As Above

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PRELIMINARY

VISUAL CLASSIFICATION OF SOILS

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PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1988	COORDINATES.	DATE 05/12/93	
LEVATION:	GWL: Depth Date/Time	DATE STARTED 05/12/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED 05/12/93	
DRILLING METHODS Hollow stem Auger w/CME sampler		PAGE 3 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1300	NA	2.5	Hard (2.5Y 5/4) light olive brown clayey silt, some (5Y 5/1) gray clay, no plasticity, some pieces of gravel, dry	ML	3.0	MT = 1.0 ppm BT = 80-100 cpm
17.5	05/12 1300	NA	2.5	SAA, dry	ML		MT = 1.0 ppm BT = 80-100 cpm
				19.0' Very hard (5Y 5/1) gray silty clay, no plasticity, dry	CL	>4.5	Iron staining evident on cleavage planes
20.0	05/12						End of Boring
				@ 1315 pushed shelby tube from 20.0' to 22.0' * very hard to push shelby tube			

PRELIMINARY

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT = 1.0 ppm
BT = 80-100

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 198E
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Como DATE [illegible]
CHECKED BY _____ DATE _____
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger w/ CME Sampler
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem [illegible]
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	0.0	1.0		
GROUT/SLURRY (Cement)	TOP 1.0	BOTTOM 20.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.0			
GWL AFTER INSTALLATION	NA			

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

REMARKS Soil Boring using CME Sampler to 20.0'. Piezo Stick-up time from 20.0' to 22.0'.

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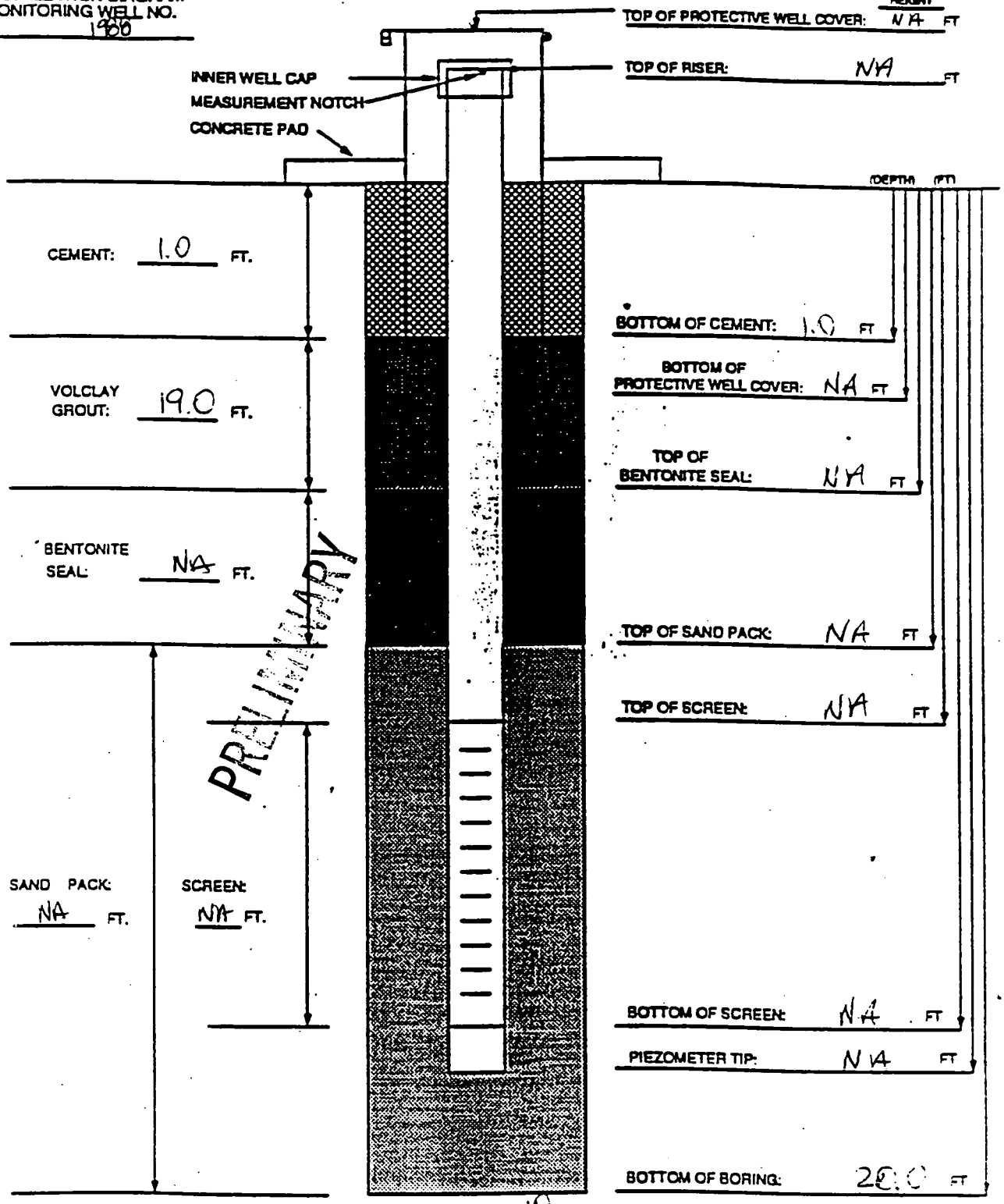
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1900

INSTALLATION DATE: 05/12/93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Soil Bonna mixed CMF Singer
TASK: Installed sheathing that from 20.0 to 22.0

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/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BEL GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Lomo

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FORM 0157 REV 10

FERMALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

JJECT NUMBER 20.03.05	PROJECT NAME. OU2 - Southfield	
BORING NUMBER: 11021	COORDINATES.	DATE 5/12/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 5/12/93
ENGINEER/GEOLOGIST J. Reagan	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow Stem auger		PAGE 1 OF 43

JR 5/12/93

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
	NA	NA	NA	Augered 1-18.5' See boring log for 11018 1-18.5' 10YR 4/3 brown poorly graded sand	NA	NA	NA
18.5	113051 113052 113053 113201	18 27 34	4 6 6	very dense, 10YR 4/3 brown, poorly graded sand, low plasticity wet	SP	NA	βγ = 60 cpm α = 0 cpm Mt = 0 ppm
	113054	~~18~~ 27 ~~34~~ JR 5/12/93		Hydropunch sample driven to 25' pull back to 21'			

βγ = 60 cpm
α = 0 cpm
Mt = 0 ppm

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller M. Watral
B. Dilley

SAA - Same as above
NA - Not Applicable

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

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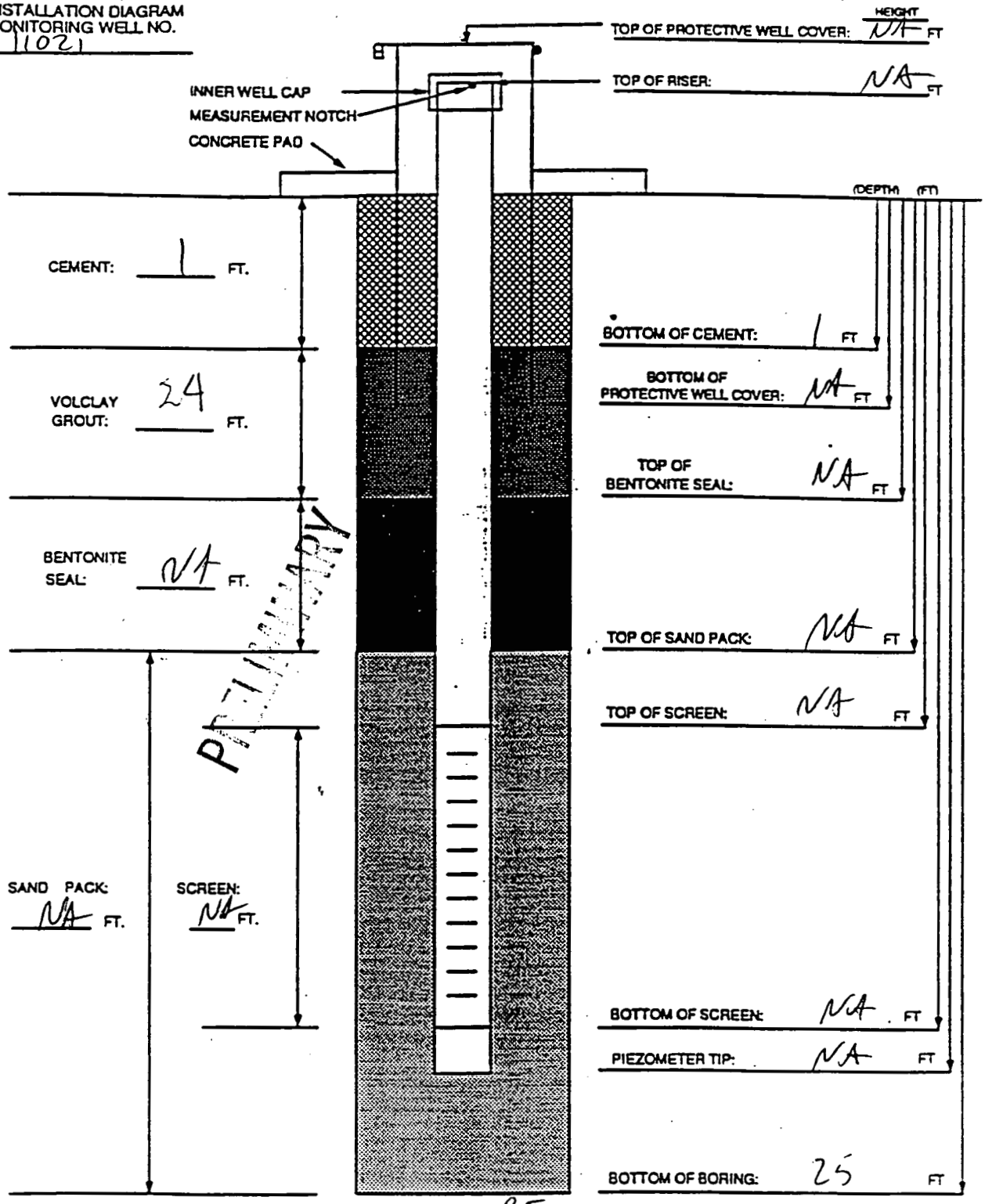
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1021

INSTALLATION DATE: 5/12/93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 20 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.
4) WATER DEPTH AND DATE 16.75 FT 5/13
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. Keagan

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FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-Southfield
PROJECT NO. 20.03.05
BORING NO. 11021
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/12/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/13/93
DR 5/13/93

BOREHOLE DRILLING

DRILLING METHOD hollowstem 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:
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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP	BOTTOM	TOP NA	BOTTOM NA
~~BENTONITE~~ Cement	TOP 0	BOTTOM 1.0	TOP ↓	BOTTOM ↓
SAND	TOP NA	BOTTOM	TOP ↓	BOTTOM ↓
GRAVEL	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	25		NA	
GWL AFTER INSTALLATION	16.79		NA	

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

REMARKS

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FERNALD
RI/FS

WATER QUALITY FIELD COLLECTION REPORT

Date: _____
Time: _____
Page: ____ of ____

FADL REF # _____

PROJECT NAME	OU2-Southfield	SAMPLE LOCATION	21-25', 1102.1
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113054
DATE COLLECTED	5-13-93	RFA NUMBER	73062
TIME COLLECTED	840	C/C NUMBER	NA
COLLECTED BY	J. Reagan	SAMPLE TYPE	Water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	No data available
AIR TEMPERATURE	No data available
DO SATURATION IN AIR	NA
WATER TEMPERATURE	10.4°~~F~~ C JRS 5/13/93
DEPTH OF SAMPLE	21-25'
WATER LEVEL	16.79'

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	6.5		
SPEC. COND. uMHOS/cm	650		
D.O. MG/L	NA		

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU			

PRELIMINARY

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
21°C	4	7	→			NA	21°C	1000	10000				
OK	✓	✓	OK	→		NA	OK	900	9000				

WEATHER CONDITIONS: Cloudy and cool

ADDITIONAL REMARKS: _____

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME	EQUIP.	NUMBER
003827	Orion 250A pH meter	BAILER	
15942	YSI Model 33SCT meter	HOSE/S	
960341	Hydropunch	PUMP	
		FILTER KIT	

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(T.D. ____) - (W.L. ____) = ____ Ht. of Water Column ____ Ht. of Water Column x ____ = ____ (3 Volumes) 201

FERNALD
RI/FS

E -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. LFP OU-2		
BORING NUMBER 1994	COORDINATES.		DATE 051293
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 051293
ENGINEER/GEOLOGIST J. BOYER	Depth	Date/Time	DATE COMPLETED 051393
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	116261	3 4	6	(10YR, 2/1) BLACK, flyash, sli. moist	NA	NA	Bf = 60cpm
		6	6	SAA	NA	NA	MT = 1.0ppm
	112661	8	6	5YFF (2.5y, 5/6) light olive brown silty clay, trace flyash, sli plasticity, moist	CI	2.0	
2	116262 116263	29	6	(10YR, 2/1) BLACK flyash, slightly moist.	NA	NA	
3	116264	13 17 21 22	6	(10YR, 2/1) BLACK flyash with silty sand, moist	NA	NA	120cpm Bf = ~~60cpm~~ 051293
			6	(10YR, 2/1) BLACK, flyash, moist	NA	NA	MT = 1.0ppm
			6	SAA	↓	↓	Bf ranges from 100-120cpm
4	116265 116266	051293	6	SAA	NA	NA	
5	116267	10 12 8 6	6	SAA	NA	NA	Bf = 80cpm
			6	(10YR, 2/1) BLACK flyash with clayey silt, moist	↓	↓	MT = 0.0ppm
			6	(10YR, 2/1) BLACK flyash, moist	↓	↓	
6	116268 116269		4	SAA	NA	NA	
7	116270	7 12 8 6	6	SAA	↓		Bf = 60cpm
			6	SAA	↓		MT = 0.0ppm
			6	SAA	NA	NA	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller JOE RAABS
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT - MICROTIP

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

JECT NUMBER 20,03,05	PROJECT NAME. IFP OU-2		
BORING NUMBER 1994	COORDINATES.	DATE 051293	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051293	
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED 051393	
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 8	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	116271 116272		6	(10yR, 2/1) Black, flyash, moist	NA	NA	
9	116273	15	6	SAA			BY = 60cpm
		5	6	SAA			MT = 0.0ppm
		3					
	116273	1	6	SAA			
	116274						
10	116275		6	SAA			
11	116276	9	6	SAA			BY = 80cpm
		2	6	SAA			MT = 0.0ppm
	116276	2	6	SAA			
	116277 116278	2	6	SAA			
12	116279	6	6	SAA			BY = 60cpm
13		3	6	SAA			MT = 0.0ppm
	116279	3	6	SAA			
	116280 116281	2	6	SAA	NA	NA	
14	116283	18	6	(10yR, 2/1) Black, flyash, moist			BY = 80cpm
		12	6				MT = 2.7ppm
15	116283	10	6	SAA	NA	NA	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller Joe Rapp, Roger Davis

SAA - Same as above
NA - Not Applicable
MT = MICROTIP
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

JECT NUMBER 20.03.05	PROJECT NAME: IFP OU-2		
BORING NUMBER 1994	COORDINATES.		DATE 051393
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 051293
ENGINEER/GEOLOGIST J. Boyer	Depth	Date/Time	DATE COMPLETED 051393
DRILLING METHODS Hollow Stem Auger			PAGE 3 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	116283	6	6	Clay, 2(1) Black, Flyash, moist	NA	NA	Bγ = 80cpm, MT = 2.7ppm
16	116284 116285		6	SAA			
	116286	8	6	SAA			Bγ = 80cpm
17		6	6	SAA			MT = 2.0ppm
	116286	5	6	SAA			
	116287 116288	6	3	SAA			
	116289	27	6	SAA			Bγ = 80cpm
19		18	6	SAA			MT = 0.6ppm
	116289	10	6	SAA			
	116290 116291	16	6	SAA	NA	NA	
20	116292	7	6	SAA			Bγ = 80cpm
		6					
21		4	6	SAA			MT = 1.7ppm
	116292	4	6	SAA			
	116293 116294		6	SAA			
22	116295	5	6	SAA	NA	NA	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT = MICROTIP

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

1 Background VARIED FROM 1.0-2.0ppm

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2		
BORING NUMBER. 1994	COORDINATES.	DATE 051393	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051293	
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED. 051393	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 7 OF 8	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
23	116295	6	6	(10YR, 2/1) Black, Humus, moist	NA	NA	Bg = 600cpm
	116295	8	6	SAA	↓	↓	MT = 1.0ppm
24	116296 116297	9	6	SAA	↓	↓	
	116298	43	6	SAA	↓	↓	Bg = 600cpm MT = 0.0ppm
25		32	6	SAA	NA	NA	
	116298	10	6	MEDIUM DENSE, (2.5Y, 3/2) very dark grayish brown, poorly graded sand with gravel, moist, trace humus	SP	NA	
26	116299 116300	8	6	SAA	SP	NA	
	116301	7	6	SAA	SP	NA	Bg = 110cpm
27		17	6	DENSE, (5Y, 3/2) dark olive gray, clayey silt, no plasticity to slight, moist	ML	NA	MT = 0.0ppm
	116301	18	6	SAA	↓	↓	
28	116302 116303	23	3	SAA	ML	NA	
	116304	NA	18	UNKNOWN	NA	NA	Shelby Tube
29				UNKNOWN	↓	↓	
				UNKNOWN	NA	NA	
30	116304			(5Y, 3/4) olive, clayey silt, moist, trace gravel	ML	NA	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT - MICROTIP
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2		
BORING NUMBER. 1994	COORDINATES.	DATE 051393	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051293	
ENGINEER/GEOLOGIST J. BOYER	Depth Date/Time	DATE COMPLETED. 051393	
DRILLING METHODS Hollow Stem Auger		PAGE 5 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30	116305 1400	10	6	Very stiff, (10YR, 4/6) dark yellowish brown, silty clay, low plasticity moist.	cl	2.0	BZ = 60cpm
	116306 1400	15 17	6	Very stiff, (10YR, 4/6) dark yellowish brown, silty clay with a 1 inch layer of flyash, low plasticity, moist	cl	4.0	MT = 0.0ppm
31	116307 1400	15	2	Very stiff (10YR, 4/6) dark yellowish brown, silty clay, low plasticity, moist	cl	4.0	
	NA		0	No Recovery 2.5 hrs 051393	NA	NA	
32	116308 116309	32	6	Very stiff (10YR, 5/4) light olive brown, silty clay, low plasticity, moist	cl	4.0	BZ = 80cpm
	↕	21	6	SAA	cl	4.0	MT = 0.0ppm
		26	6	Very dense, (10YR, 5/6) dark yellowish brown, poorly graded silty sand, moist	SM	NA	
34	116308 116309	31	6	SAA	SM	NA	
	116310	5	6	Medium dense, (10YR, 4/6) dark yellowish brown, poorly graded sand with gravel, moist	SP	NA	BZ = 60cpm
	116311	4	6	SAA	SP	NA	MT = 0.0ppm
35		11	0	No Recovery	NA	NA	
		10	0	No Recovery	NA	NA	
36	116312	9	6	Very dense (2.5Y 5/4) light olive brown, poorly graded sand with gravel, moist	SP	NA	BZ = 60cpm
	↕	9	6	SAA	↓	↓	MT = 0.0ppm
37		15					
	116312		6	SAA	SP	NA	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT - MICROTIP
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2	
BORING NUMBER 1994	COORDINATES.	DATE 051393
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051293
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED 051393
DRILLING METHODS Hollow Stem Auger		PAGE 6 OF 8

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
38	116313 116314	44	9	VERY DENSE, (2.5Y 3/4) LIGHT OLIVE BROWN, POORLY GRADED SAND, TRACE GRAVEL, MOIST	SP	NA	
				BOTTOM OF BORING 38.0 ft.			
39							
40							
41							

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller JOE RAAB
ROGER DAVIS

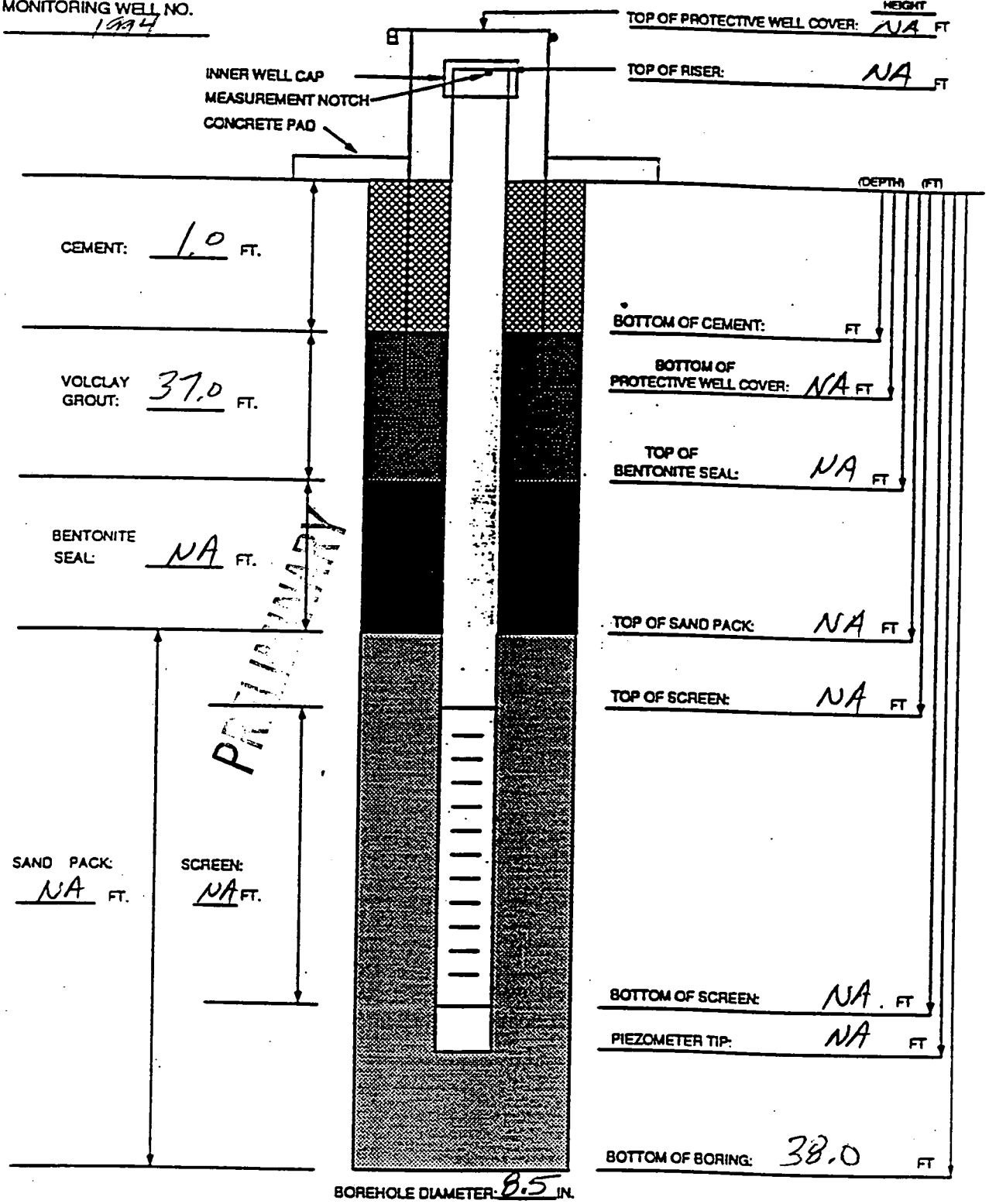
SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1994

INSTALLATION DATE: 05/13/93



TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT

(DEPTH) (FT)

BOTTOM OF CEMENT: 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

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 1/2 Bags
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 10-12 gallons
OTHER: 2 Drums 1 soil, 1 water/Alcohol
TASK: 20.03.05

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: J. Boyer

SI FORM 0157 REV (0)

FERNALD RI/FS

-4520

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 051393
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 1994
PIEZOMETER NO. NA DATE OF INSTALLATION 051393

BOREHOLE DRILLING

DRILLING METHOD 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 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 (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS: ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM NA
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 38.0	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	38.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

-4529

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 201.03.07	PROJECT NAME ACTIVE FLY ASH INVESTIGATION		
BORING NUMBER S.B. 188 0	COORDINATES	DATE 12 MAY 93	
ELEVATION	GWL. Depth Date/Time	DATE STARTED 12 MAY 93	
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED 13 MAY	
DRILLING METHODS HOLLOW STEM AUGER		PAGE 6 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS 14 MAY 13 Ev
1	112129	3	6	MED DENSE (2.5YR/0) BLACK FLY ASH DAMP	NA	NA	MT: 2.4 BY: 80
	12 MAY	4	6	SAA			
	0835	5	6	SAA			TAL-C 112129
		5	6	SAA			TIME 0835
2	112130 112131	10	6	SAA			MT: 1.0 BY: 80
3	12 MAY 0840	11	6	SAA			TAL-C 112130
		9	6	SAA			TAL-I 112131
4		8	6	SAA			TIME 0840
5	112132	6	6	SAA			MT: 0 BY: 90
	112133	6	6	SAA			ARCHIVE
	112134 12 MAY 0910	8	6	SAA			TIME: 0910
6	112135	7	6	SAA			MT: 0 BY: 78
	112136	7	6	SAA			ARCHIVE
7	112137 12 MAY 0918	11	3	SAA			TIME: 0918
7.5	112138 12 MAY 0924	4	6	SAA	NA	NA	

PRELIMINARY

NOTES

DRILLING FIRM: PENN DRILL

DRILLERS: DAN JAMESON, DON ARTHUR

RIG: MOBILE B80

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS:

MICROTIP:	X0	ppm
BY:	50	CPM
α:	NA	CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

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FERNALD RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLYASH PILE INVESTIGATION		
BORING NUMBER 1980	COORDINATES		DATE 12 MAY 93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 12 MAY 93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 12 MAY 93
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
7.5							14 BEAT MAY
8	112139 12 MAY 0924	7	6	MED BROWN (2.5YR, 10) BLACK FLYASH MOIST, LOW PLASTICITY	NA	NA	AT: 0 BY: 70
	112140 0924	10	6	SAA	NA	NA	ARCHIVE
9	112141 12 MAY 0924	6	6	SAA	NA	NA	TIME 0924
10	112142 12 MAY 0932	NA	NA	SAA SHELBY	NA	NA	AT: 0 BY: 50 SHELBY 112142 TIME 0932
11 12	112143 12 MAY 0947	NA	NA	SHELBY -TUBE SLIGHTLY BENT AT BOTTOM	NA	NA	AT: 0 BY: 70 SHELBY 112143 TIME 0942
13	112144 112145 12 MAY 1000	6	6	SAA	NA	NA	AT: 0 BY: 70
14		12	6	SAA + SOME CLAY MIXED	NA	NA	TAL-D (WISA) 112144
		9	6	SAA NO CLAY	NA	NA	TAL-C 112145
15		20	6	SAA	NA	NA	TIME 1000

NOTES

DRILLING FIRM: PENN DRILL

DRILLERS: DAN JAMISON, DON ARTHUR

RIG: MORIL 1380

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS:

MICROTIP:	0	ppm
BY:	50	CPM
α:	NA	CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLYASH PILE INVESTIGATION	
BORING NUMBER 1986	COORDINATES	DATE 12 MAY 93
ELEVATION	GWL. Depth Date/Time	DATE STARTED 12 MAY
ENGINEER/GEOLOGIST B.E. MULLEN	Depth Date/Time	DATE COMPLETED 12 MAY
DRILLING METHODS HOLLOW STEM AUGER		PAGE 3 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	112146	6	6	MED. GRAY 2.5 YR, 6/0 BLACK FLY ASH, LOW PLASTICITY, MOIST	NA	NA	MT: 0 BY: 70
	12MAY 1015	6	6	SAA			
16		6	6	SAA			TAL-I 112146
		4	6	SAA			TIME 1015
17	112147 12MAY 1025	3	6	SAA			MT: 0 BY: 80
	112148 12MAY 1025	3	6	SAA			
18	112149 12MAY 1025	3	6	SAA			ARCHIVE
	112150 12MAY 1025	4	6	SAA			TIME 1025
19	112151 12MAY 1036	1	6	SAA			BY: 50-70 MT: 0
	112152 12MAY 1036	1	6	SAA WET	NA	NA	ARCHIVE
20	112153 12MAY 1026	4	6	MED STIFF (2.5 Y 6/6) OLIVE YELLOW CLAY - SILTY, TRACE BLACK + YELLOW MOTTLES, LOW PLASTICITY, MOIST	CL	0.75	TIME: 1026
	112153 12MAY 1323	7	6	SAA	CL	0.75 ~~1.5~~	MT BY
21		21	6	SAA	CL	>4.5	TAL-I 112153
12MAY 22		23	6	SAA SOME FLY ASH	CL	>4.5	TIME 1323
13MAY 22	13MAY	10	6	SAA + PORTION OF FLYASH	CL	2.75	

NOTES

DRILLING FIRM: DEAN DRILL

DRILLERS: DAN HARRISON AND ASTRUP

RIG: [illegible]

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS: 12MAY93
MICROTIP: 1.8 PPM
BY: 50 CPM
α: NA CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH PILE	
BORING NUMBER 1580	COORDINATES	DATE 13 MAY 87
ELEVATION	GWL. Depth Date/Time	DATE STARTED [illegible]
ENGINEER/GEOLOGIST B.F. MULLER	Depth Date/Time	DATE COMPLETED [illegible]
DRILLING METHODS HOLLOW STEM AUGER		PAGE [illegible] OF [illegible]

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5							
23	112156 13MAY 0823	20	6	HARD (2.5Y 6/6) OLIVE YELLOW SILTY CLAY, LOW PLASTICITY, MOIST	CL	74.5	MT: 2.4 BY: [illegible]
	↓	31	6	V. STIFF (2.5Y 5/6) LIGHT OLIVE BROWN, CLAYEY SANDY SILT, LOW PLASTICITY VERY MOIST	CL	2.5	TAL [illegible] 112156
	112156 13MAY 0823	40	6	SAA	CL	0.75	TOC - 112[illegible] TIME: 08[illegible]
24	112157 13MAY 0845	29	6	SOFT (2.5Y 6/8) OLIVE YELLOW SILTY CLAY, BLACK MOTTLES, LOW PLASTICITY, VERY MOIST	CL	0.25	MT: [illegible] BY: [illegible]
	↓	18	6	SAA - INCREASED SILT AT [illegible] HORIZON	CL	0.25	MT BACKGROUND [illegible]
25	↓	21	6	SAA	CL	3.0	TAL [illegible] 112157
	112157 13MAY 0845	25	6	SAA - REDUCED SILT [illegible] - MOIST	CL	2.0	TIME: [illegible]
26				BOTTOM OF BORING @ [illegible]			

PRELIMINARY

NOTES

DRILLING FIRM: [illegible] DRILL

DRILLERS: [illegible]

RIG: [illegible] 850

DESCRIPTION: BASED ON MUNSELL

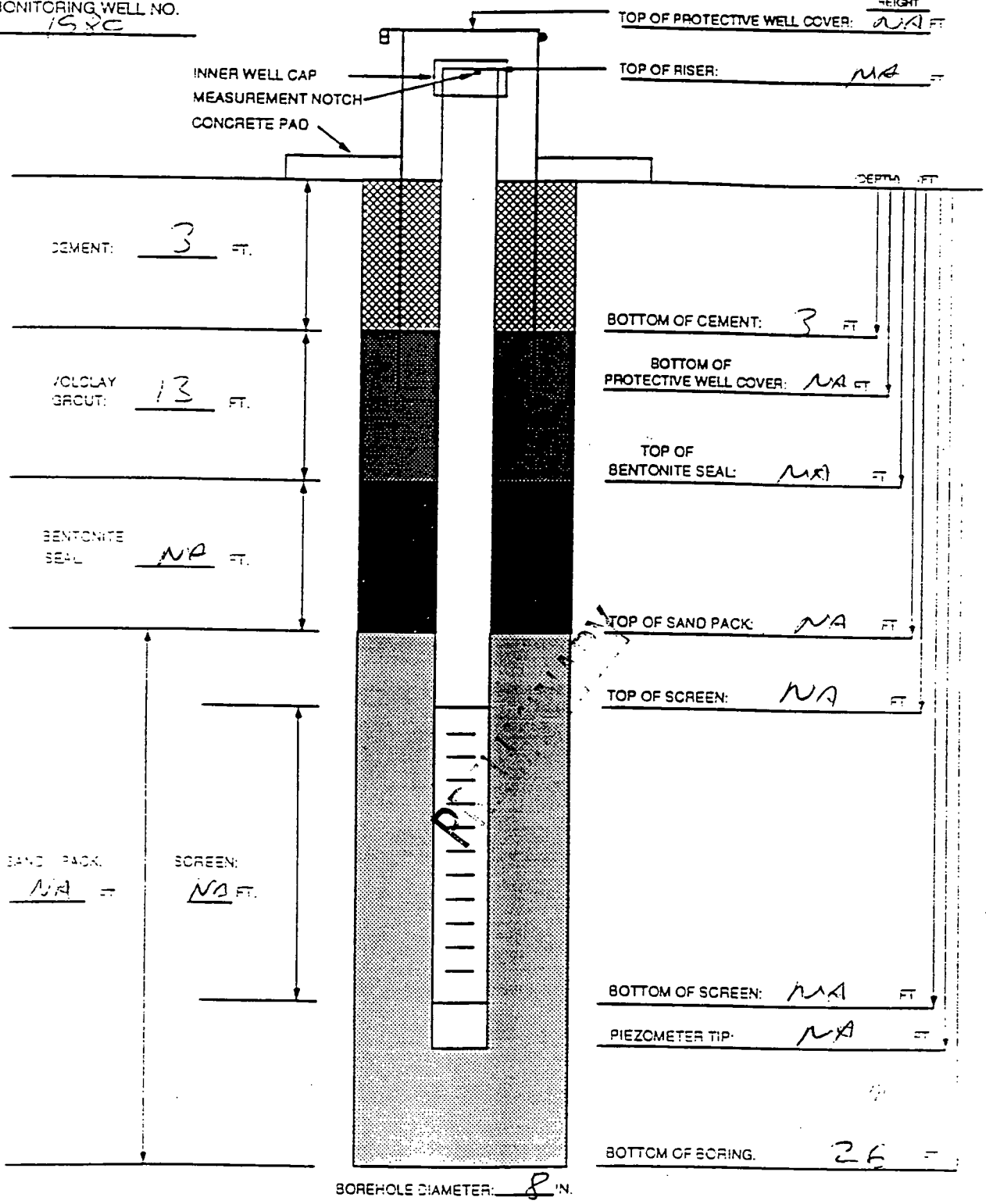
UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP: [illegible] PPM
BY: [illegible] CPM
α: [illegible] CPM

NO ALLOWANCE (NA)
SAME AS ABOVE (SAA)

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 15XC

INSTALLATION DATE: 13 MAY 93



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 50 LBS BAG
AMOUNT OF CEMENT: 1 50 LBS BAG
AMOUNT OF WATER USED: NA
TYPE: FLY ASH - FROM 26 - 16 FT
DATE: 20 03 05

NOTES:

1) RISER PIPE IS NO 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 ____ FT
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS NOTATE DEPTH GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: B. E. BULLER

FERNALD
RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME ACTIVE FLY ASH INV
PROJECT NO. 20 03 05
BORING NO. 1580
PIEZOMETER NO. NA

FIELD ENG./GEO. R. E. MOLLER DATE [illegible]
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 12 MAY [illegible]

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 [illegible]
CASING SIZE (S) USED:
SIZE NA FROM NA TO [illegible]
SIZE NA FROM NA TO [illegible]

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 16	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	26			
SWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS [illegible] FLY ASH COLLAPSED INTO HOLE BETWEEN [illegible] TO AN ELEVATION OF 16 FEET [illegible]

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RI/FS

E--4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER.	1987	COORDINATES.		DATE	05/13/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/13/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED	05/13/93
DRILLING METHODS:	Hollow stem Auger w/ CME sampler			PAGE	1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1000			Hard (2.5Y 4/3) olive brown silty clay, no plasticity, some gravel, dry			MT = 1.4 ppm BG = 40-80 cpm
	NA	NA	2.5		CL	3.0	
2.5	05/13						
	1000			SAA, dry	CL	3.0	MT = 1.4 ppm BG = 40-80 cpm
	NA	NA	2.5	3.0' Hard (2.5Y 5/4) light olive brown silty clay, low plasticity, dry, few pieces of gravel, some (5Y 5/1) gray clay, dry	CL	4.0	
5.0	05/13						
	1015			Hard (2.5Y 5/6) light olive brown silty clay and (5Y 5/1) gray silty clay, low plasticity, some gravel, dry			MT = 1.4 ppm BG = 40-80 cpm
	115557 115556	NA	2.5		CL	3.0	Found pieces of glass, black hard tar-like material
7.5	05/13						

NOTES:
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sim Smith

Background MT = 1.4 ppm
BG = 40-80 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER.	1987	COORDINATES.		DATE	05/13/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/13/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED.	05/13/93
DRILLING METHODS:	Hollow stem Auger w/ CME Sampler			PAGE	2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1015 NA 05/13	NA	2.5	Firm (5Y5/2) olive gray silty clay, medium plasticity, some gravel, some (2.5Y5/6) light olive brown silty clay, dry	CL	1.0	mT = 1.4 ppm Bg = 40-80 cpm
10.0	1040 NA 05/13	NA	2.5	Hard (5Y5/1) gray silty clay, low plasticity, some (2.5Y5/6) clayey silt, dry	CL	2.25	mT = 1.4 ppm Bg = 40-80 cpm
				12.0' Very Hard (2.5Y5/4) light olive brown clayey silt, no plasticity, some small (2.5Y5/6) gray pebbles, dry	ML	74.5	
12.5	1040 115359 05/13	NA	2.5	SAA, dry	ML	74.5	mT = 1.4 ppm Bg = 40-80 cpm Native till -iron staining present on cleavage planes

Drilling Co. Penn Drill Co.
Driller Dan Smith
Assistant Sam Smith

@ 1100 pushed shelby tube from 15.0' to 17.0' Sample # 115361

Background mT = 1.4 ppm Bg = 40-80 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

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FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 1987
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Como
CHECKED BY
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger w/CME sampler
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 NA FROM NA
SIZE NA FROM 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
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

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

OTHER PROTECTION NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS:			
Cement GROUT SLURRY	TOP 0.0 / 1.0	BOTTOM 1.0 / 15.0	TOP / BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP / BOTTOM
SAND	TOP NA	BOTTOM NA	TOP / BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP / BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP / BOTTOM
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	15.0		
SWL AFTER INSTALLATION	NA		

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS Soil boring using CME Sampler Rotary Sonic
15.0' to 17.0' 1 1

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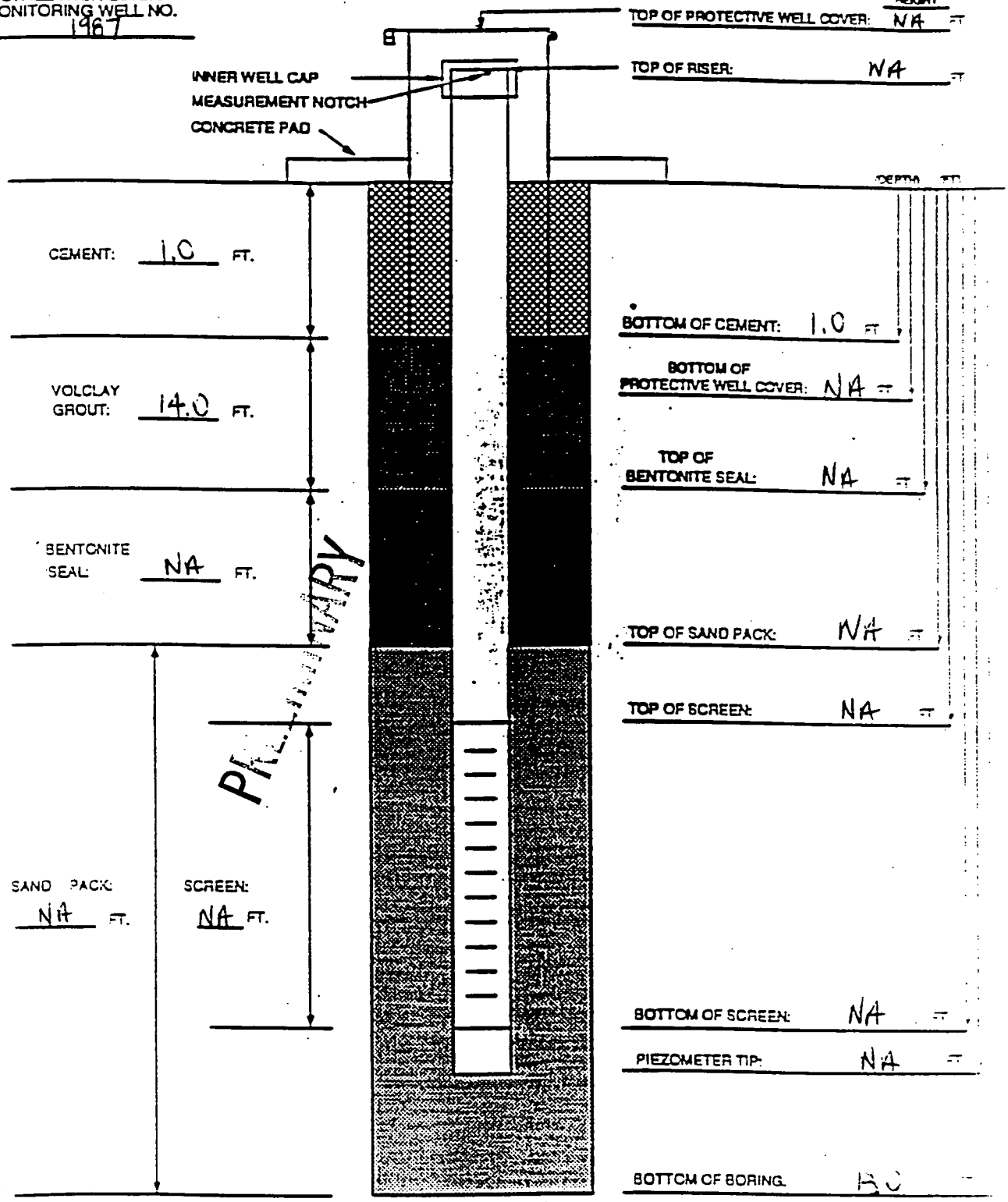
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1967

INSTALLATION DATE: 05/13/93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 8
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Ruined Shelby tube, 3 Gem 150 tubes
TASK: Soil Boring using CME Sampler

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: A. Lomo

4) WATER DEPTH AND DATE: NA FT
5) TOP OF CASING IS SEDL [illegible] STAINLESS STEEL [illegible]
6) PARENTHESIS INDICATE [illegible] GROUND LEVEL
7) WELL CASING HAS A [illegible] COVER WITH PADLOCK

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 70.03.05	PROJECT NAME. OU2 - Southfield		
BORING NUMBER. 11022	COORDINATES.		DATE 5/13/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/13/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/13/93
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 (USF)	REMARKS
							Bγ = 60 cpm α = 0 cpm mt = 0.9 ppm
	NA	NA	NA	Augered 1-20 Ft. 10YR 4/3 sand	NA	NA	NA
20	113055 113056 113057 1435 5/13/93	12 13 24	6 6 6	Dense, 10YR 4/3, poorly graded sand, low plasticity, wet,	SP	NA	Bγ = 60 cpm α = 0 cpm mt = 0.9 ppm
SP 5/13/93							
21.5	113058 1505 5/13/93	NA	NA	Hydropunch sample from 21-25'	NA	NA	NA
				Bottom of Boring 25'			

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller M. Walral
B. Oeley

SAA - Same as above
NA - Not Applicable
mt - microtip
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

DRAFT

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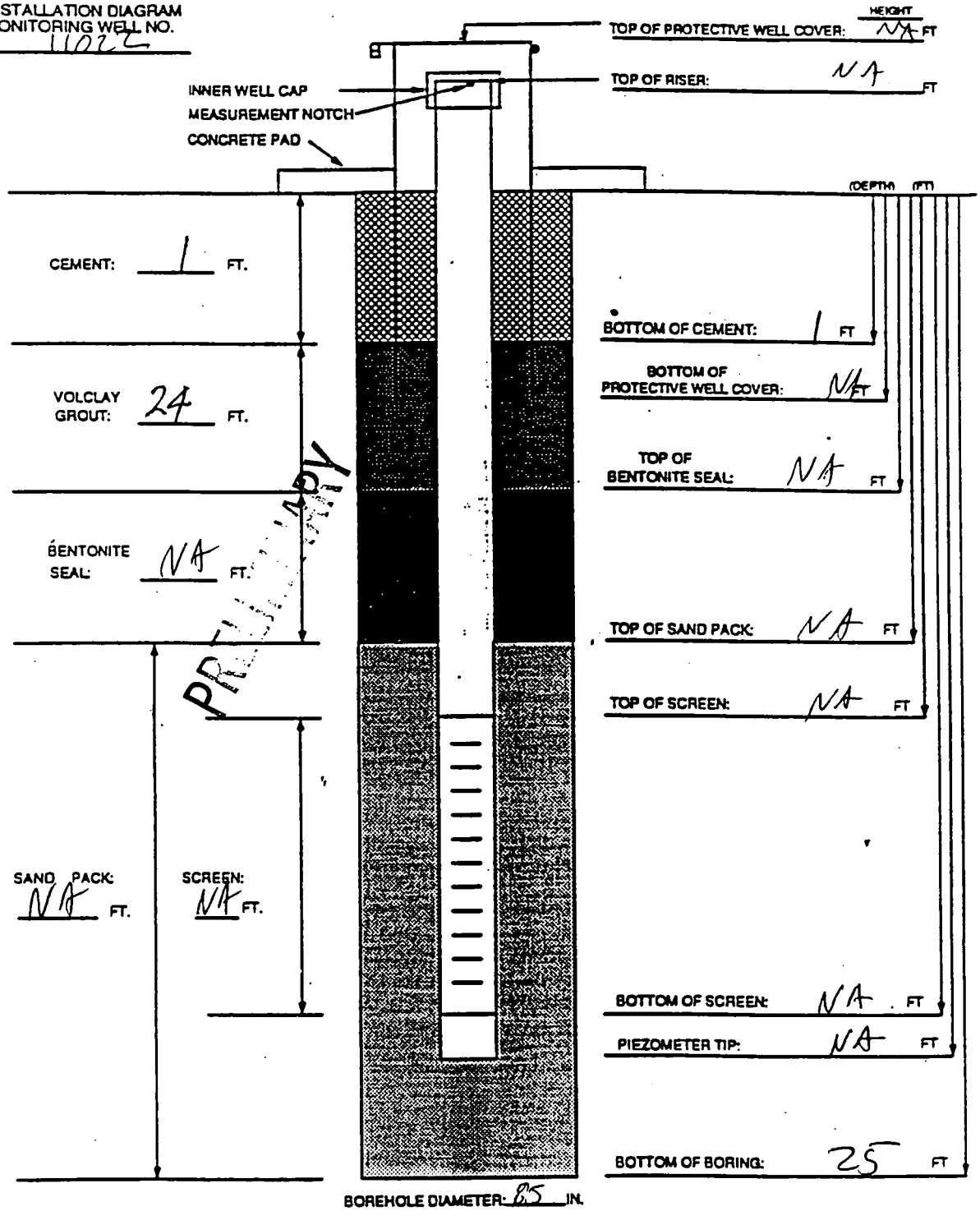
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1102L

INSTALLATION DATE: 5/13/93



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 20 gal
OTHER: NA
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.
4) WATER DEPTH AND DATE 16.1 FT 5/13/93
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. Reagan

ASI FORM 0157 REV (0)

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 - Southfield
PROJECT NO. 20.03.05
BORING NO. 11022
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/13/93
CHECKED BY DATE
DATE OF INSTALLATION 5/13/93

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 auger
CASING SIZE (S) USED: 0
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D.

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (')	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 25.0	TOP NA	BOTTOM NA
~~BENTONITE~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP ↓	BOTTOM ↓
SAND	TOP NA	BOTTOM	TOP ↓	BOTTOM ↓
GRAVEL	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	25.0			
GWL AFTER INSTALLATION	16.19'			

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

REMARKS

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH PILE INVESTIGATION	
BORING NUMBER 1981	COORDINATES	DATE 13MAY93
ELEVATION	GWL. Depth Date/Time	DATE STARTED 13MAY93
ENGINEER/GEOLOGIST B. E. MULLEN	Depth Date/Time	DATE COMPLETED 14MAY93
DRILLING METHODS AUGERS STEM AUGER		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	112160	3	6	MRD DENSE (2.5YR/0) BLACK FLY ASH SLIGHTLY MOIST	NA	NA	MT: 0 BY: 100
	13MAY	5	6	SAA			
1	1430	5	6	SAA			TAL-C 112160
		5	3	SAA			TIME: 1430
2		7	6	SAA			MT: 0
	112161	9	6	SAA			BY: 70
3	13MAY 1435	12	6	SAA			TAL-C 112161
		14	3	SAA			TIME: 1435
4		NA 9	NA 6	13MAY93			MT: 0
	112162	NA 4	NA 6	13MAY93			BY: 60
5	13MAY 1505	NA 9	NA 6	13MAY93			SHELBY TAL-J 112162
		NA 9	NA 6	SAA			TIME 1505
6	112163	6	6	SAA			MT: 0 BY: 60
	112164	7	6	SAA			ARCHIVE
7	112165 13MAY 1514	9	6	SAA	NA	NA	TIME 1514

7.5

DRILLING FIRM: PENN DRILL
DRILLER: DAN VANSON, DON ARTHUR
RIG: MOBIL 380
DESCRIPTION BASED ON MUNSELL

UNITS MEASURED.
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS
MICROTIP 0 PPM
BY 50 CPM
α NA CPM
NO HEADSPACE READINGS SAME AS BACKGROUND

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FERNALD
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH PILE INVESTIGATION		
BORING NUMBER 1581	COORDINATES		DATE 13MAY93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 13MAY93
ENGINEER/GEOLOGIST B.F. MULLER	Depth	Date/Time	DATE COMPLETED
DRILLING METHODS HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	112166 13MAY 1514	9	6	MED. DENSE (2.5YR/10) BLACK FLY ASH, VERY LOW PLASTICITY, SLIGHTLY MOIST	NA	NA	
	↑	5	6	SAA			MT: 0 BY: 80
9	112167 112168 13MAY 1523	7	6	SAA			TAL-C 112167
		4	6	SAA			TAL-I 112168
10		10	6	SAA			TIME: 1523
	112169	6	6	SAA			MT: 0 BY: 60
11	112170	12	6	SAA			
	112171	12	6	SAA			ARCHIVE
12	112172 13MAY 1546	12	6	SAA			TIME: 1546
13	112173 13MAY 1553	NA	NA				MT: 0 BY: 50 SHELBY TAL-C/C/C 112173
13.5 14			BFM 14MAY93	SAA			TIME: 1553
	112175	3	~~SA~~ 6	SAA			MT: 0 BY: 80
	112176 14MAY 0856	2	~~SA~~ 6	SAA			ARCHIVE

DRILLING CO.: PENN DRILL
DRILLER: DAN JAMISON, DON ARTHUR
RIG: MOBIL 1290
MATERIAL DESCRIBED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
O = CPM

BACKGROUND READINGS
MICROTIP: [illegible]
BY: 50
O: NA
NATURAL FIELD MOISTURE: 312

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME ACTIVE FLY ASH PILE INVESTIGATION		
BORING NUMBER 1981	COORDINATES		DATE 14 MAY 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 13 MAY 93
ENGINEER GEOLOGIST B. E. MOLLER	Depth	Date/Time	DATE COMPLETED 14 MAY 93
DRILLING METHODS ROTARY STEM AUGER			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	112177	3	6	MED DENSE (2.5YR, 1/0) BLACK FLY ASH, VERY LOW PLASTICITY, SLIGHTLY MOIST	NA	NA	
16	112178 14MAY 0958	5	6	SAA			TIME: 0858
	112179 14MAY	4	6	SAA			MT: 0 BP: 60
17	0925	4	6	SAA - WET	NA	NA	TAL-O (W, SA) 112179
	112180 14MAY	10	6	STIFF (10YR, 5/6) YELLOWISH BROWN, SILTY CLAY, HIGH PLASTICITY MOIST	CH	1	TAL-C 112180
18	0925	12	6	SAA	CH	1.5	TIME: 0925
	112180 14MAY	5	6	MEDIUM STIFF SAA	CH	0.75	MT: 0 BP: 80
19	0952	12	6	VERY STIFF SAA + COARSE SAND, FINE GRAVEL	CH	<0.25	
	112181 14MAY	14	6	STIFF SAA	CH	1.25	TAL-C 112181
20	0952	22	0	~~VERY STIFF~~ 14MAY 1500 NR	NA	NA	TIME: 0952
	112181 14MAY	4	6	VERY STIFF SAA - LOW PLASTICITY, MOIST + INCREASED GRAVEL	CL	2.0	MT: 0 BP: 60
	1004	4	0	NR	NA	NA	
21	X	8	0	NR	NA	NA	TIME: 1004
				BOTTOM OF BORING			

DRILL: DIESEL DRILL
DAN JAMISON, DON ARTHUR
MOBIL B80
BASED ON MUNSELL

UNITS MEASURED
MINI-OVA: ppm
FID = CPM
OVA = CPM

BACKGROUND
MINI-OVA 0
FID 60
OVA NA
NOTES
SUMMARY

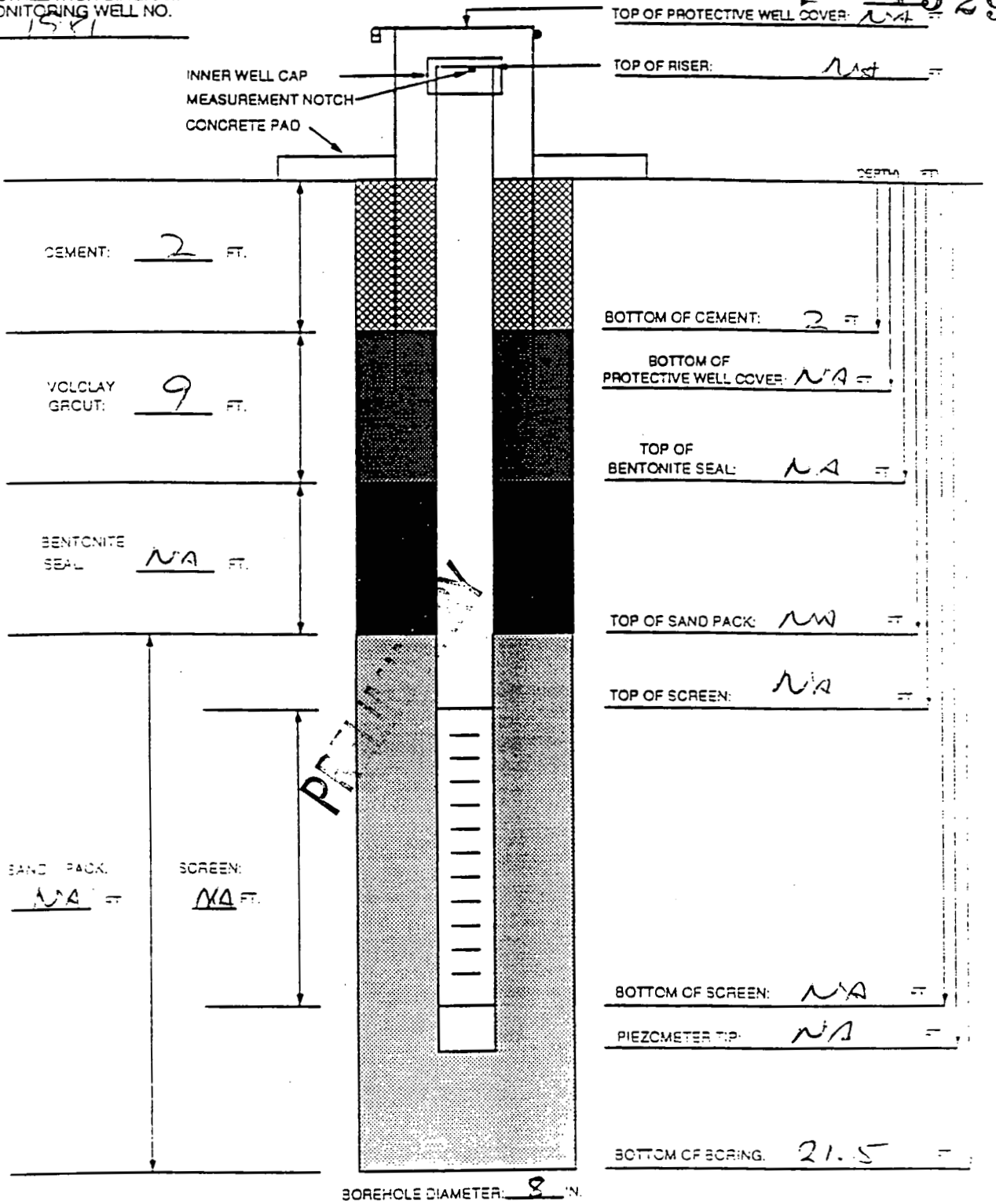
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1581

INSTALLATION DATE: 14 MAY 93

4529

TOP OF PROTECTIVE WELL COVER: NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5-GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 2 BAGS

AMOUNT OF CEMENT: 1 BAG

AMOUNT OF WATER USED: 20 GALS

OTHER: NA

DATE: 20 MAY 93

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: B. E. MULLER

4) WATER DEPTH AND DATE NA FT NA

5) TOP OF CASING IS SECURED STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

7) WELL CASING HAS BEEN CUT OFF BELOW GROUND LEVEL

FERNALD
RI/FS

F -4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME SOUTH FLY ASH PILE INV. FIELD ENG./GEO. B.E. MULLIGAN DATE 14 MAY 92
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 1581
PIEZOMETER NO. NA DATE OF INSTALLATION 14 MAY 92

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP C	BOTTOM "	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	21.5 FT			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS BLY ASH COLLAPSED INTO HOLE AFTER AUGERS REMOVED TO AN ELEVATION OF 11 FEET BELOW SURFACE.

RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.03	PROJECT NAME: OU2 phase 2	
BORING NUMBER: 11027 (1984)	COORDINATES:	DATE 3/14/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 3/14/93
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 3/14/93
DRILLING METHODS:		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5							
10	1000 119103 11:14:92	5 7 8	15	Stiff. 2.5Y(5/1) Gray gravelly clay low plasticity, slightly moist	CL	1.75	HNU = 0 ppm BG = 20 cpm
15		7 13 23	0	No Recovery	NA	NA	Spoon was wet
20				Boring terminated at 20.0 ft			

NOTES:

Drilling Contractor: Boreholes Drilling

Drilling Equipment: Acker Sonic

Driller: Jeff Bentley, Bill Sharp

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: HNU = 0 ppm PID = 40-60 cpm

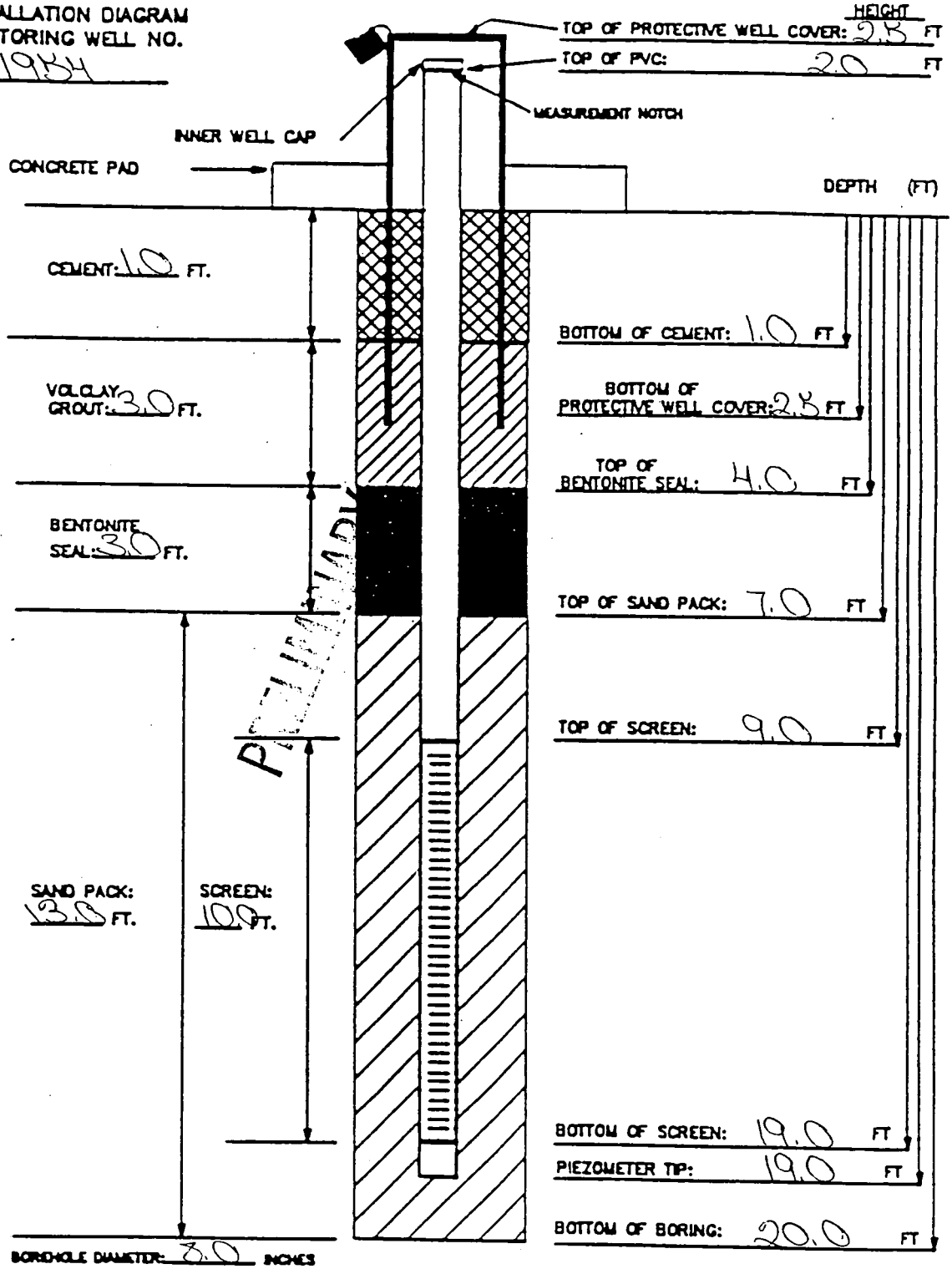
402-11-86

316229

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
(11027)1934

INSTALLATION DATE: 3/15/93



MATERIALS USED:
SAND TYPE AND QUANTITY: 10/20 8 1/2 bag
BENTONITE PELLETS (5-GALLON BUCKETS): 1 bucket
BAGS OF VOLCLAY GROUT: 1 bag
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 3 gallon
OTHER:

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

2 gal drum

TASK: 20.03.05

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD
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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 phase 2 FIELD ENG./GEO. D.O'Brien DATE 3/16/93
PROJECT NO. 2003.03 CHECKED BY _____ DATE _____
BORING NO. 1024
PIEZOMETER NO. 1984 DATE OF INSTALLATION 3/13/93

BOREHOLE DRILLING

DRILLING METHOD Hollow stem augers	TYPE OF BIT Augers
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID ___ FROM ___ TO ___	SIZE ___ FROM ___ TO ___

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL Stainless 316
DIAMETER OF PERFORATED SECTION 2.0 in ID	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 2 3/8 in I.D. 2.0
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10.0 ft, 10 ft
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD Flush joint threaded
TOTAL PERFORATED AREA 10.0 in	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft	OTHER PROTECTION Bured protective cover
PROTECTIVE PIPE O.D. 4 3/8 in	with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
BENTONITE	TOP 1.0	BOTTOM 4.0	TOP	BOTTOM
SAND	TOP 4.0	BOTTOM 7.0	TOP	BOTTOM
GRAVEL	TOP 7.0	BOTTOM 20.0	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP 9.0	BOTTOM 19.0	TOP	BOTTOM
BOTTOM OF BOREHOLE	19.0			
GWL AFTER INSTALLATION	20.0			
	5.0			

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

REMARKS _____

409-11-8t

-4529

FERNALD
RI/FS

WATER QUALITY
FIELD COLLECTION REPORT

Date: 5-14-93
Time: 1300
Page: 1 of 1

FADL REF # 5/14/93

PROJECT NAME	OU2 phase 2	SAMPLE LOCATION	1027 (1954)
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113104
DATE COLLECTED	5/14/93	RFA NUMBER	—
TIME COLLECTED	1310	C/C NUMBER	72813
COLLECTED BY	MJ, DK	SAMPLE TYPE	ground water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.09 in hg
AIR TEMPERATURE	66°F
DO SATURATION IN AIR	NA
WATER TEMPERATURE	16.0°C
DEPTH OF SAMPLE	12.0-16.0 ft
WATER LEVEL	DOS 5/14/93 5.0 ft

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.00	NA	NA
SPEC. COND. uMHOS/cm	1100	NA	NA
D.O. MG/L	NA	NA	NA

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU	0ppm	0ppm	0ppm

METER CALIBRATION

DOS 5/14/93 Monitor

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	~~HNU~~ Stand	~~HNU~~ Lot #	~~HNU~~ Span	~~HNU~~ Reading
19.5°C	4	7				N/A	19.5°C	1000	10000	Isobutylene		NA	0ppm
OK	✓	✓	OK			N/A	OK	850	8000				

WEATHER CONDITIONS: clear

ADDITIONAL REMARKS: BZ=60-80 cpm

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
6623	YSI MODEL 33 SCT METER
004012	ORION 250A PH METER

EQUIP.	NUMBER
BAILER	NA
HOSE/S	NA
PUMP	NA
FILTER KIT	QED

319 231

NA Ht. of Water Column x NA = NA (3 Volumes)

FM 0155D Rev. (1) 9/01/92

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - Southfield	
BORING NUMBER. 11023	COORDINATES.	DATE 5/14/93
ELEVATION:	GWL: Depth 16.08 Date/Time 5/14/93 1020	DATE STARTED 5/14/93
ENGINEER/GEOLOGIST J. Reagan	Depth Date/Time	DATE COMPLETED. 5/14/93
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 (ISF)	REMARKS
	NA	NA	NA	Augered 0-20'. 0-10' 10YR 7/1 very fine sand 10'-20' 10YR 4/3 poorly graded Sand with ~~some~~ many gravels JR 5/14/93	NA	NA	NA
20	113059 113060 113061 (945) 5/14/93	7 13 17	6 6 4	Dense, 10YR 4/3, low plasticity, poorly graded sand, wet	SP	NA	βγ = 60cpm α = 0cpm mt = 0 ppm
21.5	113062 1020 5/14/93			Hydropunch sample from 21-25'	NA	NA	NA

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller M. Walral
B. Reiley

SAA - Same as above
NA - Not Applicable
mt = Microrp
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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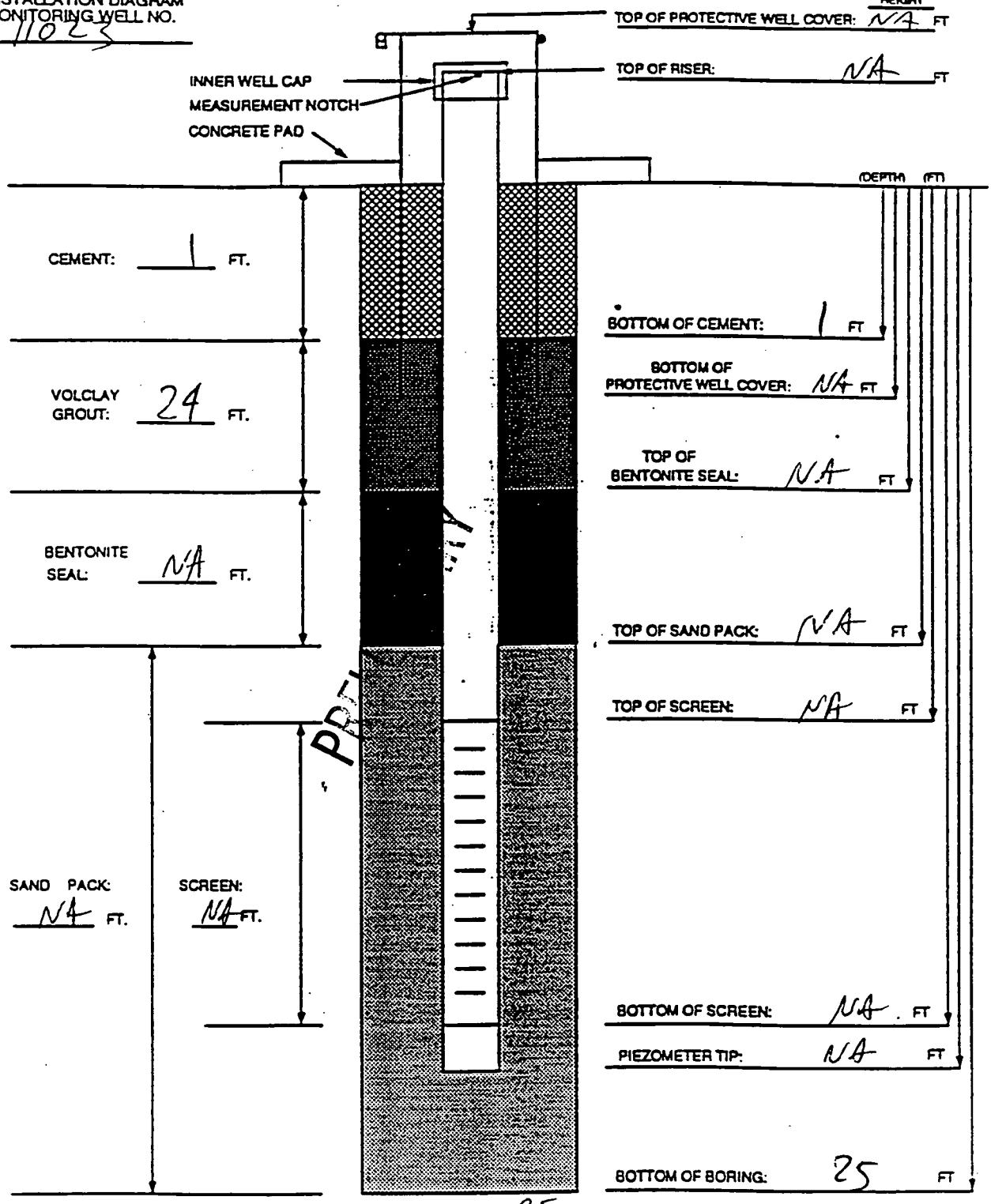
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11023

INSTALLATION DATE: 5/14/93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 20 gal
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 16.28 FT/ 5/14/93
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. Kagin

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-Southfield
PROJECT NO. 20.03.05
BORING NO. 11023
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/14/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/14/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
N

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP	BOTTOM	TOP NA	BOTTOM NA
CEMENT ~~BENTONITE~~	TOP	BOTTOM	TOP ↓	BOTTOM ↓
SAND	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
GRAVEL	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	25		↓	
GWL AFTER INSTALLATION	16.08 ft		NA	

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

REMARKS

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FERNALD
RI/FS

WATER QUALITY FIELD COLLECTION REPORT

Date: 5-14-93
Time:
Page: of

FADL REF #

PROJECT NAME	OU2 - Southfield	SAMPLE LOCATION	11023 21-25ft
PROJECT NUMBER	20.03.05	SAMPLE ID NUMBER	113062
DATE COLLECTED	5/14/93	RFA NUMBER	73108
TIME COLLECTED	1020	C/C NUMBER	NA
COLLECTED BY	J. Reagan	SAMPLE TYPE	water

SAMPLING INFORMATION

BAROMETRIC PRESSURE	29.13
AIR TEMPERATURE	57°
DO SATURATION IN AIR	NA
WATER TEMPERATURE	16.3°C
DEPTH OF SAMPLE	21.0-25.0'
WATER LEVEL	16.08

FIELD READINGS

	BEGINNING READ 1	MIDDLE READ 2	END READ 3
pH	7.11		
SPEC. COND. µMHOS/cm	600		
D.O. MG/L	NA		

	BACKGROUND	BREATHING ZONE	DOWNHOLE READING
HNU			

METER CALIBRATION

pH Temp.	pH Std.	pH Std.	D.O. Temp.	D.O. Zero	D.O. Full Sc.	D.O. Calib. O_2	Spec. Cond. Temp.	Spec. Cond. Low	Spec. Cond. High	HNU Stand	HNU Lot #	HNU Span	HNU Reading
19.5°c	4	7	→		→	N/A	19.5°c	1000	10000				
OK	✓	✓	OK		→	N/A	OK	980	9000				

WEATHER CONDITIONS: Sunny, mild

ADDITIONAL REMARKS:

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME
00 4032	ORION 250A PH METER
92J42759	YSI MODEL 33 SCT METER
960341	Hydropunch

EQUIP.	NUMBER
BAILER	
HOSE/S	
PUMP	
FILTER KIT	

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_____ Ht. of Water Column x _____ = _____ (3 Volumes)

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	20.03.05	PROJECT NAME	OU2 Phase II		
BORING NUMBER	1989	COORDINATES		DATE	05/14/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/14/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED	05/14/93
DRILLING METHODS	Hollow Stem Auger w/CME Sampler			PAGE	1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0945	NA	2.5	Firm (2.5Y 4/4) olive brown silty clay, slight plasticity, some gravel, dry	CL	1.5	MT = ~~40-60~~ 0.4 ppm (as of 05/14/93) Br = 40-60 cpm Some plastic
2.5	05/14 0945	NA	2.5	Firm (5Y 4/1) dark gray silty clay, medium plasticity, some gravel, dry	CL	1.25	MT = 1.4 Br = 80-100 120-140 at 3.0' Evidence of waste, glass, plastic, paper
				4.0' Firm (2.5Y 5/4) light olive brown silty clay, some (5Y 4/1) dark gray silty clay, medium plasticity, some gravel, dry	CL	2.0	
5.0	05/14 1000	NA	2.5	Firm (5Y 5/3) olive and (5Y 5/1) gray silty clay, some gravel, medium plasticity, dry	CL	2.0	MT = 0.4 ppm Br = 40-60 cpm - Plastic, glass
7.5	05/14						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

MT = 0.4 ppm
Br = 40-60 cpm

NA- Not Applicable
SAA- Same As Applicable

PRELIMINARY

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER	20.03.05	PROJECT NAME	OU2 Phase II		
BORING NUMBER	1989	COORDINATES		DATE	05/14/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/14/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED	05/14/93
DRILLING METHODS	Hollow stem Auger w/CME Sampler			PAGE	2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N#)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1000			SAA, dry	CL	2.0	MT = 0.4 ppm BZ = 40-80 cpm
		NA	2.5	8.5 Hard (2.5Y 5/6) light olive brown clayey silt with some (5Y 6/1) gray clay, no plasticity, dry, some small gravel	ML	2.25	Pushed Shelby tube @ 1005 from 10.0' to 12.0'
10	05/14 1030	NA	2.5	Very Hard (2.5Y 5/6) light olive brown clayey silt, no plasticity, some (5Y 6/1) gray clay along cleavage planes, dry, some small gray gravel	ML	>4.5	MT = 0.4 ppm BZ = 40-80 cpm
12.5	05/14 1030	NA	2.5	SAA, dry	ML	>4.5	MT = 0.4 ppm BZ = 40-80 cpm
	05/14			END of Boring			

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

@ 1040 pushed shelby tube from 15.0' to 17.0', no recovery.
@ 1315 pushed shelby tube from 15.0' to 17.0', little recovery. will turn in second shelby tube
~~END of Bor~~ ac 05/14/93

Background: MT = 0.4 ppm
BZ = 40-80 cpm

SAA - Same As Above
NA - Not Applicable

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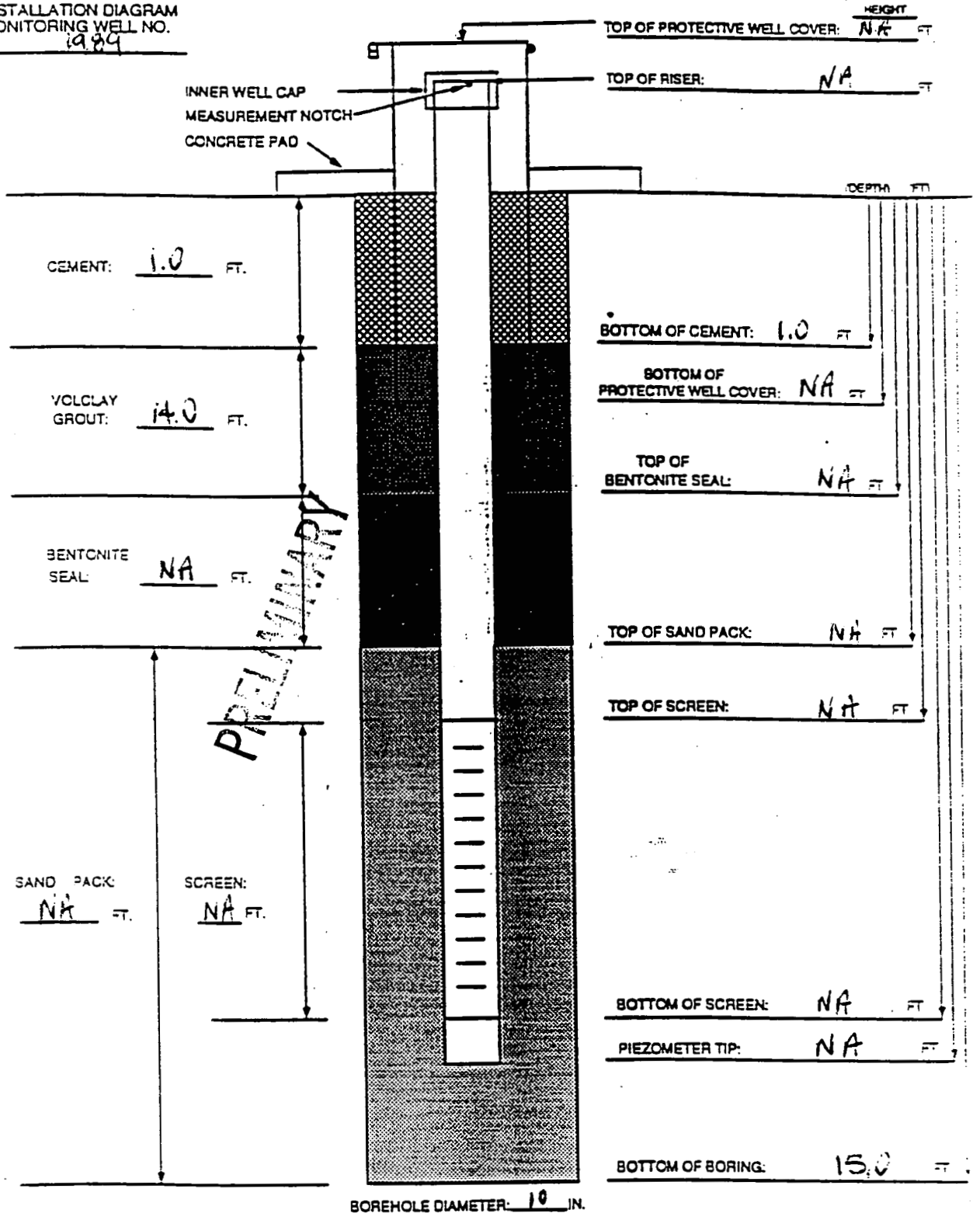
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1989

INSTALLATION DATE: 05/14/92



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 6
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: [illegible]
TASK: [illegible]

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 [illegible]
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: A. Lamy

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
PROJECT NO.: 20.03.65
BORING NO.: 1989
PIEZOMETER NO.: NA
FIELD ENG./GEO.: A. Lomo
DATE: [illegible]
CHECKED BY:
DATE:
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow stem Auger w/ core sampler
TYPE OF BIT: Hollow stem 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: 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

PRELIMINARY

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:	0.0	1.0		
cement GROUT/SLURRY	TOP 1.0	BOTTOM 13.0	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE			NA	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS: Used CME sampler to sample to 5.0 then used shelby tube from 5.0 to [illegible]

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - Southfield	
BORING NUMBER 11024	COORDINATES.	DATE 5/15/93
ELEVATION:	GWL: Depth 8.82' Date/Time 5/15/93	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST J. Keagan	Depth Date/Time	DATE COMPLETED 5/15/93
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 (Bγ = 50cpm, mt = 0.9ppm, α = 0cpm)
1.5	NA	NA	NA	Augered to	NA	NA	NA
	NA	NA	NA	3.5'	NA	NA	NA
3.5 5/15/93	113063 1035	3 5 8	6 4 4	very stiff, 10YR 4/4 dark yellowish brown silty fine sand low plasticity, moist	ml	2.0	mt 1.2 ppm Bγ = 50cpm α = 0cpm
5.0 5/15/93 6.5	113064 1040	3 7 12	6 6 4	very stiff, 10YR 4/4, 10YR 6/1 mottles, silty clay, medium plasticity, moist	cl	2.5	mt = 1.6ppm Bγ = 50cpm α = 0cpm
8.0 5/15/93	113065 1045	7 13 18	6 6 2	stiff, 10YR 4/4, 10YR 6/1 mottles silty fine sand, low plasticity, very moist	ml	1.5	Bγ = 50cpm mt = 1.3ppm α = 0cpm
9.5 5/15/93	113066 1100	5 7 9	6 6 6	stiff 10YR 4/4, silty clay, low plasticity, wet	cl	1.5	Bγ = 50cpm mt = 1.8ppm α = 0cpm
	113067 1310	NA	NA	Hydropunch sample from 6.5 - 10.5'	NA	NA	NA

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Soil Sentry
Driller M. Watral
B. Sibert

SAA - Same as above
NA - Not Applicable
ml - Microtip
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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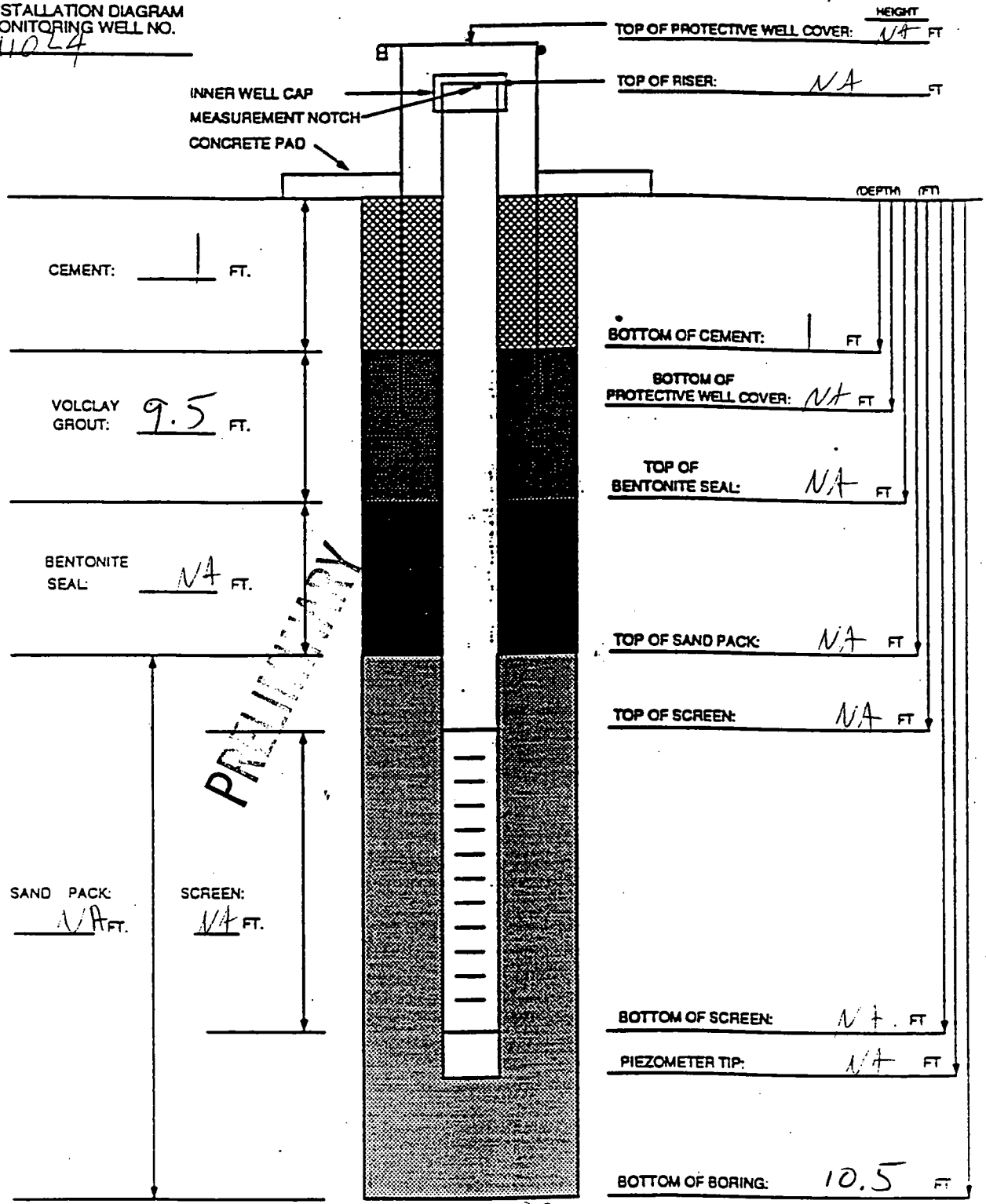
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1024

INSTALLATION DATE: 5/1/93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
S OF VOLCLAY GROUT: 2
...OUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 20 gal.
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 8.82 FT/5/1
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: J. Beagan

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...FORM DIST REV ...

FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-Southfield
PROJECT NO. 20.03.05
BORING NO. 11024
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/15/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/15/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 10.5	TOP NA	BOTTOM NA
~~BENTONITE~~ CEMENT	TOP 0	BOTTOM 1	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	10.5'		NA	
GWL AFTER INSTALLATION	8.82'		NA	

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

REMARKS

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 - Southfield		
BORING NUMBER 11025	COORDINATES.		DATE 5/15/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED.
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
	NA		NA	augered to 3.5'	NA	NA	βγ = 50cpm Mt = ~~2.5~~ 0.5ppm α = 0cpm JR 5/15/93
1							NA
2							
3							
	NA	NA	NA	augered to 3.5'	NA	NA	
4	113068 1505 5/15/93	4	6	stiff, 10YR 5/6, silty fine sand	ml	1.5	βγ = 50cpm α = 0cpm Mt = 0.5ppm
		6	6	low plasticity, very moist	SAA	SAA	
		7	6	SAA	SAA	SAA	
5	113069 1510 5/15/93	4	6	Stiff, 10YR 5/6, 10YR 5/1 mottles	cl	2.0	βγ = 50cpm α = 0cpm Mt = 0.5ppm
6		6	6	silty clay, medium plasticity moist	SAA	SAA	
		9	6	SAA	SAA	SAA	
7	113070 1515 5/15/93	7	6	Stiff, 10YR 4/3, silty fine sand, low plasticity, wet	ml	1.0	βγ = 50cpm α = 0cpm Mt = 0.5ppm
		15	6	SAA	SAA	SAA	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment acker soil sentry
Driller M. Watral
B. Sibert

SAA - Same as above
NA - Not Applicable
Mt - Microtip
Samples collected per ASTM standard penetration
Colors identified using Munsell Color Char

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 70.03.05	PROJECT NAME. OU2 - Southfield		
BORING NUMBER. 11025	COORDINATES.		DATE 5/15/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED.
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
8	113070 1515 5/15/93	26	6	Stiff, 10YR4/3, silty fine sand, low plasticity, wet	ml	1.0	
	113071 1550 5/15/93	NA	NA	Hydropunch from 6.5-10.5	NA	NA	
9							NA
10			NA		NA	NA	
11							
12							
13							
14							

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment See pg 1

Driller Supp

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard [illegible]

Colors identified using Munsell Color Chart

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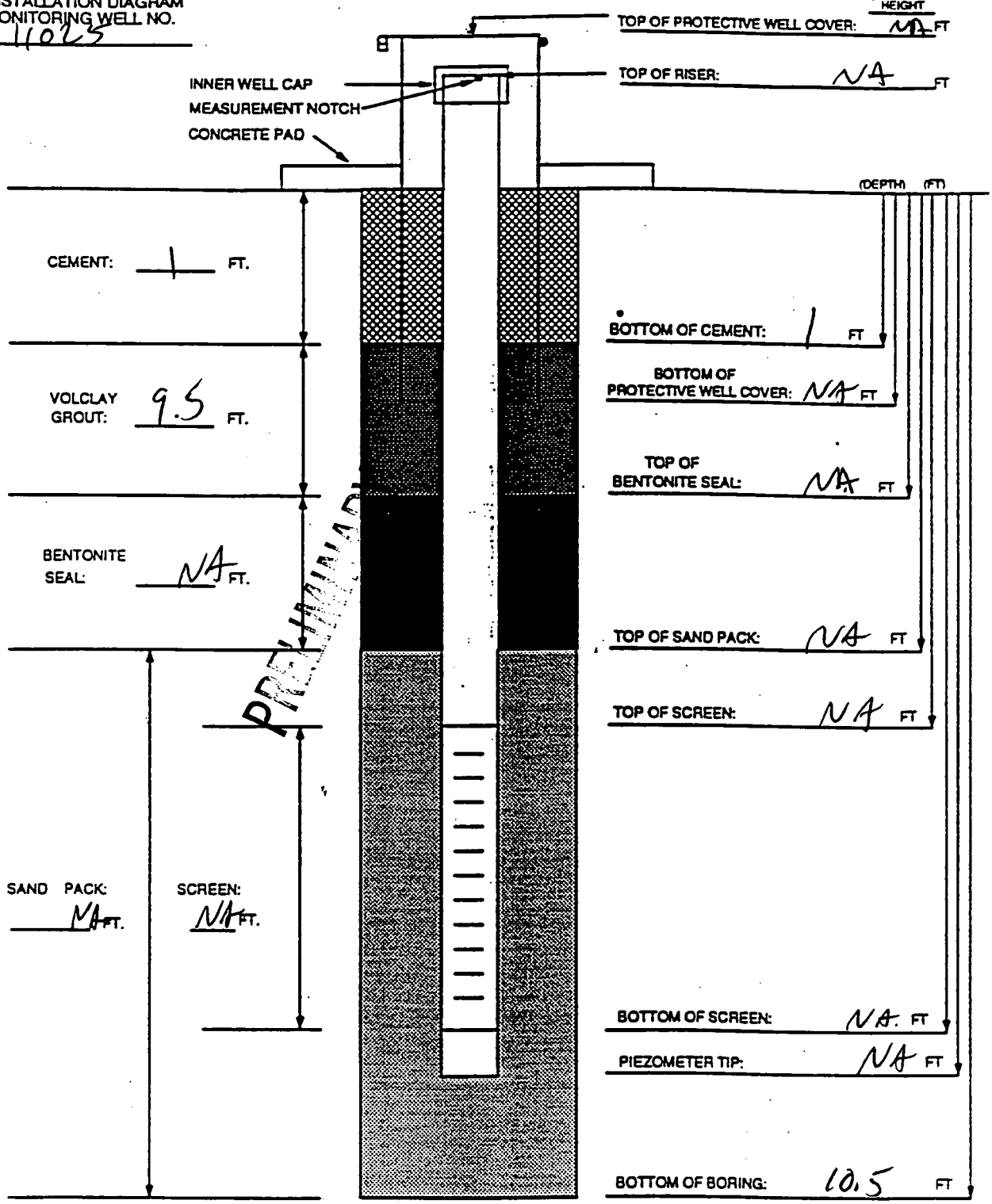
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11025

INSTALLATION DATE: 5/15/93



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
GS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 20 gal
OTHER: NA
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.
4) WATER DEPTH AND DATE ____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:

FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-Southfield FIELD ENG./GEO. J. Reagan DATE
PROJECT NO. 20.03.05 CHECKED BY DATE
BORING NO. 11025
PIEZOMETER NO. NA DATE OF INSTALLATION 5/15/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↓	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 10.5	TOP NA	BOTTOM NA
~~BENTONITE~~ Cement	TOP 0	BOTTOM 1	TOP ↓	BOTTOM ↓
SAND	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
GRAVEL	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	10.5'		NA	
GWL AFTER INSTALLATION	7.86'		NA	

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

REMARKS

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME CRUZ Phase II, Lime Sludge Pond	
BORING NUMBER 1940	COORDINATES	DATE 5/15/93
ELEVATION	GWL. Depth Date/Time	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST Greg Ronczka	Depth Date/Time	DATE COMPLETED 5/20/93
DRILLING METHODS Hollow Stem Augering		PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 cm	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	114667 1010 5/15/93	4	6	Soft (2.5Y, 3/3) dark olive brown silty clay, medium plasticity, moist	CL	0.25	MT = 0.0 ppm
1	114668 1010 5/15/93	8	6	Stiff (2.5Y, 5/4) light olive brown, silty clay, medium plasticity, moist	CL	1	βγ = 60 cpm
	114669 1010 5/15/93	8	6 5/15/93	SAA	CL	1.75	α = 0 cpm
2	114670 1010 5/15/93	15	2	Hard, (2.5Y, 5/4) light olive brown, silty clay, medium plasticity, moist	CL	>4.5	Archive entire sample
	114671 1030 5/15/93	NA	NA	Shelby tube	NA	NA	MT = 0.0 ppm
3		NA	NA	Shelby tube	NA	NA	βγ = 50 cpm
		NA	NA	Shelby tube	NA	NA	α = 0 cpm
4	114671 1030 5/15/93	NA	NA	Very stiff (2.5Y, 5/3) light olive brown, silty clay, medium plasticity, moist	CL	3.0	Shelby tube entire sample
	114672-114673 1310 5/15/93	4	6	Stiff (2.5Y, 5/4) light olive brown silty clay, medium plasticity, moist	CL	1.75	MT = 0.0 ppm
5	114672-114673 1310 5/15/93	7	6	Very stiff, SAA	CL	2.5	βγ = 70 cpm
	114672-114673 1310 5/15/93	7	6	Very stiff, SAA	CL	2.75	α = 0 cpm TALD 114672 TOC 114673
6	114672-114673 1310 5/15/93	14	6	Stiff, SAA	CL	1.0	TALD entire sample
	114674 1325 5/15/93	4	6	SAA	CL	1.5	MT = 0.0 ppm
7	114675 1325 5/15/93	7	6	Very Stiff, SAA	CL	2.75	βγ = 70 cpm α = 0 cpm
	114676 1325 5/15/93	12	6	SAA	CL	3.5	Archive 6.5-7.5 ft Total U 6.0-6.5 ft

NOTES

DRILLING FIRM: Penn Drill

DRILLER: Dan Jamison, Dan Arthur

RIG: Mobile, B-53 track rig

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED
MICROTIP = ppm
βγ = CPM
α = CPM

BACKGROUND READINGS
MICROTIP (MT) 0.0 ppm
βγ 50 cpm
α 0 cpm
NO RECORD HEADSPACE
SAME AS RECORD

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME CRU2 Phase II Lime Sludge Pond		
BORING NUMBER 1940	COORDINATES		DATE 5/15/93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST Greg Rancitka	Depth	Date/Time	DATE COMPLETED BR 5/27/93
DRILLING METHODS Hollow Stem Augering			PAGE 2 OF 35

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	114677 1335 5/15/93	3	6	Stiff (2.5Y, 5/2) grayish brown, silty clay, low plasticity, moist	CL	1.75	MT = 0.0 ppm
	114678 1335 5/15/93	6	6	Very Stiff, SAA	CL	3.5	βγ = 80 cpm α = 0 cpm
9	114679 1335 5/15/93	14	6	SAA	CL	3.5	Archive entire sample
	114680 1357 5/15/93	4	6	Stiff (2.5Y, 5/4) light olive brown, silty clay, medium plasticity, moist	CL	1.0	MT = 0.0 ppm
10	114681 1357 5/15/93	4	6	Medium stiff SAA	CL	0.75	βγ = 60 cpm α = 0 cpm
	114682 1357 5/15/93	4	6	Medium stiff (5Y, 5/1) gray, silty clay, medium plasticity, moist	CL	0.5	Archive entire sample
11	114683 1430 5/15/93	4	6	Loose, (5Y, 5/1) gray, silty, fine grained sand, wet	SM	NA	MT = 0.0 ppm
	114684 1430 5/15/93	5	4	SAA	SM	NA	βγ = 60 cpm α = 0 cpm
12	1430 5/15/93	5	0	~~Very soft (5Y, 5/1) gray silty clay, medium plasticity, wet~~ BR 5/15/93	NA	NA	Archive entire sample
	114685 1440 5/15/93	5	6	Very soft (5Y, 5/1) gray, silty clay, medium plasticity, wet	CL	<0.25	MT = 0.0 ppm
13	114686 1440 5/15/93	10	6	Medium dense. (5Y, 5/1) gray, silty fine grained sand, wet	SM	NA	βγ = 70 cpm α = 0 cpm
	114687 1440 5/15/93	20	6	SAA	SM	NA	Archive entire sample
14	114688 1450 5/15/93	5	6	Medium dense. (5Y, 5/1) gray, silty, fine to medium grained sand with trace gravel, wet	SM	NA	MT = 0.0 ppm
	114689 1450 5/15/93	10	6	SAA	SM	NA	βγ = 70 cpm α = 0 cpm
15	114690 1450 5/15/93	10	6	SAA	SM	NA	Archive entire sample

NOTES:

DRILLING FIRM: Penn Drill

DRILLERS: Don Jamison, Don Arthur

RIG: Mobile, B-53 track rig

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = ppm, βγ = CPM, α = CPM

BACKGROUND READINGS:
MICROTIP (MT) 0.0 ppm
βγ 50 cpm
α 0 cpm

NO RECOVERY (NR)
SAME AS ABOVE (S.A.A.)

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FERNALD
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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 20.03.05	PROJECT NAME CRU 2 Phase II Lime Sludge Pond		
BORING NUMBER 1940	COORDINATES		DATE 5/15/93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 5/15/93
ENGINEER/GEOLOGIST Greg Rowczka	Depth	Date/Time	DATE COMPLETED 5/21/93
DRILLING METHODS Hollow Stem Augering			PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	114691 1505 5/15/93	4	6	SAA	SM	NA	MT = 0.0 PPM βγ = 70 cpm α = 0 cpm
	114692 1505 5/15/93	7	6	SAA	SM	NA	
16	114693 1505 5/15/93	7	6	Medium stiff (5Y, 5/1) gray, silty clay with some gravel, medium plasticity, ~~wet~~ moist 5/15/93	CL	0.75	Archive entire sample
	114694 1520 5/15/93	10	6	Very stiff SAA	CL	2.0	MT = 0.0 PPM βγ = 70 cpm α = 0 cpm
17	114695 1520 5/15/93	22	6	SAA	CL	2.25	
	114696 1520 5/15/93	22	6	Hard, SAA	CL	>4.5	Archive entire sample.
18	114697 1530 5/15/93	6	6	Dense, (5Y, 5/1) gray silt, wet	SM	NA	MT = 0.0 PPM βγ = 60 cpm α = 0 cpm
	114698 1530 5/15/93	18	6	Very stiff, (5Y, 5/1) gray, silty clay with some gravel, low plasticity, ~~wet~~ moist 5/15/93 SR	CL	2.0	
19	114699 1530 5/15/93	21	6	Hard, SAA	CL	4.5	Archive entire sample.
				Bottom of boring at 19.5 ft			
20							
							Trip Blank Sample No. Will be 114700

NOTES

DRILLING FIRM: Renn Drill

DRILLERS: Dan Jamison, Jay Arthur

RIG: Mobile B-53 track rig

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = PPM, βγ = CPM, α = CPM

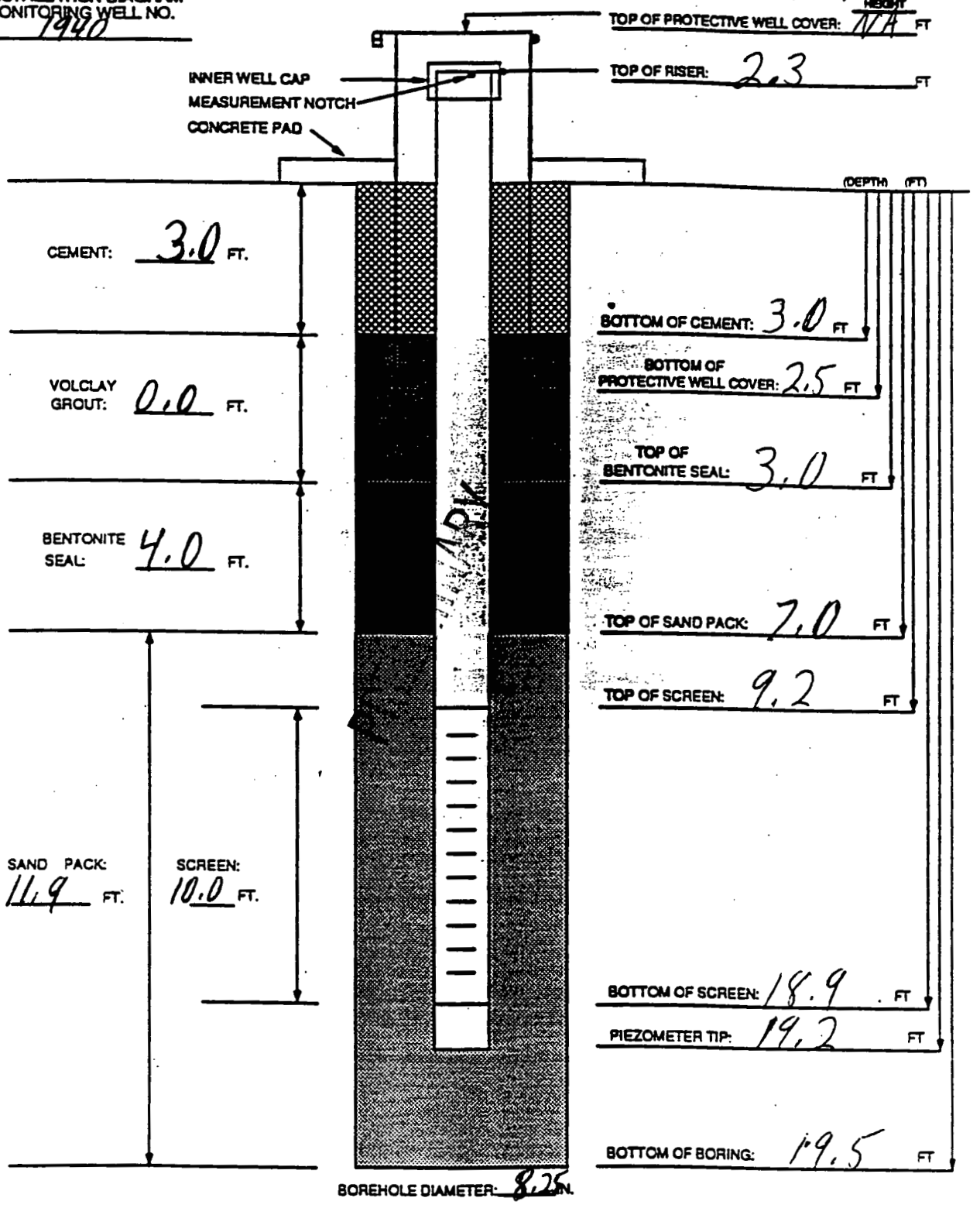
BACKGROUND READINGS:
MICROTIP (MT) 0.0 PPM
βγ 50 CPM
α 0 CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1940

INSTALLATION DATE: 5/24/93



MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 4 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 0
AMOUNT OF CEMENT: 1 80lb. bag
AMOUNT OF WATER USED: 5 gallons
OTHER: NA
TASK: NA

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2 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 6.35 FT/ 5/2
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Greg Ronczka

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FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 2 PHASE II
PROJECT NO. WBS 20.03.05
BORING NO. 1940
PIEZOMETER NO. NA

FIELD ENG./GEO. Greg Ronczka DATE 5/24
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/24/93

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 Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Stainless steel
DIAMETER OF PERFORATED SECTION 2 in.
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 0.01 in
TOTAL PERFORATED AREA 10 ft.

RISER PIPE MATERIAL Stainless
RISER PIPE DIAMETERS:
O.D. NA I.D. 2 in
LENGTH OF PIPE SECTIONS 11.5 feet
JOINING METHOD flush thread

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 feet
PROTECTIVE PIPE O.D. 4 in

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.3 feet		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	2.5 feet		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 3.0'	TOP NA	BOTTOM NA
BENTONITE	TOP 3.0'	BOTTOM 7.0'	TOP NA	BOTTOM NA
SAND	TOP 7.0'	BOTTOM 18.9'	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP 9.2'	BOTTOM 18.9'	TOP NA	BOTTOM NA
PIEZOMETER TIP	19.2 feet			
BOTTOM OF BOREHOLE	19.5 feet			
GWL AFTER INSTALLATION	6.35 feet, 5/27/93			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS Protective casing is set, concrete pad to be installed at a later date

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. 11038	COORDINATES.	DATE 05/16/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/16/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/16/93	
DRILLING METHODS Hollow stem Auger w/ Core Sampler		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NH)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1000			Hard (2.5Y5/1) silty clay, low plasticity, some gravel, moist, some sand, well graded	CL	3.0	MT = 1.4 ppm BJ = 40-80 cpm Areas of glass, plastic, metal, clay pipe, tar like material
	115376	NA	2.5				
				2.0' (2.5Y7/8) yellow and (5Y8/1) white silt like material, some gravel, moist	NA	NA	MT = 1.4 BJ = 28,000 cpm
2.5	05/16						
	1000			No Recovery			MT = ~~1.4~~ NA BJ = ~~40~~ NA
	NA	NA	0		NA	NA	
5.0	05/16						
	1015			Hard (5Y4/1) dark gray silty clay, low plasticity, some gravel, dry			MT = 1.4 ppm BJ = 40-80 cpm
	NA	NA	2.5		CL	3.0	
7.5	05/16						

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Robert Just

Background MT = 1.4 ppm
BJ = 40-80 cpm

NA- Not Applicable

FERNALD RI/FS

B-4529

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11098	COORDINATES.	DATE 05/16/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/16/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED. 05/16/93	
DRILLING METHODS Hollow stem Auger w/CME Sampler		PAGE 2 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	1015	NA	2.5	8.0' SAA Hard (5Y 2.5/1) black silty clay, medium plasticity, some organic material, dry	CL	2.75	MT = 1.4 ppm BT = 40-80 cpm
				9.0' Hard (5Y 5/1) gray silty clay, some small gravel, dry	CL	2.75	Piece of concrete in tip of sampler
10	05/16 1035	NA	2.5	Hard (5Y 5/1) gray to (5Y 4/1) dark gray silty clay, some (2.5Y 5/6) light olive brown silt, low plasticity, dry	CL	3.0	MT = 1.4 ppm BT = 40-80 cpm
				11.6' Hard (2.5Y 5/6) light olive brown, clayey silt, no plasticity, (5Y 5/1) gray silty clay along cleavage planes,	ML	3.0	
12.5	05/16 1035	NA	2.5	SAA, some thin moist silty zones	ML	3.0	MT = 1.4 ppm BT = 40-80 cpm
	115377						Native
15	05/16						

Drilling Co. Pennsylvania Drilling Co.

Driller Don Smith

Assistant ~~Sam Smith~~ 05/16/93 Robert Yost

@ 1045 pushed shelby tube from 15.0' to 17.0' Sample No. 115378

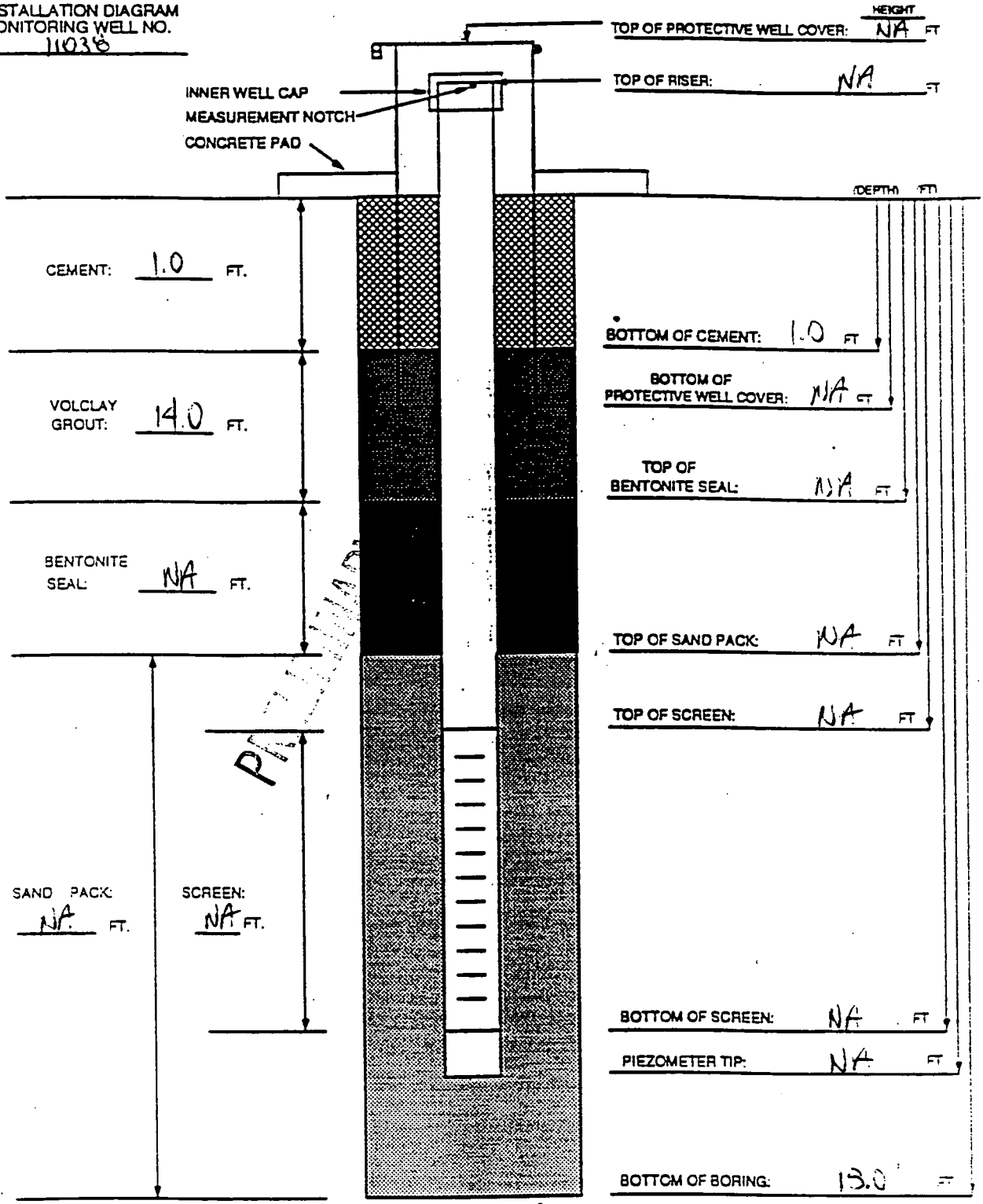
Background MT = 1.4 ppm BT = 40-80 cpm

NA- Not Applicable

SAA- Same As Above

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11038

INSTALLATION DATE: 05/16/93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 7
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 5 gallons
OTHER: Pushed shelby tube 13.0' to 17.0'
TASK: Soil boring using cone sampler

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: A. Como

4) WATER DEPTH AND DATE [illegible] 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

FERNALD RI/FS

E-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II' FIELD ENG./GEO. A. Lamo DATE 05/16/9
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11038
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger w/ CME Sampler TYPE OF BIT Hollow Stem 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 NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 / 1.0	BOTTOM 1.0 / 15.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Used CME sampler to 15.0'. Pushed shelby tube from 15.0' to 17.0'.

RI/FS

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VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER 11031	COORDINATES.	DATE 05/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/17/93	
ENGINEER/GEOLOGIST A. Lomo	Depth Date/Time	DATE COMPLETED 05/17/93	
DRILLING METHODS Hollow stem Auger w/ CME Sampler		PAGE 1 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1005			Hard (2.5Y 5/4) light olive brown, silty clay, no plasticity, gravel dry			MT = 0.5 ppm BT = 50-100 cpm
	NA	NA	2.5		CL	4.0	
2.5	5/17						
	1005			SAA, dry	CL	4.0	MT = 0.5 ppm BT = 50-100 cpm
	15381	NA	2.5	3.5' Hard (5Y 4/1) dark gray silty clay, slight plasticity, some (5Y 2.5/1) black silty clay, gravel, dry	CL	3.25	glass, pieces of slag MT = 0.5 BT = 3500 - 4000 cpm
5.0	5/17						
	1020			SAA, dry			MT = 0.5 ppm BT = 500 cpm
	NA	NA	2.0		CL	2.5	
7.5	5/17						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = ~~50-10~~ 0.5 ppm (ac 05/17/93)
BT = 50-100 cpm

NA- Not Applicable
SAA- Same As Above

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 2603.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 110316	COORDINATES.	DATE 05/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/17/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED. 05/17/93	
DRILLING METHODS: Hollow Stem Auger w/CME Sampler		PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	NA	NA	ac 05/17/93 ~~0~~ NA	NO Recovery	NA	NA	MT = NA BJ = NA
10.0	NA	NA	NA	NO Recovery	NA	NA	MT = NA BJ = NA
12.5	NA 05/17	NA	NA	NO Recovery	NA	NA	MT = NA BJ = NA
15.0	NA 05/17	NA	NA				

PRELIMINARY

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.5 ppm
BJ = 50-100 ppm

NA - Not Applicable
SAA - Same As Above

RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. 11036	COORDINATES.	DATE 05/17/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/17/93	
ENGINEER/GEOLOGIST A. Lamb	Depth Date/Time	DATE COMPLETED. 05/17/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 3 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (N#)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	NA	NA	NA		NA	NA	Augered 2.0' to break up concrete. Will then use 3" split spoons to collect native till sample.
17.0	1345			Very Hard (2.5Y5/4) light olive brown clayey silt (some (2.5Y5/1) clay, no plasticity, few pieces of gravel, dry			MT = 0.5 BT - 50-100
	115360	NA	2.0		ML	>4.5	Iron staining on cleavage planes. Found piece of wood at top of spoon. Wood was the material causing the blockage.
19.0	05/17			@ 1400 pushed shelby from 19.0' to 21.0' Sample No. 115382			
	NA	NA	NA		NA	NA	
21.0							

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.5 ppm
BT = 50-100 cpm

NA- Not Applicable
SAA- Same As Above

FERNALD
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PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
FIELD ENG./GEO.: A. Como
DATE: 05/17/
PROJECT NO.: 20.03.05
CHECKED BY:
DATE:
BORING NO.: 11036
PIEZOMETER NO.: NA
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow Stem Auger w/CME Sampler
TYPE OF BIT: Hollow Stem 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: 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

PRELIMINARY

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT/SLURRY	TOP 0.0 / 1.0	BOTTOM 1.0 / 19.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	19.0'			
GWL AFTER INSTALLATION	NA			

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

REMARKS: used CME sampler to 19.0' then pushed shelby tube from 19.0' to 21.0'

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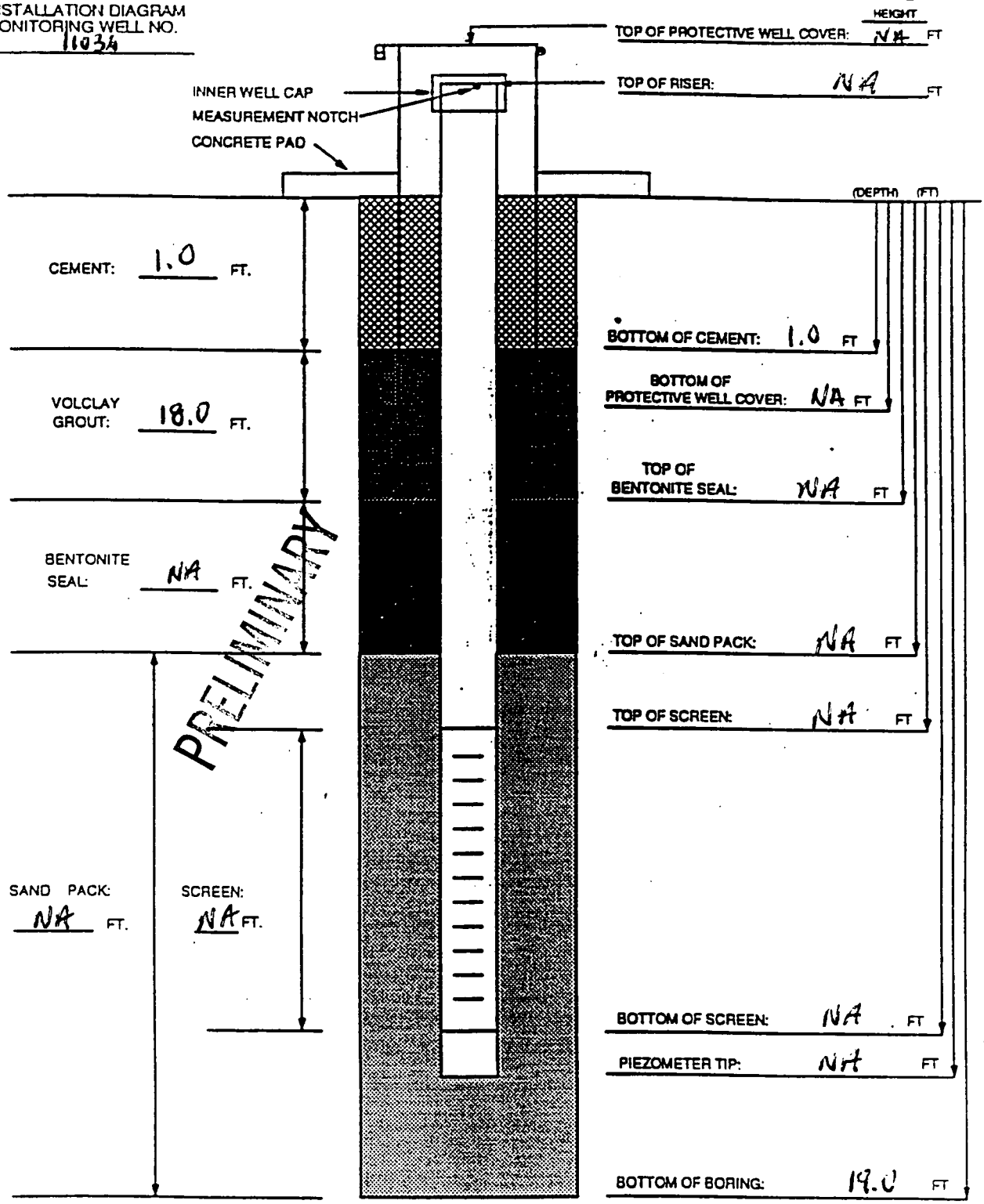
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1103A

INSTALLATION DATE: 05/17/93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 7
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Pushed shelby tube from 17.0' to 21.0'
TASK: Soil Boring w/CME Sampler

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/
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BE GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: R. Conno

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11091	COORDINATES.	DATE	05/19/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED	05/19/93
ENGINEER/GEOLOGIST A. Camo	Depth Date/Time	DATE COMPLETED.	05/19/93
DRILLING METHODS Hollow Stem Auger w/ CME Sampler		PAGE 1	OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	1330			Firm (2.5Y4/4) olive brown clayey silt, no plasticity, some gravel, organic material, dry			MT = 0.0 ppm BT = 0-50 cpm
5	115359	NA	2.5		ML	2.0	some stiff firm, white plastic
2.5	05/19						
	1330			Firm (2.5Y5/3) olive and (2.5Y5/6) light olive brown silty clay, medium plasticity, few pieces of gravel, dry			MT = 0.0 ppm BT = 0-50 cpm
	NA	NA	2.5		CL	2.0	
5.0	05/19						
	1345			Firm (2.5Y5/3) olive and (2.5Y5/6) light olive brown silty clay, high plasticity, few organic pieces, moist, some (5Y5/1) gray clay			MT = 0.0 ppm BT = 0-50 cpm
	NA	NA	2.5		CL	1.25	
7.5	05/19						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background: MT - 0.0 ppm
BT = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

RI/FS

VISUAL CLASSIFICATION OF SOILS

-4529

IOJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. 11041	COORDINATES.	DATE 05/19/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/19/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED 05/19/93	
DRILLING METHODS Hollow stem Auger w/CME Sampler		PAGE 2 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	~~1330~~ 1395			SAA, moist			MT = 0.0 ppm BT = 0-50 cpm
	NA	NA	2.5		CL	1.25	
10.0	05/19 1400			Firm (5Y 4/1) dark gray silty clay, medium plasticity, some (2.5Y5/6) light olive brown clayey silt, moist			MT = 0.0 ppm BT = 0-50 cpm
	NA	NA	2.5		CL	1.0	
12.5	05/19 1400			12.0' Hard (2.5Y5/6) light olive brown clayey silt, slightly plasticity, some (5Y5/1) gray clay on cleavage planes, dry	ML	2.0	MT = 0.0 ppm BT = 0-50 cpm
				SAA, dry			MT = 0.0 ppm BT = 0-50 cpm
5	11041	NA	2.5		ML	2.0	
15.0	05/19			@ 1410 push Shelby tube from 15.0' to 17.0' Sample No. 115391			

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sim Smith

Background MT = 0.0 ppm
BT = 0-50 cpm

NA - Not Applicable
SAA - Same As Above

PRELIMINARY

402-...86

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FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: OU2 Phase II
FIELD ENG./GEO.: A. Lamo
DATE: 05/19/93
PROJECT NO.: 20.03.05
CHECKED BY:
DATE:
BORING NO.: 11041
PIEZOMETER NO.: NA
DATE OF INSTALLATION: NA

BOREHOLE DRILLING

DRILLING METHOD: Hollow Stem Auger w/ Core Sampler
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 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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION: NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 / 1.0	BOTTOM 1.0 / 13.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	18.0			
GWL AFTER INSTALLATION	NA			

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

REMARKS: Pushed shelby tube from 13.0' to 17.0'. Used CME sampler from 0.0' to 13.0'.

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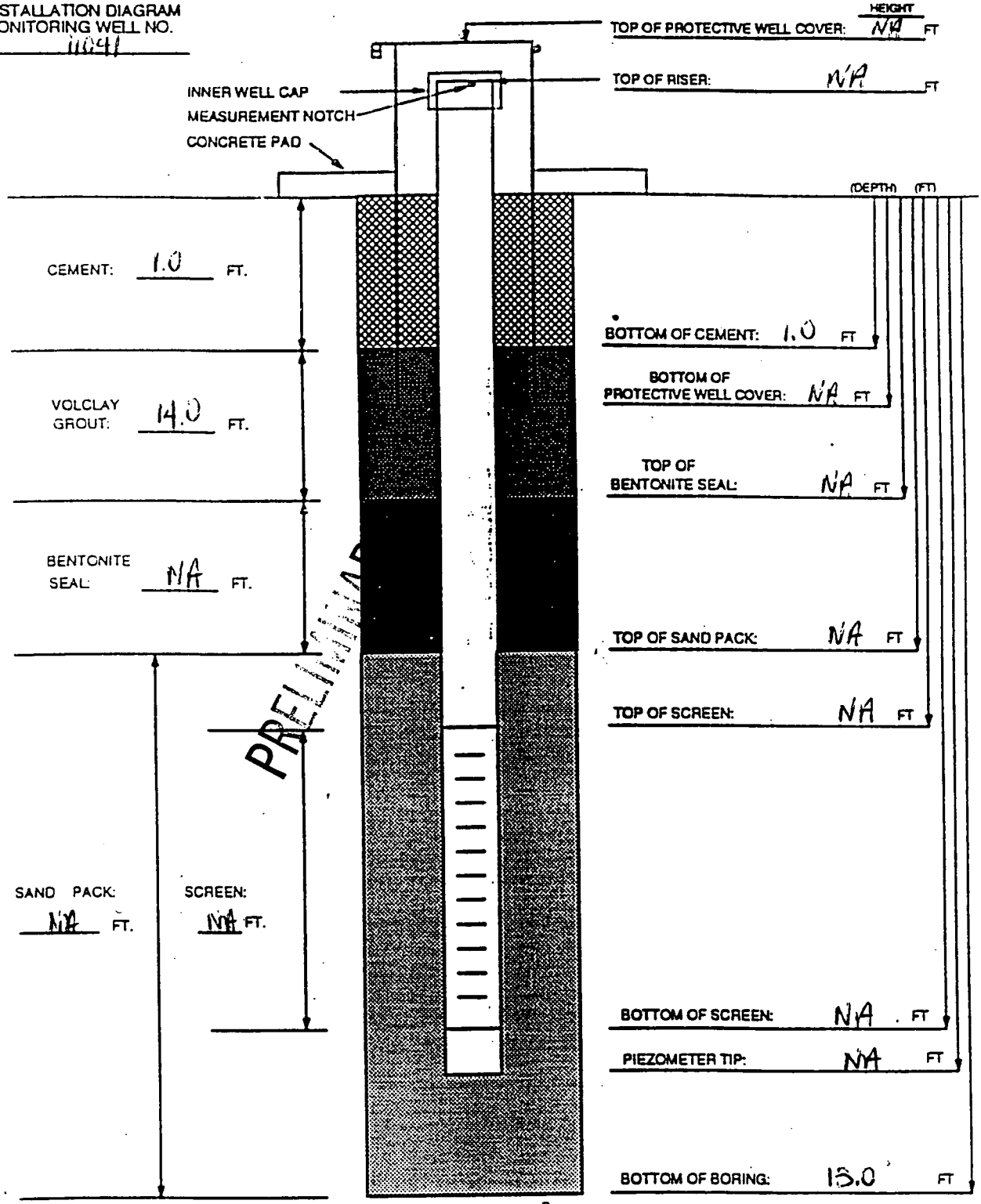
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1041

INSTALLATION DATE: 05/19/93



	HEIGHT	
TOP OF PROTECTIVE WELL COVER:	NA	FT
TOP OF RISER:	NA	FT

(DEPTH) (FT)

CEMENT: 1.0 FT.

VOLCLAY GROUT: 14.0 FT.

BENTONITE SEAL: NA FT.

SAND PACK: NA FT.

SCREEN: 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:	15.0	FT

BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 7
COUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Posted Shelby tube from 15.0' bgs
TASK: Soil Borings w/ GME Sampler

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: A. Gunn

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU L Phase II		
BORING NUMBER.	11039	COORDINATES.		DATE	05/19/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/19/93
ENGINEER/GEOLOGIST	A. Lomc	Depth	Date/Time	DATE COMPLETED.	05/19/93
DRILLING METHODS	Hollow stem Auger w/ CME Sampler			PAGE	1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0910			Very hard (2.5Y 4/4) olive brown silty clay, slight plasticity, some gravel, dry	CL	4.5	MT = 1.0 ppm BT = 0-50 ppm
	NA	NA	2.5	Black roofing ~~shingles~~ with some (2.5Y 5/4) light olive brown silty clay, between them, tar	NA	NA	MT = 2.5 ppm BT = 200-250 ppm
2.5	0919						
	0910			~~SAA~~, dry			MT = 2.5 ppm BT = 200-250 ppm
	113564	NA	2.5		NA	NA	
5.0	0919						
	0930			No Recovery			MT = NA BT = NA
	NA	NA	NA		NA	NA	Hit water between 6.0' and 7.0'.
	0934						

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 1.0 ppm
BT = 0-50 ppm

NA - Not Applicable
SAA - Same As Above

PRELIMINARY

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU 2 Phase II		
BORING NUMBER. ~~[illegible]~~ 110339	COORDINATES.		DATE 05/19/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 05/19/93
ENGINEER/GEOLOGIST A. Como	Depth	Date/Time	DATE COMPLETED. 05/19/93
DRILLING METHODS Hollow stem Auger			PAGE 2 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	0930			No Recovery			MT = NA BT = NA
	NA	NA	NA		NA	NA	
10.0	05/19						
	1035	8-12- 18-18		Hard (2.5Y5/6) light olive brown clayey silt, ~~w~~ plasticity, some (5Y5/1) gray clay along cleavage planes, ~~[illegible]~~			MT = 1.0 ppm BT = 0-50 cpm Start using 3" split spoons.
	NA		1.0'		ML	3.0	
12.0	05/19						
	1045			SAA, dry			MT = 1.0 ppm BT = 0-50 cpm
	115385	7-12- 18-20	2.0		ML	3.0	
14.0	05/19			@ 1050 Drove Shelby tube from 14.0' to 16.0' sample No. 115386			

Comments
Drilling Co. Pennsylvania Drilling Co
Driller Don Smith
Geologist Sam Smith

Background MT = 1.0 ppm
BT = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

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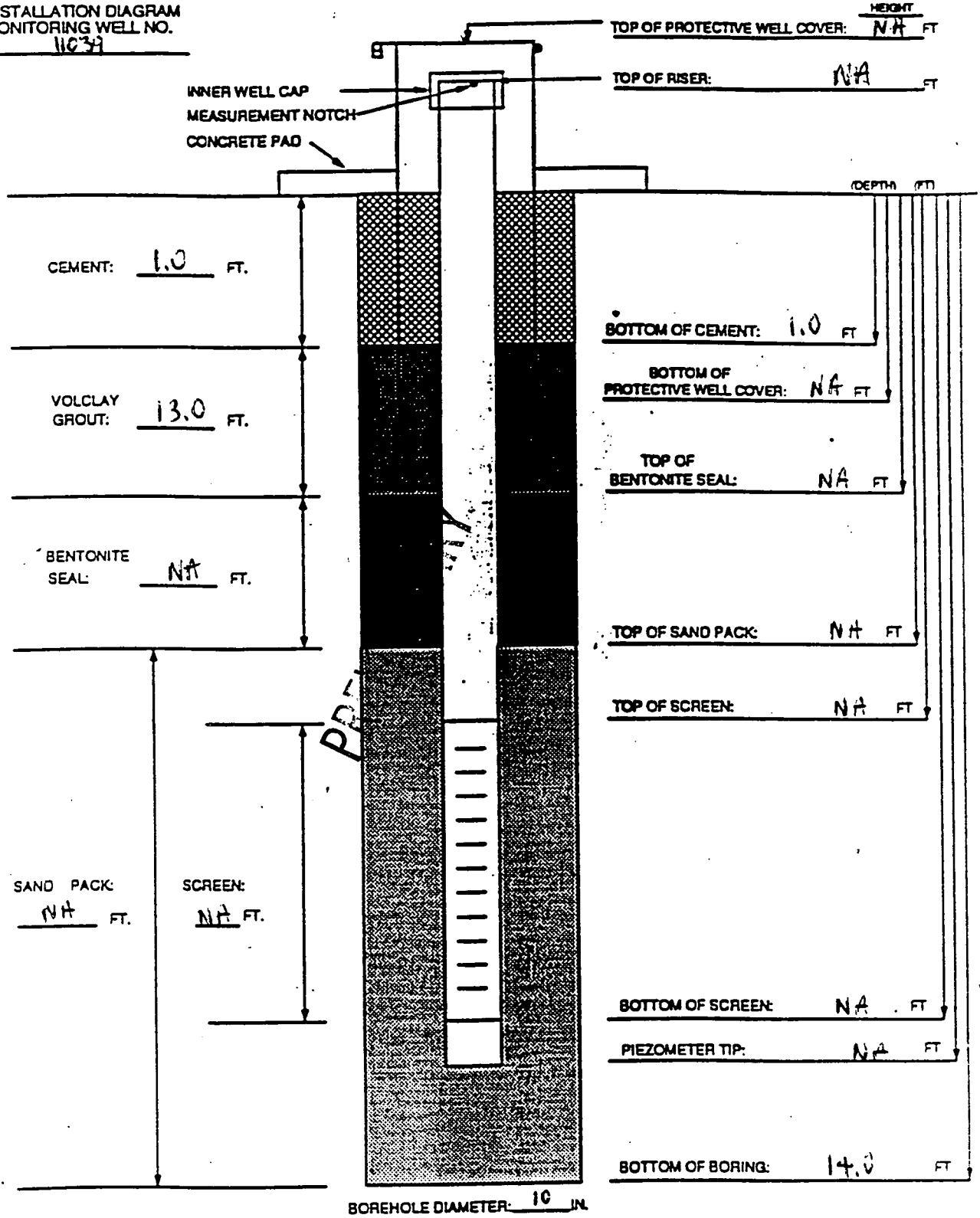
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11039

INSTALLATION DATE: 05/19/93



TOP OF PROTECTIVE WELL COVER: HEIGHT 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: 14.0 FT

BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
TONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4
AMOUNT OF CEMENT: 1 Bag
AMOUNT OF WATER USED: 15 gallons
OTHER: Used 3" split spoon from 14.0' to 14.5'
TASK: Soil Boring using Core Sampler

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/ A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELO GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Lemo

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FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II FIELD ENG./GEO. A. Como DATE [illegible]
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11039
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger w/CME Sampler
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 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

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP 1.0	BOTTOM 14.0
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	14.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Soil borings using CME Sampler to 10.0' then used Shelby to 14.0 & pushed shelby tube from 14.0' to 16.0'

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. ~~11055~~ 20.03.05	PROJECT NAME. FFP OU-2		
BORING NUMBER: 11055	COORDINATES.	DATE 051993	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051993	
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED: 051993	
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	NA	NA	NA	DESTRUCTIVE Drilling TO 10 FEET 051993	NA	NA	NA
10	NA	12 15 SPT 11 10	6 6 ~~18~~ 6 6	(10YR, 2/1) flyash, BLACK moist SAA 051993	NA	NA	Bq = 60cpm MT = 1.9 ppm
11				Stiff, (2.5Y, 5/3) olive brown, silty clay, low plasticity, moist	cl	1.0	HARD Drilling through concrete.
12	NA	16 28 14 16	6 6 NA 0 6	(10YR, 2/1) flyash, BLACK, moist with concrete + silty clay. 051993	NA	NA	Bq = 80cpm MT = 30.0ppm
13				NO RECOVERY	NA	NA	
14	NA	3 2 2 2	6 6 6 0	(10YR, 2/1) flyash, BLACK, 45% silty clay (2.5Y 5/4), moist	NA	NA	Bq = 40cpm MT = 1.5ppm
15				(10YR, 2/1) BLACK, flyash	NA	NA	
16				NO RECOVERY			
	NA	NA	NA	PAGE 2	NA	NA	NA

NOTES

DRILLERS:
JOE RAAB
ROGER DAVIS

MT = MICROTIP
SAA = SAME AS ABOVE

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FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 ~~H055~~ 05/1993	PROJECT NAME: [illegible]		
BORING NUMBER: 11055	COORDINATES:		DATE: 05/1993
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 05/1993
ENGINEER/GEOLOGIST: Boyer	Depth	Date/Time	DATE COMPLETED: 05/1993
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 2

TIME	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1300	17	11633 1	3 3 3 3	24	(10YR, 2/1) Black, fly ash, Sli. moist.	NA	NA	BZ = 4 ppm MT = 0.0 ppm
	18	11633 1						
	23	NA 05/93	NA	NA	DESTRUCTIVE DRILL to 23 FEET	NA	NA	NA
1335	24	11633 2 NA	6	6	(10YR, 2/1) fly ash, Black, Sli. moist			BZ = 4 ppm
		11633 2	6 7 13	6 6 6	Medium Dense, (2.5Y 5/4) light olive Brown Silty sand with gravel, moist	SM	NA	MT = 0.0 ppm
	25	11633 2						
					Bottom Boring 25 feet			

NOTES

05/1993

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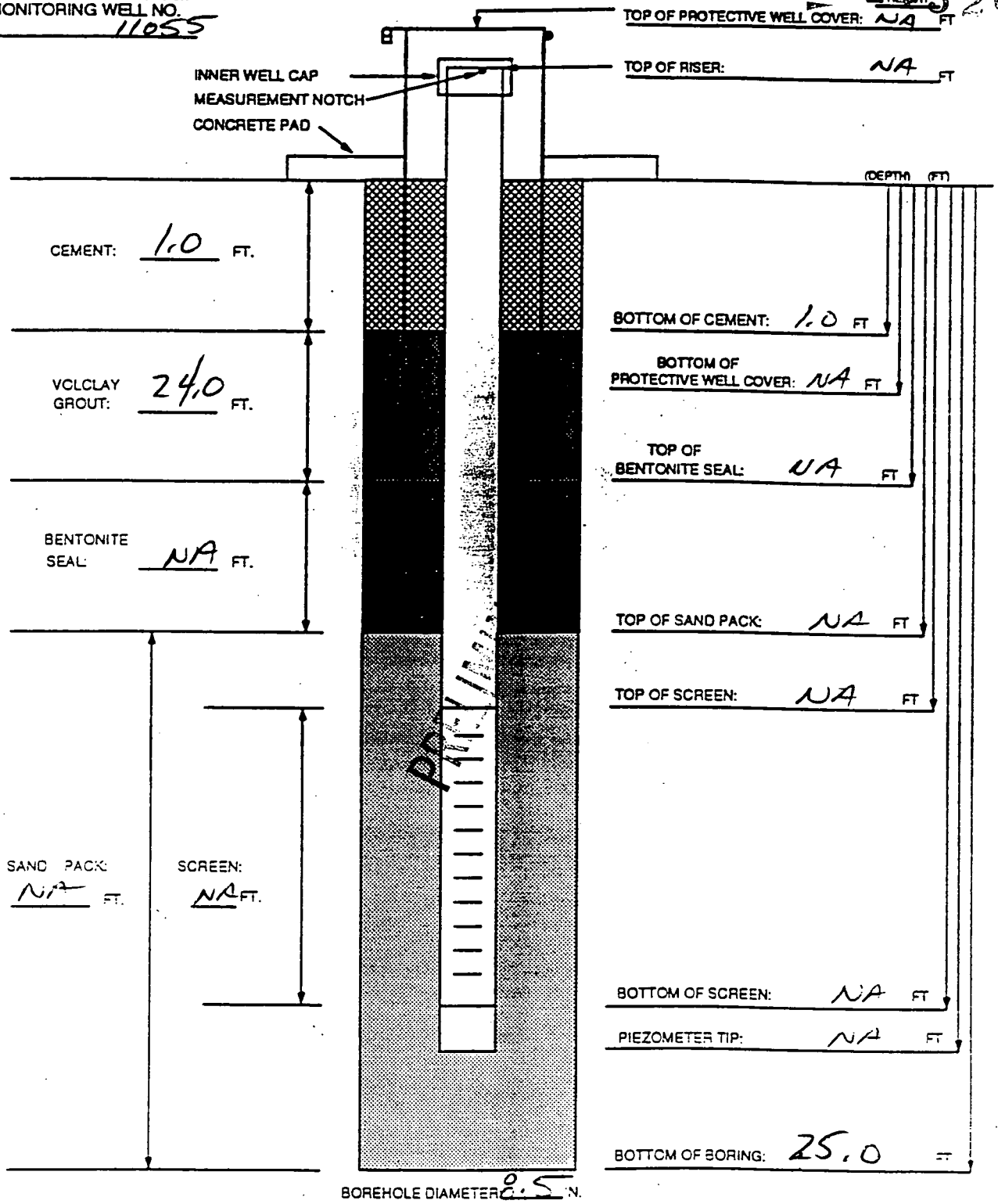
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11055

INSTALLATION DATE: 05/1993

ELEVATION: 45.29



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~5 BAGS
AMOUNT OF CEMENT: 1 BAGS
AMOUNT OF WATER USED: ~20 gallons
OTHER: 1 Soil Drum 1 water drum
TASK: 20.03.05

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: J. Boyer

FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 05/9
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11055
PIEZOMETER NO. NA DATE OF INSTALLATION 051993

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION _____
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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
2lb ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM /
2lb ~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 25.0	TOP NA	BOTTOM /
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM /
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM /
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM /
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	25.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS _____

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER.	20.03.05	PROJECT NAME.	OU2 Phase II		
BORING NUMBER.	110240	COORDINATES:		DATE	05/20/93
ELEVATION:		GWL: Depth	Date/Time	DATE STARTED	05/20/93
ENGINEER/GEOLOGIST	A. Como	Depth	Date/Time	DATE COMPLETED.	05/20/93
DRILLING METHODS	Hollow stem Auger w/OME Sampler			PAGE	1 OF 10

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0923 NA	NA	2.5	Very Hard (2.5Y5/4) light olive brown silty clay, slight plasticity, some (5Y 3/1) very dark grey silty clay, some gravel, pieces of organic material, dry	CL	7.5	MT = 0.3 ppm BT = 0-50 cpm
2.5	0925 115392	NA	2.5	Hard (2.5Y5/4) light olive brown and (5Y4/3) olive silty clay, low plasticity, some gravel, dry	CL	2.0	MT 0.3 ppm BT = 0-50 cpm few pieces of plastic, wood
5.0	0935 NA	NA	2.5	SAA	CL	2.0	MT = 0.3 ppm BT = 0-50 cpm

PRELIMINARY

NOTES
Drilling Co Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.3 ppm
BT = 0-50 cpm

NA- Not Applicable
ft - Since to the

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 1104C	COORDINATES.	DATE 05/20/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/20/93	
ENGINEER/GEOLOGIST R. Como	Depth Date/Time	DATE COMPLETED: 05/20/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 2 OF 6	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (Ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
7.5	00135			Firm (5Y4/1) dark gray silty clay, no plasticity, dry	CL		MT = 0.3 ppm BT = 0-50 cpm
	NA	NA	1.0	8.5' No Recovery	NA	1.5	
	05/20 1000			Hard (5Y4/1) dark gray silty clay, slight plasticity, some (5Y4/3) olive silty clay, dry, some (2.5Y5/4) light olive brown clayey silt			MT = 0.3 ppm BT = 0-50 cpm
	NA	NA	2.5		CL	3.0	-(2.5Y5/4) light olive brown clayey silt increases as depth increases.
12.5	05/20 1000			Hard (2.5Y 5/4) light olive brown clayey silt, some (5Y5/1) gray silty clay along cleavage planes, low plasticity, dry			MT = 0.3 ppm BT = 0-50 cpm
	115393	NA	2.5	@ 1010 pushed shelby tube from 15.0' to 17.0'	ML	2.0	
17.5	05/20						

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

MT - 0.3 ppm
BT = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

SUMMARY

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FERNALD
RI/FS

= -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. OU2 Phase II	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11090	COORDINATES.	DATE 05/20/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/20/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED. 05/20/93	
DRILLING METHODS Hollow stem Auger w/ Cme Sampler		PAGE 3 OF	

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (Ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	1030			Hard (2.5Y 5/4) light olive brown, clayey silt, (5Y5/1) gray silty clay along cleavage planes, no plasticity, few pieces of small gravel, dry			MT = 0.3 ppm BT = 0-50 cpm
	NA	NA	2.5		ML	4.5	-some thin moist lenses.
11.5	05/20						
	1030			Hard (2.5Y5/3) light olive brown and (5Y5/1) gray clayey silt, slight plasticity, some small gravel, dry			MT = 0.3 ppm BT = 0-50 cpm
	NA	NA	2.5		ML	4.0	- iron staining on cleavage planes - limestone gravel
20.0	05/20						
	1090			SAA		4.0	MT = 0.3 ppm BT = 0-50 cpm
	NA	NA	2.5	Firm (5Y 4/1) dark gray silty clay, medium plasticity, ~~thin moist~~ ac 05/20/93 small pieces of gravel, dry	CL	ac 05/20/93 2.0	MT = 0.3 ppm BT = 0-50 cpm -Thin well graded sand lenses ac 05/20/93
22.5	05/20						

NOTES

Drilling co Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

MT = 0.3 ppm
BT = 0-50 cpm

NA - Not Applicable
SAA - Same As Above

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11C4C	COORDINATES.	DATE 05/20/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/20/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED. 05/20/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 4 OF [illegible]	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
22.5	1050			SAA			MT = 0.3 ppm BZ = 0-50 cpm
	NA	NA	2.5		CL	2.0	
25.0	05/20						
	1400			Firm (5Y 4/1) dark gray silty clay, medium plasticity, gravel, ~~dry~~ moist ac 05/20/93			MT = 0.3 ppm BZ = 0-50 cpm
	NA	NA	2.5		CL	1.5	- limestone gravel - thin wet well graded sand lenses
27.5	05/20						
	1400			SAA, moist			MT = 0.3 ppm BZ = 0-50 cpm
	NA	NA	2.5		CL	1.5	
30.0	05/20						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant John Smith

Background: MT = 0.3 ppm
BZ = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

364

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.05.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11040	COORDINATES.	DATE 05/20/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/20/93	
ENGINEER/GEOLOGIST A. Como	Depth Date/Time	DATE COMPLETED: 05/20/93	
DRILLING METHODS Hollow stem Auger w/CME Sampler		PAGE 5 OF 6	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NA)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	1540			Firm (5Y 4/1) dark gray clayey silt, slight plasticity, some (2.5Y 5/2) grayish brown silty clay, some small gravel, dry			MT = 0.3 ppm BZ = 0-50 cpm
	NA	NA	2.5		ML	2.0	- some moist thin well graded (5Y 4/1) dark gray sand lenses
32.5	05/20						
	1540			SAA			MT = 0.3 ppm @ 05/20/93 BZ = 40-50 cpm
	NA	NA	2.5		ML	2.0	
33.0	05/20						
	1600			SAA			MT = 0.3 ppm BZ = 0-50 cpm
	115316	NA	2.5		ML	74.5	
35	05/20						

NOTES

Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

Background MT = 0.3 ppm
BZ = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

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FERNALD
RI/FS

: -4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. OU2 Phase II		
BORING NUMBER. 11090	COORDINATES.	DATE 05/20/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 05/20/93	
ENGINEER/GEOLOGIST A. Lomo	Depth Date/Time	DATE COMPLETED: 05/20/93	
DRILLING METHODS Hollow Stem Auger w/CME Sampler		PAGE 6 OF 6	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (ft)	RECOVERY (ft)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
37.5	HAS			SAA			MT = 0.3 ppm BZ = 0-50 cpm
	115397	NA	2.5		ML	74.5	
40.0	05/20						
				END OF BORING			

NOTES
Drilling Co. Pennsylvania Drilling Co.
Driller Don Smith
Assistant Sam Smith

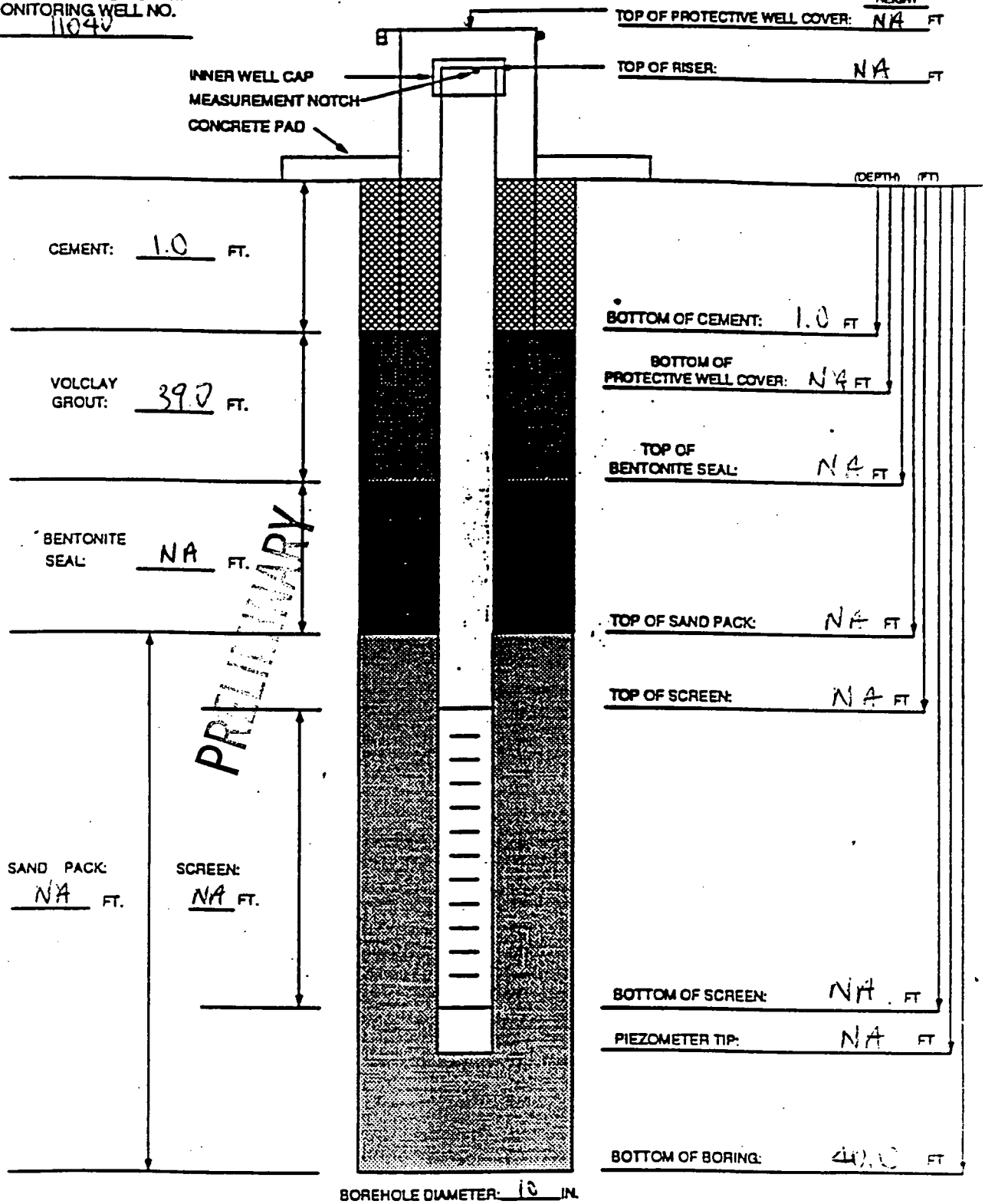
Background MT = 0.3 ppm
BZ = 0-50 cpm

NA- Not Applicable
SAA- Same As Above

PRELIMINARY

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11040

INSTALLATION DATE: 05/20/93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

'O TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 16
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 5 gallons
OTHER: Soil Borings w/ CME Sampler
TASK: Soil Borings, Install Stainl. Line from [illegible] to 17.0'

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 BELO GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: [illegible]

FERNALD RI/FS

F -4520

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 11040
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Lunsford DATE 05/20/
CHECKED BY _____ DATE _____
DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger w/CME sampler
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 NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 / 1.0	BOTTOM 1.0 / 40.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	40.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Soil Boring using CME Sampler. Installed Slotted Pipe from 15.0' to 17.0'.

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 70.03.05	PROJECT NAME. OU2 - ITP		
BORING NUMBER. 11053	COORDINATES.		DATE 5/20/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/20/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/21/93
DRILLING METHODS Hollow Stem auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS BZ - 60ppm - 80ppm M - 3 4ppm
0	NA	NA	NA	Augered to 14' Difficult augering 5'-8.0'	NA	NA	NA
10	NA	3 7 18/3"	6 6 0	10YR 2/1, Fly ash. Very stiff, 10YR 5/4 silty clay, medium plasticity, moist. Refusal at 15.5' augered to 16'	NA / CL / NA	NA / 5.0 / NA	BZ 60ppm ML 30ppm
16	NA	14 19 15 18	6 6 6 6	Dense, 10YR 5/6, medium sand, poorly graded, dry	SP	NA	BZ 60ppm M 3 2ppm
19	11649 11642 1610 5/20/93	17 20 23 22	6 6 6 6	Dense, 10YR 5/6, medium sand, poorly graded, dry	SP	NA	BZ 60ppm
20	NA	23 23 23	6 6 0	SAA	SP	NA	M - 3 ppm
22	NA	17 18 19 26	6 6 6 6	SAA	SP	NA	BZ - 4 M - 3

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment 4x CME soil sentry
Driller M. Watral
B. Deiley

SAA - Same as above
NA - Not Applicable

Samples collected per [illegible] standard procedures
Colors identified using [illegible]

PRELIMINARY

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03 05	PROJECT NAME. OU2 - IFP	
BORING NUMBER. 11053	COORDINATES.	DATE 5/21/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 5/21/93
ENGINEER/GEOLOGIST J. Reagan	Depth Date/Time	DATE COMPLETED. 5/21/93
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
5/21/93							
4	116421	3		Dense, 10YR 5/6 medium sand, poorly graded, moist	SP	NA	BS -
	116422	17					
	940	20					MH = 0.5 ppm
5/21/93	5/21/93	26					
26				End of boring 26'			

PRELIMINARY

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment Failing Soil Sentry
Driller [illegible]
[illegible]

SAA - Same as above
NA - Not Applicable

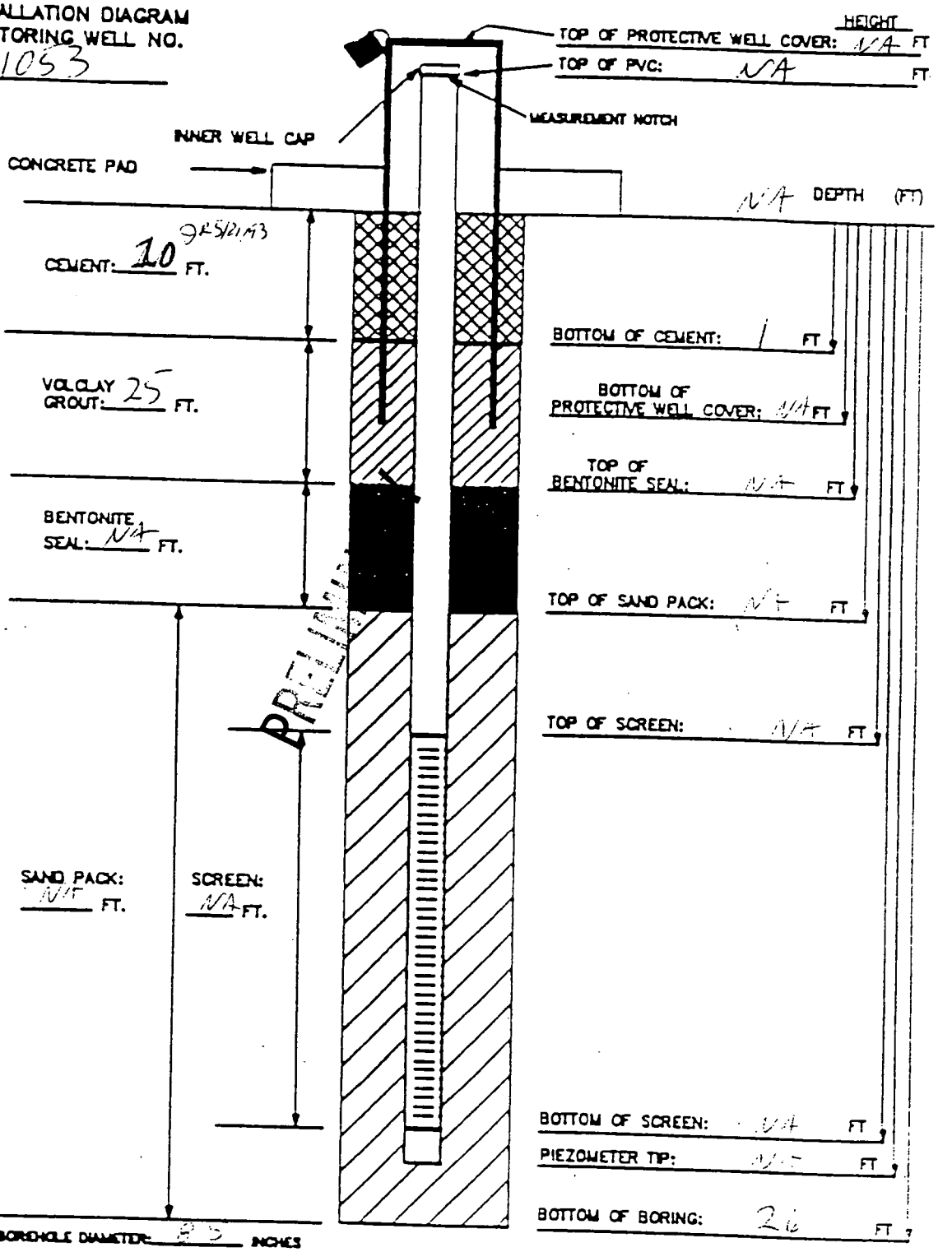
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

-4529

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 11053

INSTALLATION DATE: 5/20-5/21/93



PRELIMINARY

MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ≥2
AMOUNT OF CEMENT: 2
AMOUNT OF WATER USED: 20 gal
OTHER:

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

TASK: 20.03.03

GEOLOGIST/ENGINEER:

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FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 - IFP
PROJECT NO. 20.03.05
BORING NO. 11053
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/21/92
CHECKED BY DATE
DATE OF INSTALLATION 5/20-5/21/92

BOREHOLE DRILLING

DRILLING METHOD Hollow stem auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT auger
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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↓	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0	BOTTOM 1	TOP NA	BOTTOM NA
~~BENTONITE~~ GROUT	TOP 1	BOTTOM 26	TOP ↓	BOTTOM ↓
SAND	TOP NA	BOTTOM NA	TOP ↓	BOTTOM ↓
GRAVEL	TOP ↓	BOTTOM ↓	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	26'		↓	
GWL AFTER INSTALLATION	NA		NA	

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

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 phase 2	
BORING NUMBER: 1028	COORDINATES:	DATE 5/20/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 5/20/93
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 5/26/93
DRILLING METHODS: Hollow Stem Augers		PAGE 1 OF 2

DEPTH AT -	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER -	RECOVERY -	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10				For soil descriptions see boring log for 1026			
20							
30				Typical aquifer sands			No sampling required Visual surface [illegible]
40							
50							
				Boring terminated at 53.04			

PRELIMINARY

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Acker Sentry II

Driller: [illegible] Carlisle

Mike Lucas

Field PID = 10 ppm Max = [illegible] ppm

402-11-86

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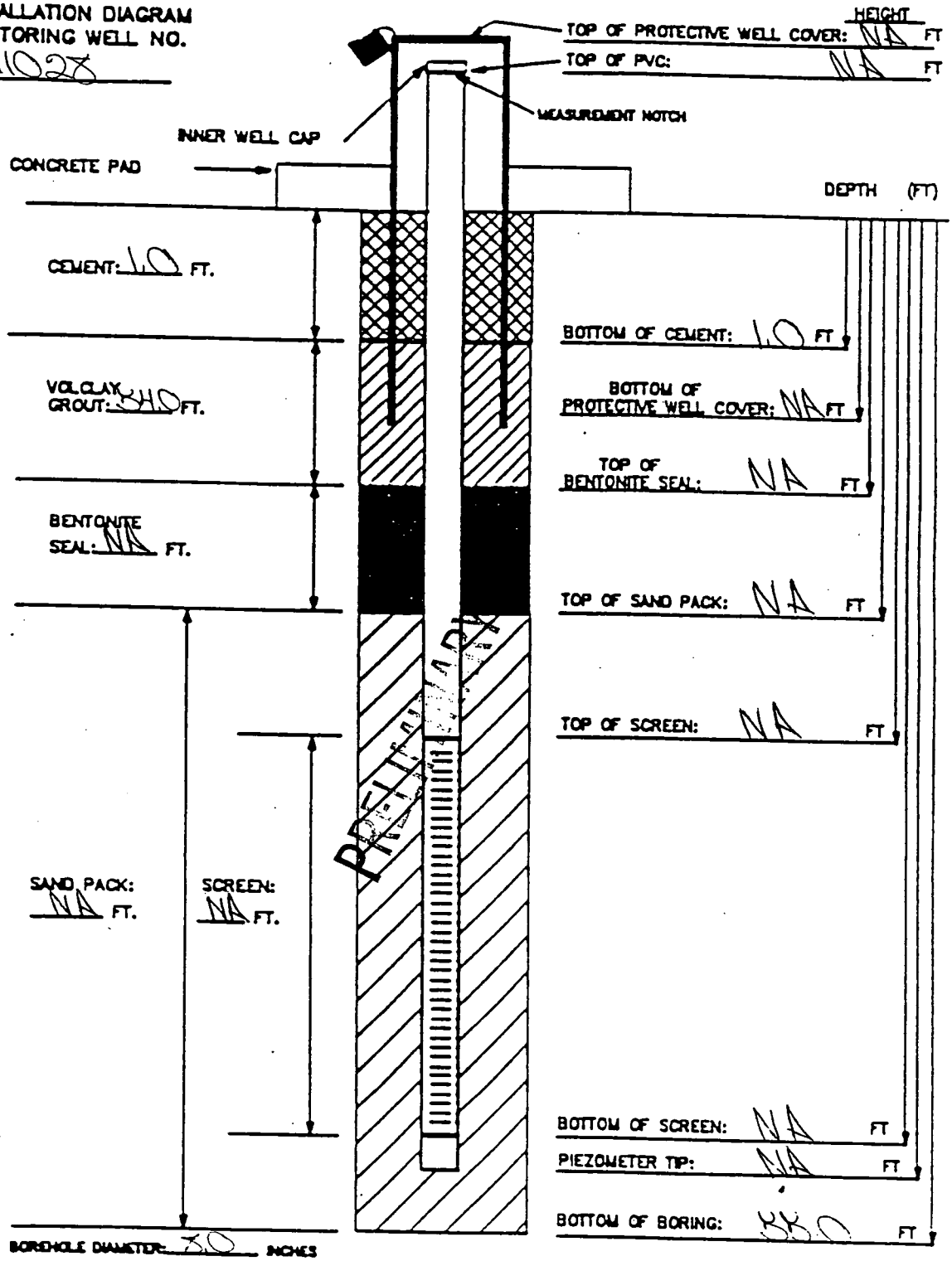
FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO. 11028

INSTALLATION DATE: 5/21/93



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4 bags
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 30 gal
OTHER:

NOTES:

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

2 soil drums

TASK: 2002.02

GEOLOGIST/ENGINEER: D. O'Brien

FERNALD RI/FS

3/3

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 phase 2 FIELD ENG./GEO. D. O'Brien DATE 3/28/93
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11025
PIEZOMETER NO. _____ DATE OF INSTALLATION 3/26/93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Augs	TYPE OF BIT Augs
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID — FROM — TO —	SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

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

PROTECTION SYSTEM

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

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
	TOP 1.0	BOTTOM 55.0		
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	55.0			
GWL AFTER INSTALLATION	44.16			

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

REMARKS _____

409-11-2

375 287

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

ECT NUMBER 20.03.05	PROJECT NAME. Southfield OU-2		
BORING NUMBER 11026	COORDINATES.	DATE 051493	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051493	
ENGINEER/GEOLOGIST J. Beyer	Depth Date/Time	DATE COMPLETED 051593	
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 4	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0	NA	NA	NA	DESTRUCTIVE DRILL ↓	NA	NA	NA
5	113142 ↕ 113142	12 17 14	17	DENSE, ~~CLAY~~ 051493, (2.5y, 5/6) light olive Brown, clayey silt, moist, no plasticity, TRACE Dolomite (concrete)	ml	NA	BZ = 60cpm MT = 0.0ppm
7 8	113143 ↕ 113143	13 17 32	16	HARD (2.5y, 5/6) light olive Brown, ~~clayey~~ silt, CLAY Slight plasticity, sli. moist	cl	<40	BZ = 60cpm MT = 0.0ppm
9	NA	13 12 11	16	very stiff, (2.5y 5/6) Light olive Brown, silty clay, slight plasticity, Slightly moist.	cl		BZ = 60cpm MT = 0.0ppm
10 11	NA	8 7 10	17	Stiff (2.5y 5/4) light olive Brown, silt clay, low plasticity, moist	cl	1.5	BZ = 60cpm MT = 0.0ppm
				medium dense (2.5y 6/8) olive yellow, silt, trace silty clay, wet to moist	ml	NA	
	113144			PAGE 2			

OVP 051593

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT = MICROTIP
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. Southfield OU-2		
BORING NUMBER 11026	COORDINATES.	DATE 051493	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 051593	
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED. 051593	
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 24	

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
12	113144 ↕ 113144	10 9 10	18	MEDIUM DENSE, (2.5Y 5/2), GRAYISH BROWN, SILT, with FINE SAND, WET.	ML	NA	SS = 20cpm MT = 0.0 ppm
13 14	113145 ↕ 113145	NA	NA	Hydropunch	NA	NA	Hydropunch
				Bottom of Boring 14 1/2 feet			

TIME 0915 1300

PRELIMINARY

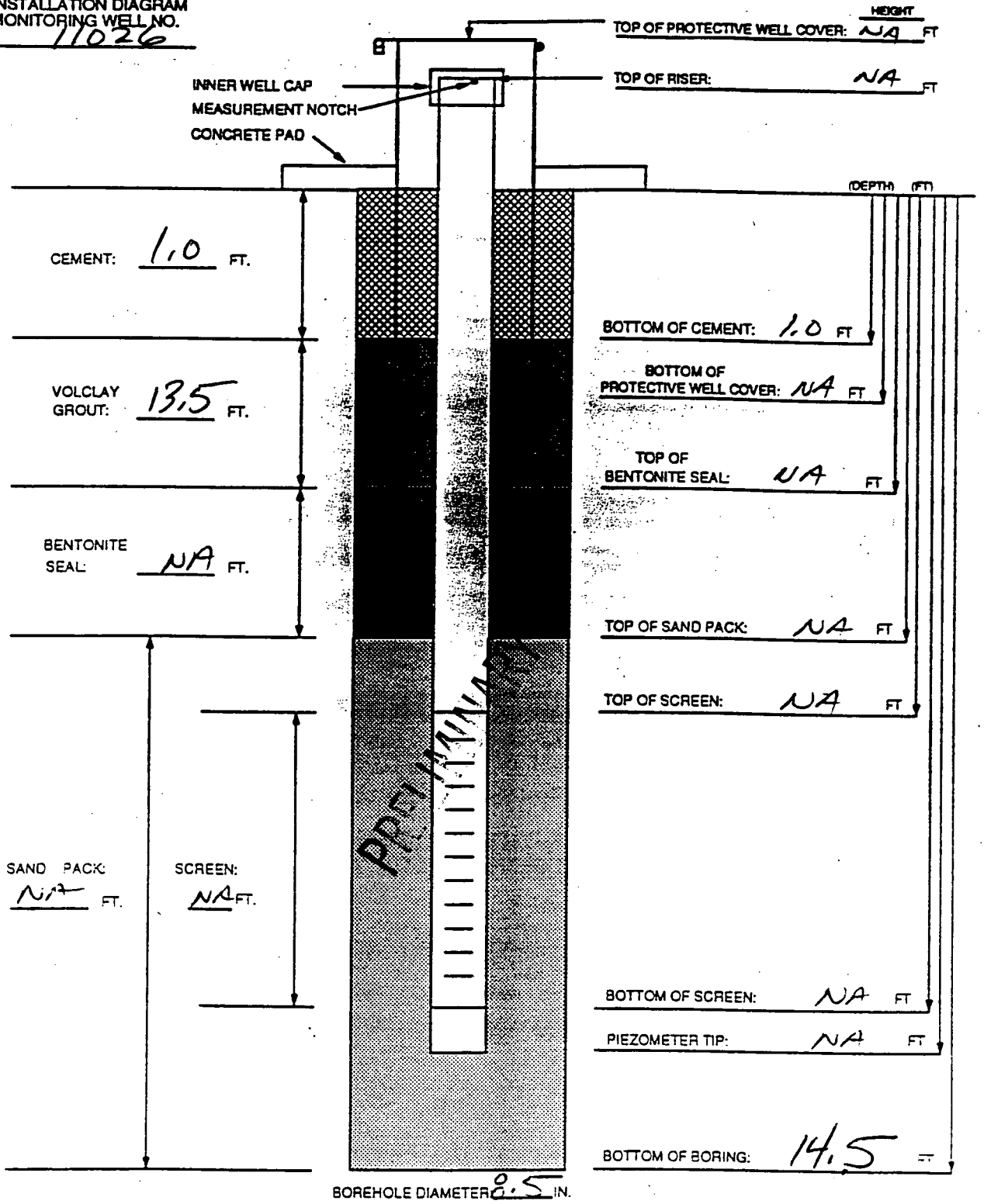
NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT = MICROTIP
Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

QAB 051594

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11026

INSTALLATION DATE: 05/5/93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~2 1/2 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~15 GALLONS
OTHER: 1 SOIL DRUM 1 WATER DRUM
TASK: 2.0.03.05

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: J. BOWER

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 05/5
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11026
PIEZOMETER NO. NA DATE OF INSTALLATION 051593

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM N
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 14.5	TOP NA	BOTTOM N
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 N
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	14.5		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS _____

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2		
BORING NUMBER 1105b	COORDINATES.		DATE 05 20 93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 05 20 93
ENGINEER/GEOLOGIST J. Boyer	Depth	Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow Stem Auger			PAGE 1 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MT Background ~2.0 ppm
10	NA	NA	NA	↓ Destructive Drill To 10 feet ↓	NA	NA	NA
11	NA	33 50/3/0	6 6	Very Dense, (~~10YR~~ 2.5YR) 5/6 light olive brown, silty sand and flint (50%) moist.	SM	NA	Bf = 80 ppm MT = 3.5 ppm (Background ~2.0 ppm)
12			0 0	No Recovery split spoon Refusal	NA	NA	split spoon Refusal at 11 feet
13	NA	14 17 4 2	6 6 6 6	(10YR 2/1) Ash, Black, slightly moist.	NA	NA	Bf = 80 ppm MT = 4.5 ppm
14 15	NA	18 22 4 3	6 6 6 6	SAA	NA	NA	Bf = 60 ppm MT = 2.5 ppm
16							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker
Driller Joe Raab
Roger Davis

SAA - Same as above
NA - Not Applicable
MT = MicroTip
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

PRELIMINARY

300

292

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2		
BORING NUMBER 110556	COORDINATES.		DATE 052093
ELEVATION: SEE 052093	GWL: Depth	Date/Time	DATE STARTED 052093
ENGINEER/GEOLOGIST J. Boyer	Depth	Date/Time	DATE COMPLETED.
DRILLING METHODS Hollow Stem Auger			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS Background MTE ~2.5 ppm
16	116335 1015	2	6	(10YR 2/1) BLACK, flyash, moist	NA	NA	Bg = 60 cpm MT = 2.6 ppm
17	↕	2	6				
	116335 1015	2	6				
18		2	6				
19	NA	12	6	SAA	NA	NA	Bg = 40 cpm MT = 45 ppm
		22	6				
		22	6				
		12	6	DENSE, (10YR, 3/4) DARK YELLOWISH BROWN, silt, TRACE COARSE SAND, moist	ML	NA	
20	NA	6	6	MEDIUM DENSE, (10YR, 4/6) DARK YELLOWISH BROWN, SILT, TRACE COARSE SAND, moist.	052093 ML	NA	Bg = 40 cpm MT = 5.3 ppm
		6	6				
21		7	6				
		12	2				
22	NA	12	6	DENSE, (2.5Y 5/6) light olive brown, silty SAND, TRACE COARSE SAND + PEBBLES, moist	SM	NA	Bg = 40 cpm MT = 3.6 ppm
		14	6				
23	116336 1100	17	6				

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller Joe RAAB
Roger DAVIS

SAA - Same as above
NA - Not Applicable

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

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2	
BORING NUMBER 110556	COORDINATES.	DATE 052093
ELEVATION: 052093	GWL: Depth Date/Time	DATE STARTED 052093
ENGINEER/GEOLOGIST J. Boyer	Depth Date/Time	DATE COMPLETED 052093
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF 8

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
24	116336 1100	23	6	DEBRIS, (2.5y 5/6) light olive brown, poorly graded sand, moist	SP	NA	Page 2
				Bottom of Boring 24 feet			

PRELIMINARY

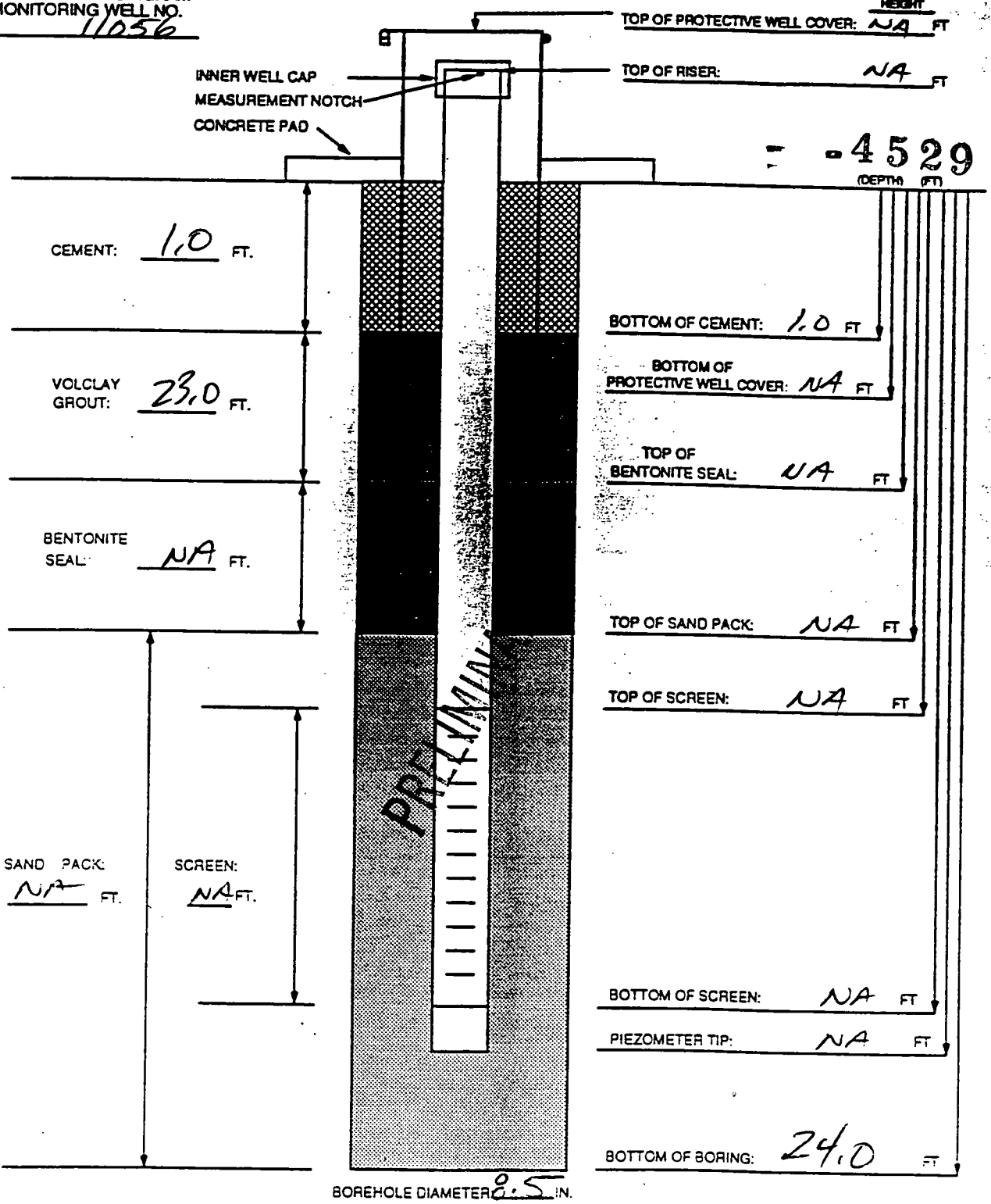
NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard [illegible]
Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11056

INSTALLATION DATE: 052093



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~6 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~25 GALLONS
OTHER: 1 SOIL DRUM 1 WATER FALLOUT
TASK: 20.03.05

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: J. BOYER

FERNALD RI/FS

5 of 5 29

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 0520
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11056
PIEZOMETER NO. NA DATE OF INSTALLATION 052093

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
2ub ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM N
2ub ~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 24.0	TOP NA	BOTTOM N
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 N
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	24.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS _____

RI/F

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME		
BORING NUMBER 11057	COORDINATES		DATE 05 20 93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 05 20 93
ENGINEER/GEOLOGIST J Boyer	Depth	Date/Time	DATE COMPLETED 05 20 93
DRILLING METHODS Hollow Stem Auger			PAGE 1 OF 4

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	PID (ppm)	REMARKS
0							MT Background 0.2 ppm
	NA	NA	NA	DESTRUCTIVE DRILLING 10 FEET		NA	NA
10		33	6	Borings DENSE, (2.5Y 5/4) light olive brown, SILTY SAND, TRACE COARSE SAND			
		17					
		1	6	SAA			BY = 0.2 ppm
11	NA	5					MT = 4.4 ppm
			6	(10YR 2/1) BLACK, Flyash, moist			
			6	SAA			
12		4					
		4	6	SAA			BY = 60 ppm
13	NA	2	6	SAA			MT = 2.1 ppm
		8	6	SAA	NA	NA	
			3	LOOSE, (2.5Y 5/3) light olive brown CLAYEY SILT w/ Flyash, TRACE GRAVEL, LOW PLASTICITY, MOIST	ML	NA	
14		7	6	(10YR, 2/1) BLACK, Flyash, moist, TRACE WOOD FRAGMENTS.	NA	NA	BY = 60 ppm
		6					
15	NA		6	SAA			MT = 4.4 ppm
		10		MEDIUM DENSE, (2.5Y 5/4) light olive BROWN, POORLY GRADED SAND, TRACE SILT, moist	SP	NA	NO VOCs FROM THE WOOD FRAGMENTS
		9	6				
16			6	SAA	SP	NA	
	NA	N	NA	PAGE 2	NA	NA	NA

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ACKER

Driller JOE RAPPS

ROGER DAVIS

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERRALLOY
RI/FS

- 4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. [illegible] 002		
BORING NUMBER. 11057	COORDINATES.	DATE 05 20 93	
ELEVATION:	GWL.: Depth Date/Time	DATE STARTED 05 20 93	
ENGINEER/GEOLOGIST J. Boyle	Depth Date/Time	DATE COMPLETED 05 20 93	
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 4	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ASTM)	REMARKS
17	116337 1535 NA	12 14	6 6	DENSE, (2.5y 5/4) light olive brown, poorly graded sand, moist. SAA	SP	NA	Bq = 60cpm MT = 2.6ppm
	05 20 93	16	6	SAA	SP	NA	
18	116337 1536	21	6	SAA	SP	NA	
19	NA	4 12 15 21	6 6 6 6	(DENSE, (2.5y 5/6) light olive brown, poorly graded sand, moist SAA SAA SAA	SP	NA	Bq = 60cpm MT = 2.5ppm
20							
21	NA	5 15 17 20	6 6 6 6	SAA SAA SAA SAA	SP	NA	Bq = 60cpm MT = 2.0ppm
22							
23	05 20 93 NA	17 21 25	6 6	SAA SAA	SP	NA	Bq = 40cpm MT = 1.0ppm
24	116338 1600 116338 1600	15	6 6	SAA SAA	SP	NA	

PRELIMINARY

NOTES

Bottom Boring 24 FEET

Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable

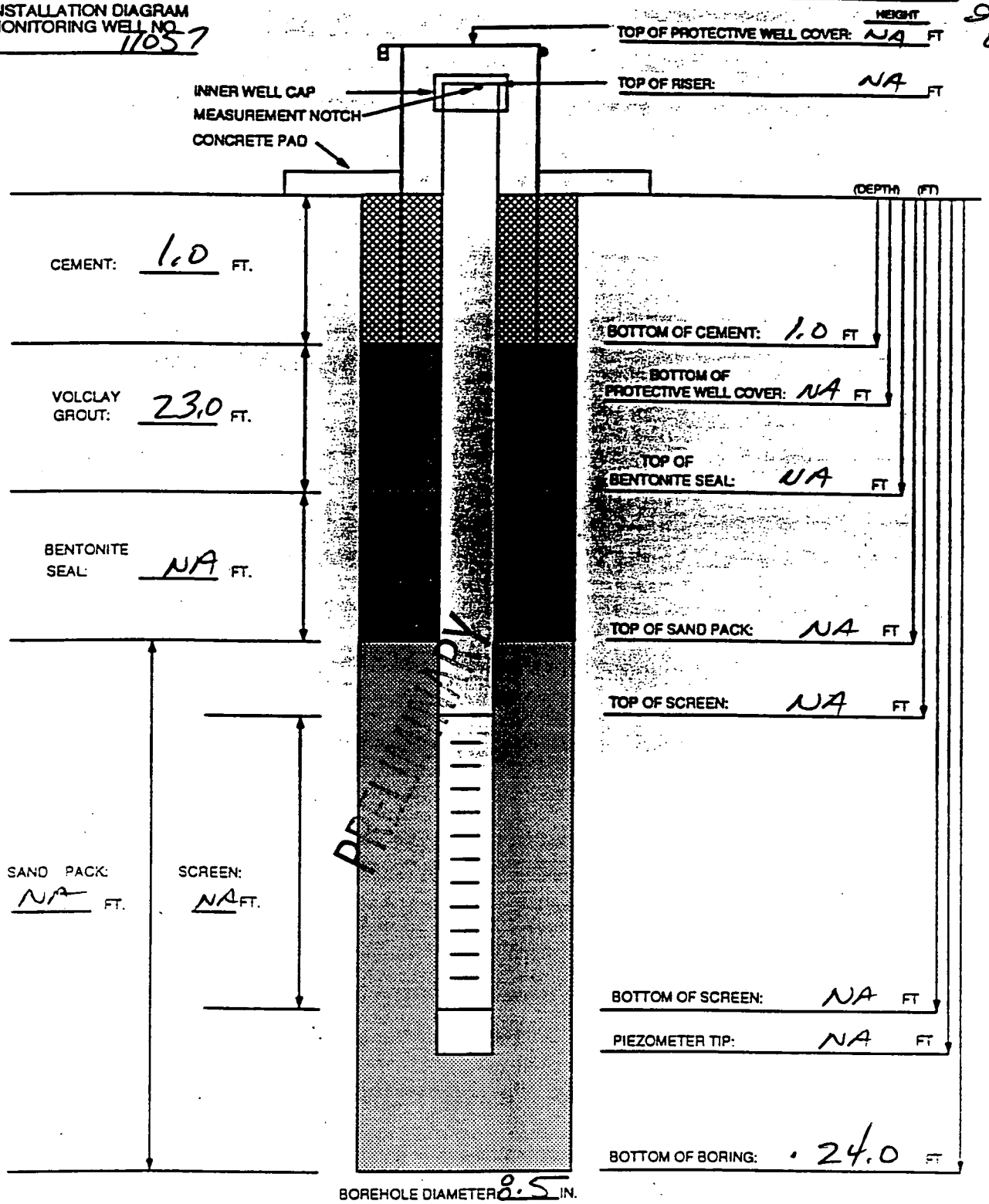
Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

386

298

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11057

INSTALLATION DATE: ~~050~~ 052073 JLB 052095



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~6 BAGS
AMOUNT OF CEMENT: 1 BAGS
AMOUNT OF WATER USED: ~25 GALLONS
OTHER: 1 SOIL DRUM 1 WATER DRUM
TASK: 20.03.05

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: J. Boyer

FERNALD RI/FS

-4529 4 of 4

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 052
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11057
PIEZOMETER NO. NA DATE OF INSTALLATION 052093

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM NA
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 24.0	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	24.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

388

300

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IEP OU-2		
BORING NUMBER. 11054	COORDINATES.		DATE 052193
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 052193
ENGINEER/GEOLOGIST J. Bayer	Depth	Date/Time	DATE COMPLETED 052193
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (Background MT = ~3.9 ppm)
8	NA	NA	NA	DESTRUCTIVE DRILLING TO 8 FEET.	NA	NA	NA
9	NA	10	6	MEDIUM STIFF (2.5Y 5/4) LIGHT OLIVE BROWN, SILTY CLAY w/ FLYASH, w/o GRAVEL, SLI. PLASTICITY, MOIST	CL	.75	BG = 80 ppm. MT = 45 ppm
		8	6	SAA	CL	1.0	
		5	6	SAA		.5	
		7	6	SAA		.75	
10	NA	2	6	SAA	CL	1.0	BG = 80 ppm MT = 3.8 ppm
		3	0	NO RECOVERY (PUSHED ROCK)	NA	NA	
11		5	0				
		5	0	NO RECOVERY (PUSHED ROCK)	NA	NA	
12	NA	3	6	(10YR 2/1) BLACK, FLYASH, MOIST			BG = 80 ppm MT = 4.8 ppm
13		2	6	SAA			
		2					
		3	6	SAA			
14			5	SAA	NA	NA	
	NA	1		(5Y, 5/6) MEDIUM DENSE, (5Y, 5/6) OLIVE, SILT, TRACE GRAVEL, DRY	ML	NA	Page 2

PRELIMINARY

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER
Driller JOE RAAB
ROGER DAVIS

SAA - Same as above
NA - Not Applicable
MT - MICROTIP
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. IFP OU-2		
BORING NUMBER. 11054	COORDINATES.		DATE 052193
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 052193
ENGINEER/GEOLOGIST J. BOYER	Depth	Date/Time	DATE COMPLETED. 052193
DRILLING METHODS HOLLOW STEM AUGER			PAGE 2 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USF)	REMARKS
15	NA	5	6	MEDIUM DENSE, (5Y, 5/6) OLIVE, SILT, TRACE GRAVEL, DRY	ML	NA	BK = 80cpm
		7	6	SAA	↓	↓	MT = 3.8ppm
		15	4	SAA	ML	NA	
16	116340 1010	5	6	DENSE, (2.5Y 5/6) light olive BROWN, POORLY GRADED SAND, moist	SP	NA	BK = 80cpm
	↑	10	6	SAA	SP	↓	MT = 2.6ppm
17	↓ NA	17	0	NO RECOVERY	NA		
18	~~116340 1010~~	22	0	NO RECOVERY	NA SP	↓	
19	NA	5	6	DENSE, (2.5Y 5/6) light olive BROWN, POORLY GRADED SAND, moist	SP	NA	BK = 80cpm
		11	6	SAA	↓	↓	MT = 3.4ppm
		17	2	SAA	SP	NA	
20		28	0	NO RECOVERY	NA	NA	
21	NA	5	6	DENSE (2.5Y 5/4) light olive BROWN, POORLY GRADED SAND, TRACE GRAVEL, moist	SP	NA	BK = 80cpm
		9	6	SAA	↓	↓	MT = 3.2ppm
		17	6	SAA	SP	NA	
		27					
22							

Witnessed 052193

Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER
Driller JOE RAAB
ROBERT DAVIS

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard practice
Colors identified using Munsell Color Chart

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 20.03.05	PROJECT NAME. [illegible]		
BORING NUMBER 11054	COORDINATES.		DATE 052193
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 052193
ENGINEER/GEOLOGIST J. Boyer	Depth	Date/Time	DATE COMPLETED 052193
DRILLING METHODS Hollow Stem Auger			PAGE 3 OF 5

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
22	NA	7		DENSE, (2.5Y 5/6) light olive brown, poorly graded sand, moist	SP	NA	BZ = 80 ppm
		12		SAA			
23	116341 1100	17		SAA			MT = 3.3 ppm
		23		SAA	SP	NA	
24				Bottom Boring 24 feet			

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Aeroz
Driller Joe Raab
Roger Davis

SAA - Same as above
NA - Not Applicable

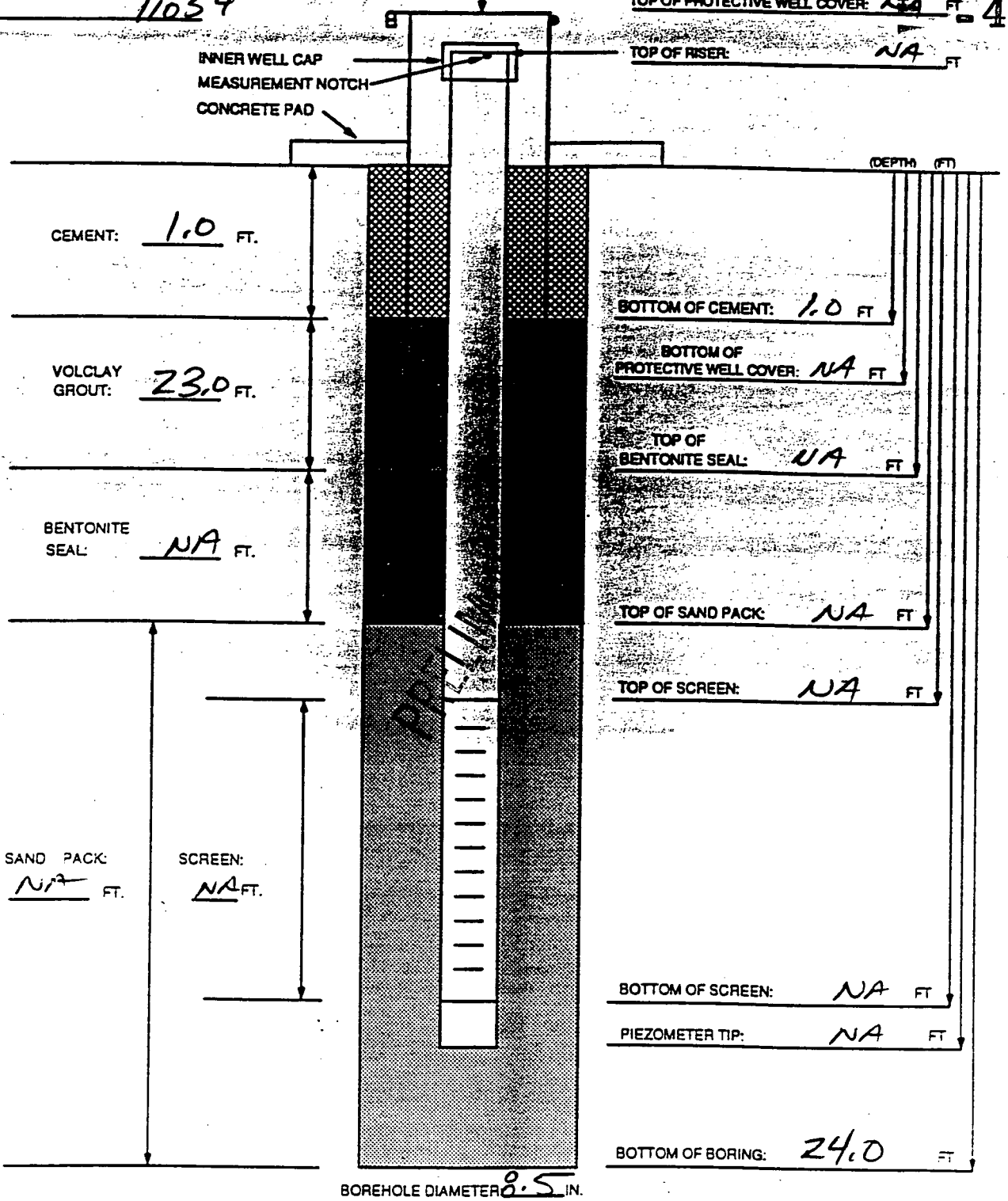
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1105-4

INSTALLATION DATE: 05/2/93

TOP OF PROTECTIVE WELL COVER: NA FT (HEIGHT) = 4529

TOP OF RISER: NA FT



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: ~5 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~20 gallons
OTHER: 1 SOIL DRUM 1 WATER + ALUMINY
TASK: 20.03.05

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: J. Boyer

(S) FORM 1157 REV 3)

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FERNALD RI/FS

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-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 052193
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11054
PIEZOMETER NO. NA DATE OF INSTALLATION 052193

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION _____
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

PRELIMINARY

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM N
~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 24.0	TOP NA	BOTTOM N
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 N
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	24.0		NA	
GWL AFTER INSTALLATION	NA		NA	

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

RI/FS

VISUAL CLASSIFICATION OF SOILS

-4529

PROJECT NUMBER: 20.03.05	PROJECT NAME: IFP OU-2		
BORING NUMBER: 1104B	COORDINATES:	DATE 052793	
VATION:	GWL: Depth Date/Time	DATE STARTED: 052793	
ENGINEER/GEOLOGIST: J. Boyle	Depth Date/Time	DATE COMPLETED: 052693	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 6	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MT=Background ~1.0 ppm
1	NA	6	6	Dense, (2.5y 5/6) light olive brown, clayey silt w/ gravel, sil. plastics dry	ML	NA	Bg = 80cpm
		11	6	SAA	ML		MT=0.1ppm Bg=80cpm
	116342 1345	13 24	6	* Dense (2.5y, 5/6) light olive brown, clayey silt, 50% gravel (1200cpm on frisker) no plasticity, dry	ML/GC		Bg=1200cpm
2	NA		5	(10yr 2/1) Black flyash w/ gravel dry.	NA	NA	Bg = 80cpm 9405229
3	NA	5	6	Very stiff (2.5y 5/6) light olive brown, silty clay with flyash + gravel, low plasticity, dry	CL	3.5	MT = ~1.0ppm Bg = 100cpm
		6	6	SAA		3.0	
		6	6	Very stiff (2.5y, 5/6) light olive brown, silty clay with gravel and flyash stringer, low plasticity, dry.	CL	2.0	
4		8	4	(10yr 2/1) Black, flyash w/ gravel dry.	NA	NA	
5	NA	9	6	Stiff (2.5y 6/4) light yellowish brown, silty clay with gravel and flyash, low plasticity dry.	CL	1.0	MT = ~1.0ppm Bg = 80cpm
		11 11	6	SAA	CL	1.0	
		13	6	(10yr 2/1) Black, flyash, dry	NA	NA	
6			5	SAA	NA	NA	
7	NA	1	6	~~SAA~~			MT = 1.5ppm Bg = 80cpm
		1	6	~~SAA~~			
		1	6	~~SAA~~			

NOTES:

Drilling Contractor: Penn Drilling

Drilling Equipment: Acker

Driller: Mike Bentley, Roger Davis

SAA = Same As Above

MT = Microtip

* gravel was most likely that had concrete been contaminated

RI/FS

VISUAL CLASSIFICATION OF SOILS

-4529

PROJECT NUMBER: 20.03.05	PROJECT NAME: IFP OU-2	DATE: 052793 & 052693
BORING NUMBER: 1104B	COORDINATES:	DATE STARTED: 052893
ELEVATION:	GWL: Depth Date/Time	DATE COMPLETED: 052693
ENGINEER/GEOLOGIST: J. Boyer	Depth Date/Time	PAGE 2 OF 6
DRILLING METHODS: Hollow Stem Auger		

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION SAA = SAME AS ABOVE	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	MT = MICROTIP REMARKS MT BACKGROUND ~ 1.5ppm
8	NA	NA	0	NO RECOVERY	NA	NA	NA
	NA	2 3	6	(10YR, 2/1) BLACK, flyash, moist	NA	NA	MT = 1.6ppm Bγ = 80cpm
9		3	6	SAA	↓		
		6	6	SAA	↓		
			5	SAA	NA	NA	
10	NA	1 2	6	SAA	NA	NA	MT = 1.5ppm Bγ = 60cpm
		4	6	SAA	↓	↓	
		13	6	SAA	NA	NA	
			3	VERY STIFF, (5y 4/4) OLIVE, SILTY CLAY TRACE GRAVEL + flyash, low PLASTICITY, moist	cl	2.25	
12	NA	6	6	VERY STIFF (5y 5/3) OLIVE, SILTY CLAY, TRACE GRAVEL, low PLASTICITY, moist.	cl	2.0	MT = 1.5ppm Bγ = 60cpm
		9 9	6	STIFF, (5y 5/3) OLIVE SILTY CLAY, TRACE WOOD (APPEARS TO BE ROOT MATERIAL), low PLASTICITY, MOIST	↓	1.5	
13		17	6	SAA	CL	2.0	
			4	MEDIUM DENSE (5y 5/2) OLIVE GRAY, SILT TRACE ROOT MATERIAL, moist	ml	NA	
14	NA	8	6	MEDIUM DENSE, (5y 4/2) OLIVE GRAY, SILT with ROOT AND GRASS MATERIAL, moist	ml	NA	MT = 1.5ppm Bγ = 40cpm
		11	6	SAA	ml	NA	
15							

NOTES:

Drilling Contractor

Drilling Equipment

Driller:

052593

RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20.03.05	PROJECT NAME. IFP OU-2		DATE 052693
DRILLING NUMBER: 11048	COORDINATES:		DATE STARTED: 052693
ELEVATION:	GWL: Depth	Date/Time	DATE COMPLETED: 052693
ENGINEER/GEOLOGIST. J. Bayer	Depth	Date/Time	PAGE 3 OF 6
DRILLING METHODS: Hollow Stem Auger			

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MT=MICROTIP
15	NA	11	6	MEDIUM DENSE, (5Y 4/2) OLIVE GRAY, SILT WITH ROOT AND GRASSES, MOIST	ML	NA	Page 2
16		10	6	SAA	ML	NA	
17	NA	6, 9, 9, 10	6, 6, 6, 4	MEDIUM DENSE, (5Y 4/2) OLIVE GRAY, CLAYEY SILT WITH ROOT AND GRASS MATERIAL, MOIST	ML		MT = 1.6ppm BZ = 40cpm
				SAA			
				SAA			
18				SAA	ML	NA	
19	NA	3, 6, 7, 10	6, 6, 6, 5	MEDIUM DENSE, (5Y 4/3) OLIVE CLAYEY SILT WITH TRACE ORGANIC MATERIAL, ALSO CONTAINS BURNT WOOD, MOIST	ML	NA	MT = 2.2ppm BZ = 60cpm
				MEDIUM DENSE, (5Y 4/3) OLIVE CLAYEY SILT, TRACE ROOT MATERIAL, MOIST	ML	NA	
				MEDIUM DENSE (5Y 4/2) OLIVE GRAY, CLAYEY SILT, SLIGHTLY PLASTIC, MOIST	ML	NA	
				SAA	ML	NA	
20	NA	9, 9, 12, 14	6, 6, 6, 6	SAA			MT = 1.8ppm BZ = 60cpm
				SAA	ML	NA	
21	116344, 116345, 116343, 116346, 1620			MEDIUM DENSE, (5Y 4/3) OLIVE, SILTY SAND WITH CLAY, WET	SM	NA	Duplicates for Gamma Spec + Total U were collected at 21.0-22.0
				MEDIUM DENSE (5Y, 5/4) OLIVE, SILTY SAND, WET	SM	NA	
22	116351, 1015 NA	NA	NA	HYDROPUNCH	NA	NA	NA

NOTES: DB 052693

Drilling Contractor: PENN DRILL

Drilling Equipment: AGER

er: MIKE BENTLEY, ROGER DAVIS

SAA = SAME AS ABOVE

MT = MICROTIP

RI/FS

E-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 20,03,05	PROJECT NAME. IFP OU-2		
BORING NUMBER: 11048	COORDINATES:		DATE 052693
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 052693
ENGINEER/GEOLOGIST. J. Boyer	Depth	Date/Time	DATE COMPLETED 052693
DRILLING METHODS:			PAGE 4 OF 6

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
23	116351 1015 (AA 116351 1015	052693 NA	NA	Hydropunch ↓ 052693	NA	NA	NA
24	NA	50/1	5	~~VERY~~ HARD, (5Y, 4/2) OLIVE GRAY, SILTY CLAY, TRACE GRAVEL, LOW PLASTICITY MOIST	CL	>4.5	MT = 0.6ppm BZ = 60cpm
25		80/3	0	NO RECOVERY / SPLIT SPOON REFUSAL	NA	NA	
			0	SPLIT SPOON REFUSAL	NA	NA	
26			0	SPLIT SPOON REFUSAL	NA	NA	
27	116347 116348 116349 116350 1440	8	6	VERY DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN, POORLY GRADED SAND, MOIST	SP	NA	MT = 0.5ppm BZ = 40cpm
		19	6	SAA	SP	NA	
		32	6	SAA	SP	NA	
28	NA	34	0	NO RECOVERY	NA	NA	
				BOTTOM OF BORING 27.5 FEET			

NOTES:

Drilling Contractor: PENN DRILL

Drilling Equipment: ACKER

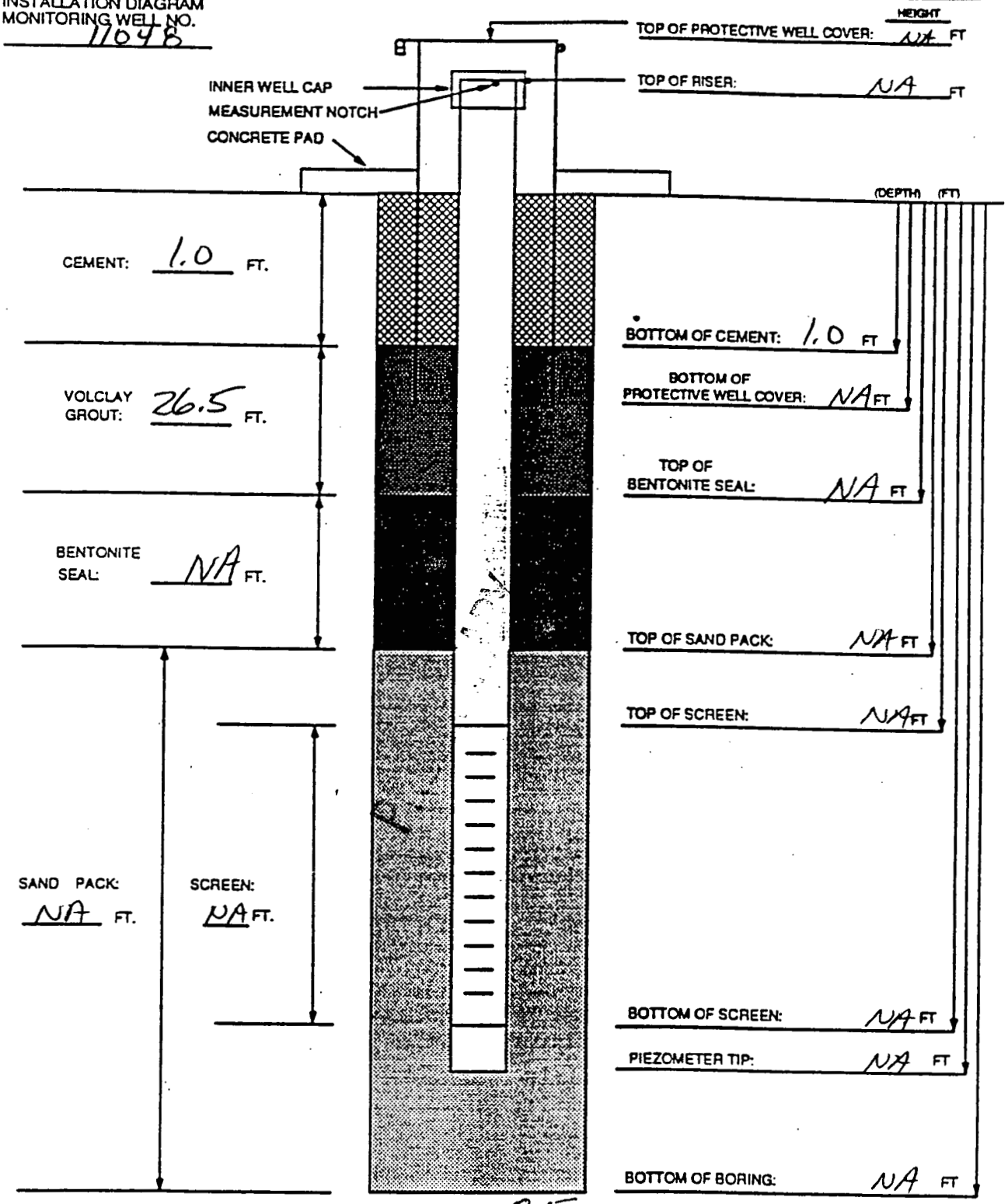
Driller: MIKE BENTLEY, ROGER DAVIS

MT = MICROTIP

SAA = SAME AS ABOVE

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11048

INSTALLATION DATE: 052693



BOREHOLE DIAMETER: 8.5 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
S.OF VOLCLAY GROUT: 6
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: ~20 gallons
OTHER: 1 Drum Soil 1 Drum water/flocknox
TASK: 20.03.05

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: J. Boyer

398 310

ASI FORM 0157 REV. (0)

FERNALD RI/FS

6 of 6

P-54590

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE
PROJECT NO. 20.03.05 CHECKED BY DATE
BORING NO. 11048
PIEZOMETER NO. NA DATE OF INSTALLATION 052693

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA
NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM NA
~~BENTONITE~~ VOLCLAY	TOP ~~26.5~~ 1.0	BOTTOM 27.5	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	27.5		NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS

~~399~~ 311

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2-IFP		
BORING NUMBER 11052	COORDINATES.		DATE 5/25/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/25/93
ENGINEER/GEOLOGIST J. Keagan	Depth	Date/Time	DATE COMPLETED 5/25/93
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 βγ = 60cpm-80cpm Mt = 0.5 ppm
0	NA	NA	NA	Augered 0-19FT	NA	NA	NA
19	116427 1400 TALC 116428 116429	3 8 100/3" 3"	6 6 3 NA	very stiff 10YR 3/3, silty clay, medium plasticity, very moist Some gravels	cl	2.0	βγ = 1000 cpm Mt = 2.5ppm
21	116430 ~~116430~~ 1450 5/25/93	14 17 22 28	6 6 0 0	very stiff 10YR 3/3, silty clay medium plasticity, moist, Some gravels	cl	2.5	βγ = 200cpm Mt = 1.0ppm
23	NA	6 8 12 14	6 6 6 6	very stiff 10YR 3/3, silty fine sand, low plasticity, moist,	ml	2.0	βγ - 50cpm Mt = 1.0ppm
25	116431 116432 116433 116434 1520	7 10 10 12	6 6 6 6	medium dense, 10YR 5/6, poorly graded medium sand, low plasticity, moist	SP	NA	βγ = 50cpm Mt = 2.0ppm
27				27' Bottom of boring			
29							

NOTES:

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker Sril Sentry
Driller M. Walrid
B. Dailey

SAA - Same as above
NA - Not Applicable
Mt - Microtip
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

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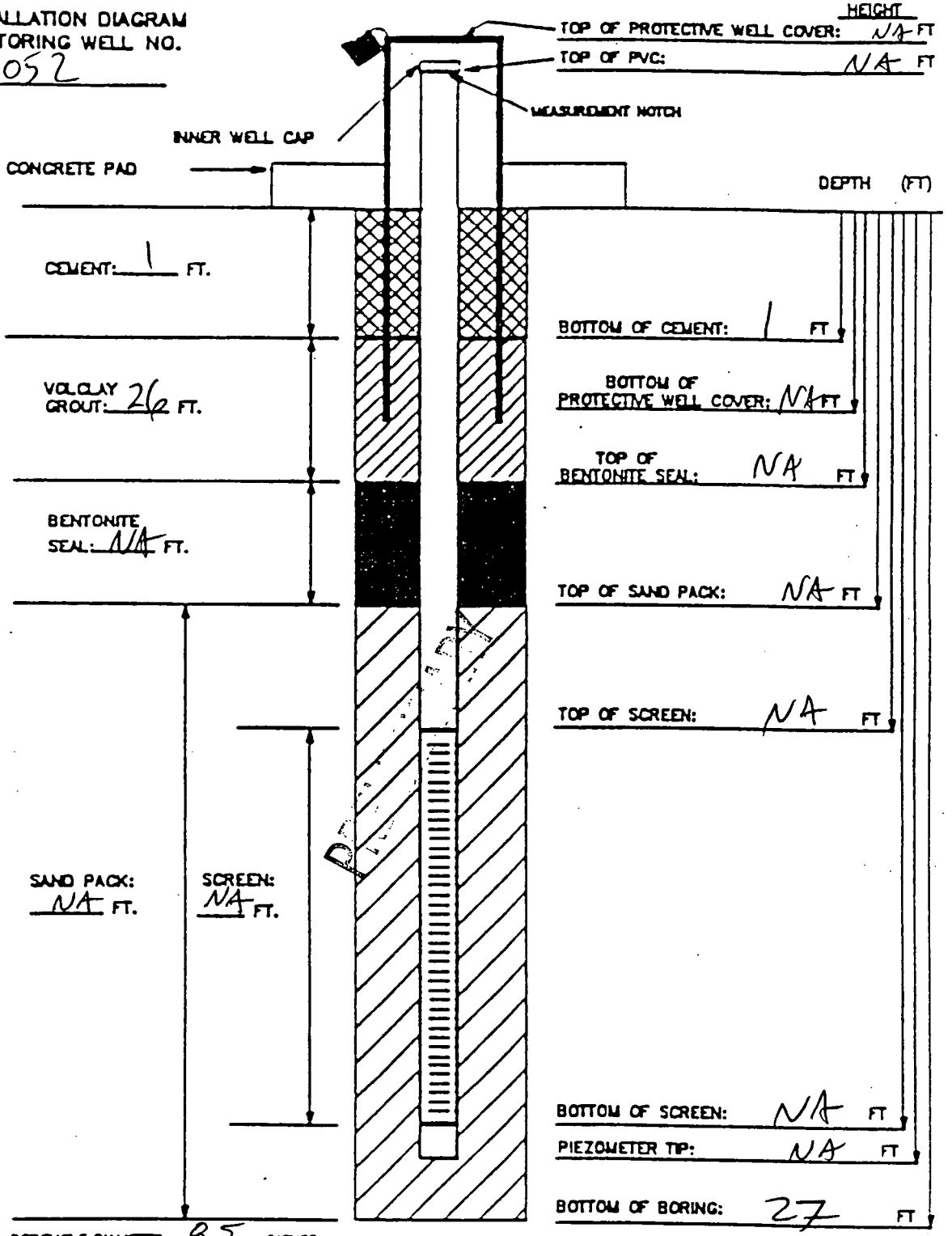
4500

INSTALLATION DATE: 5/25/93

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
1105 2



MATERIALS USED:
SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 6
AMOUNT OF CEMENT: ½
AMOUNT OF WATER USED: 45 gal
OTHER: NA

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

TASK:

GEOLOGIST/ENGINEER:

401 313

FERNALD
RI/FS

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9k 5/27/93
- 4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2-IFP
PROJECT NO. 20.03.05
BORING NO. 1/052
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/25/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/24-5/25/93

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 auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

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

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

PROTECTION SYSTEM

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

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↓	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 27	TOP NA	BOTTOM NA
~~BENTONITE~~ CEMENT	TOP 0	BOTTOM 1	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM ↓	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	27.0		↓	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

OJECT NUMBER 20.03.05	PROJECT NAME INACTIVE FLUMES OU-2	
BORING NUMBER 11047	COORDINATES	DATE 051693
ELEVATION	GWL: Depth Date/Time	DATE STARTED 051693
ENGINEER/GEOLOGIST J. Boyd	Depth Date/Time	DATE COMPLETED 051693
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF X 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
4	NA	NA	NA	↓ DESTRUCTIVE DRILLING ↓	NA	NA	NA
5	116316 0850 ↕ 116316 0850	10 13 11	15	MEDIUM DENSE (2.5Y, 5/4) CLAYEY SILT, LOW PLASTICITY, MOIST	ml	NA	BG = 40 cpm MT = 0.8 ppm
6	NA	6 7 9	18	MEDIUM DENSE (2.5Y, 4/4) OLIVE BROWN, CLAYEY SILT, LOW PLASTICITY	ml	NA	BG = 40 cpm MT = 0.8 ppm
7	116317 0915 ↕ 116317 0915	7 5 8	14 ~~NA~~ gh 051693	MEDIUM DENSE (2.5Y 5/3) LIGHT OLIVE BROWN, SILTY SAND, MOIST	gh ~~ml~~ sm	051693 NA	BG = 40 cpm MT = 0.8 ppm
8				MEDIUM DENSE (2.5Y 5/6) LIGHT OLIVE BROWN, POORLY GRADED SAND, WET	sp	NA	
9	NA	7 6 19	NA	NO RECOVERY	NA	NA	NA
10	116318 1015	NA	NA	HYDROPUNCH ↓ BOTTOM BORING 12 FEET	NA	NA	NA
12							

DRILLERS: JOE RAMB, ROGER DAVIS

SMA = SAME AS ABOVE

MT = MICROTIP

Hydropunch from 8.0 ft to 12 ft.

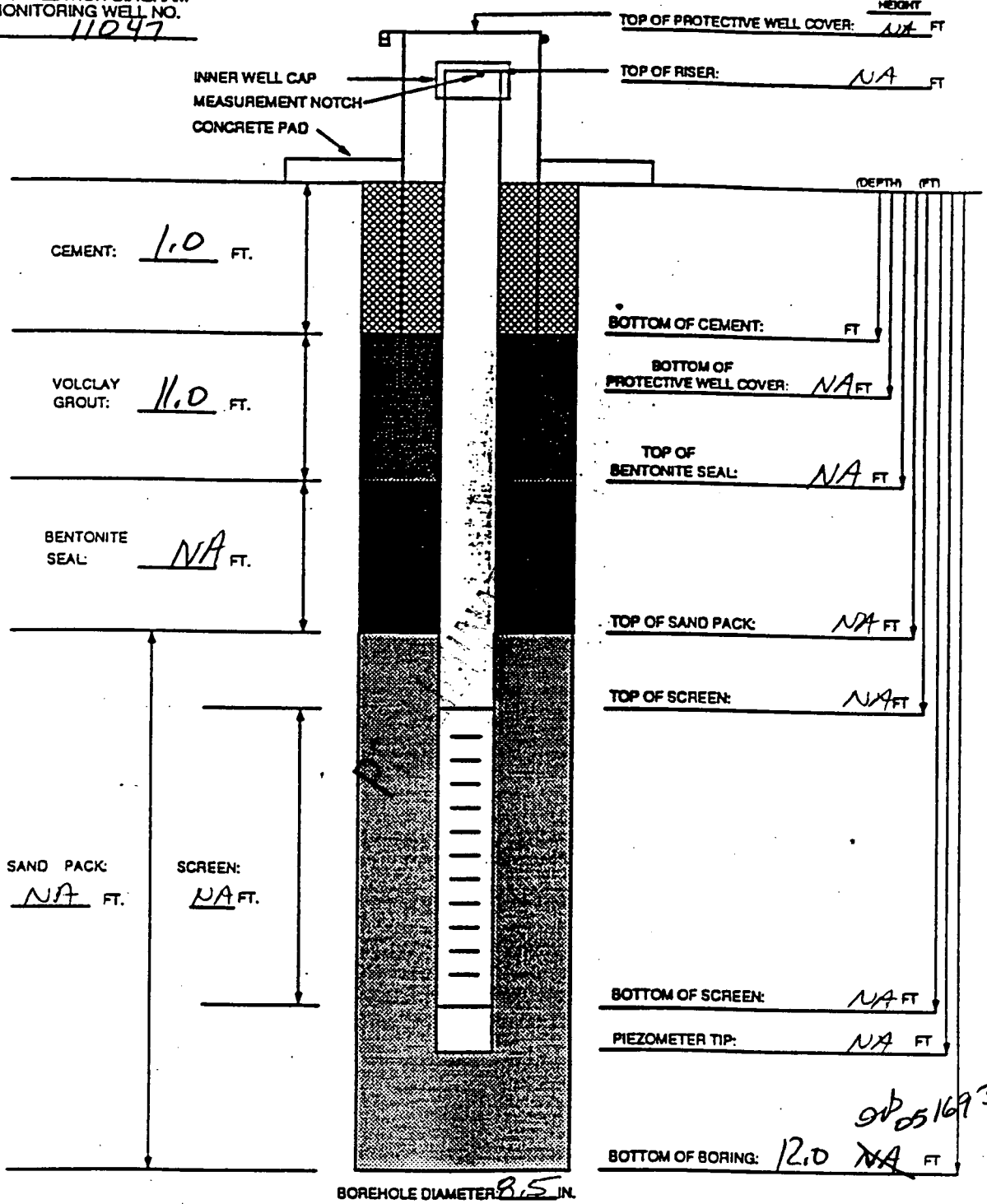
PRELIMINARY

gh 051693

402-11-88

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11047

INSTALLATION DATE: 051693



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 BAGS
AMOUNT OF CEMENT: 1 BAGS
AMOUNT OF WATER USED: ~10 GALLONS
OTHER: 1 DRUM SOIL 1 DRUM WATER/FLUSHES
TASK: 20.03.05

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: J. BOYER

ASI FORM 0157 REV (0)

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FERNALD RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME IFP OU-2 FIELD ENG./GEO. J. Boyer DATE 05/6/93
PROJECT NO. 20.03.05 CHECKED BY _____ DATE _____
BORING NO. 11047
PIEZOMETER NO. NA DATE OF INSTALLATION 05/6/93

BOREHOLE DRILLING

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

PIEZOMETER DESCRIPTION

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

PROTECTION SYSTEM

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

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
2a ~~GROUT/SLURRY~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP NA	BOTTOM NA
2b ~~BENTONITE~~ VOLCLAY	TOP 1.0	BOTTOM 12.0	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE			NA	
GWL AFTER INSTALLATION	NA		NA	

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

REMARKS _____

FERNALD
RI/FS

P-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (ROCII)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2939	COORDINATES:	DATE: 05/15/93
ELEVATION:	GWL: Depth ~54.1 Date/Time 05/27/93	DATE STARTED: 05/15/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/27/93
DRILLING METHODS: CABLE TOOL		PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 1 2	110826 0930 05/15/93	2 4 6 9	18	HARD, 10YR 5/6, silty clay, some mottling, medium plasticity, moist	CL	4.0	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm Drove split spoon 2'
3 4	110827 110828 0940 05/15/93	30 15 16 16	18	HARD, 2.5Y 5/4, silty clay, some mottling, medium plasticity, moist	CL	4.5	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm Drove split spoon 2' Take total U sample 110828
5 6	110829 0945 05/15/93	12 17 15 14	18	SAA	CL	4.5	Bg - 60-80cpm Microtip - 4.0ppm α - 0cpm Drove split spoon 2'
7	110830 0950 05/15/93	12 10 7	16	Very stiff, 2.5Y 5/2, silty clay, some mottling, oxide staining, some very fine sand, medium plasticity, moist	CL	4.0	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm
8 9	110831 0955 05/15/93	7 9 8	18	0-15" SAA - Gravel zone at ~4-6" wet, microtip 2.0ppm 15"-18" Stiff, 2.5Y 5/1, clay, lacustrine, varvum, high plasticity, moist	CL / CH	4.0 / 3.0	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm
10	110832 1335 05/15/93	7 12 12	12	Stiff, 2.5Y 5/1, clay, lacustrine, varvum increasing silt, high plasticity, moist	CH	3.0	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm
11 12	110833 1340 05/15/93	6 12 15	16	0-4" SAA 4"-16" Soft, 2.5Y 4/1, silt, carbonized plant fibers, wet	CH / ML	.5	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm
13	110834 1355 05/15/93	12 12 15	8	Soft, 2.5Y 4/1, silt with increasing fine sand, carbonized plant fibers wet	ML	.5	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm
14 15	110834 1400 05/15/93	5 12 11	0	0-4" SAA 4"-8" Soft 2.5Y 4/1, silt w/ very fine sand carbonized plant fibers, laminar, wet	ML	.5	Bg - 60-80cpm Microtip - 0.0ppm α - 0cpm

NOTES

DRILLING CONTRACTOR: Environmental Drilling

DRILLING EQUIPMENT: Bucyrus - Erie

DRILLER: Bob Erickson

GEOLOGIST: ~~Richard Thomas~~ ~~Bobby Yost~~ - Mike Dean

GEOLOGIST: Jennifer Milchert

ABRV.S: SAA - Same As Above
NA - Not Applicable

- Samples collected per ASTM standard penetration test
- Colors identified using Munsell color chart

PRELIMINARY

406

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FERNALD RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05 (RDC11)	PROJECT NAME. CRU 2 / PHASE 2	
BORING NUMBER: 2939	COORDINATES:	DATE. 05/15-16/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/15/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/27/93
DRILLING METHODS:		PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15 16	110836 1425 05/15/93	1 3 5	6	SAA	ML/CL	.5	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
17 18	110837 1435 05/15/93	1 11 7	6	Very stiff, 2.5Y 5/2, silty clay, some small gravels, medium plasticity, moist	CL	3.5	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
19	114627 1445 05/15/93	12 15 12	6	SAA	CL	3.5	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
20 21	114628 1610 05/15/93	6 10 10	14	Very stiff 2.5Y 4/1, silty clay, some small weathered gravels, med. plasticity, moist - gravel zone at 10" small gravels, wet -	CL	3.5	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
22	114629 1630 05/15/93	12 12 12	12	SAA	CL	3.0	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
23 24	114630 1640 05/15/93	7 7 10	18	SAA	CL	3.0	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
25	114631 0910 05/16/93	11 12 30	4	Very stiff, 2.5Y 4/1, silty clay, some fine sand, some small weathered gravels med. plasticity, moist large gravel at bottom of spoon	CL	3.0	Bq - 60-80 cpm Microtip - 3.6 ppm α - 0 cpm
26 27	114632 0920 05/16/93	12 50/3	8	SAA	CL	4.0	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
28	114633 1425 05/16/93	1 3 20	4	large gravel at bottom of spoon SAA	CL	3.5	Bq - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
29 30	114634 1430 05/16/93	70/3	18	SAA	CL	4.25	Bq - 60-80 cpm Microtip - 0.0 ppm α - .

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Rig Bucyrus-Erie
Driller Bob Erickson
Helper ~~R. Thomas~~ ~~Bobby Yost~~ - M. Kevin Dixon (from 05/16/93)
Sample Tech J. Mikkert

ABRV.s : SAA - Same as Above
NA - Not Applicable

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

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (RACII)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER:	COORDINATES:	DATE: 05/17/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/15/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/27/93
DRILLING METHODS: CABLE TOOL		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30							
31							No sample taken from 30.0 to 31.5 - no split spoon driven
32	114635 0945 05/17/93	1 7 19	4	SAA	CL	4.5	Bz - 60-80 cpm Microtip - 0 ppm α - 0 cpm
33	114636 1045 05/17/93	32 24 30	4	SAA	CL	4.5	Bz - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
34	114637 1335 05/17/93	20 23 20	6	0-2" SAA 2"-6' DENSE, 10YR 5/4, MED TO FINE SILTY SAND ~~very~~ 05/17/93, MOIST	CL / SM	4.0 / NA	Bz - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
35	114638 1540 05/15/93	21 41 49	18	SAA	SM	NA	Bz - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
36				WILL BEGIN SAMPLING EVERY 5.0 FT BEGINNING FROM 35.0' - NEXT SAMPLE 40.0'-41.5'			
37							
38							
39							
40	114639 1435 05/17/93	50 50/1	8	VERY DENSE, 10YR 5/4, MED TO FINE SILTY SAND OXIDE STAINING, SOME LARGE GRAVELS, DRY	SM	NA	Bz - 60-80 cpm Microtip - 0.0 ppm α - 0 cpm
41							
42							
43							
44							
45							

PRELIMINARY

NOTES

DRILLING CONTRACTOR: Pennsylvania Drilling
DRILLING EQUIPMENT: Bucyrus-Erie
DRILLER: Bob Erickson
HELPER: Richard Thomas
GEOLOGIST: Jennifer Mickert

ABRV.'s: SAA - Same As Above
NA - Not Applicable

- Samples collected per ASTM standard penetration test
- Colors identified using Munsell color chart

400

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FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (RDC11)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2939	COORDINATES:	DATE: 05/17 - 20/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/15/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/27/93
DRILLING METHODS: CABLE TOOL		PAGE 4 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45 46	114640 1535 05/17/93	4 35 47	12	SAA	SM	NA	β_γ - 60-80cpm Microrp - 0.0ppm α - 0cpm
47 48 49 50							
5	114641 1625 05/17/93	7 14 33	4	SAA	SM	NA	β_γ - 60-80cpm Microrp - 0.0ppm α - 0cpm Resume continuous sampling
52 53	114642 0915 05/20/93	9 9 10	4	SAA	SM	NA	β_γ - 20-40cpm Microrp - 0.0ppm α - 0cpm
54	114643 0925 05/20/93	8 23 28	8	SAA	SM	NA	β_γ - 20-40cpm Microrp - 0.0ppm α - 0cpm
55 56	114644 0935 05/20/93	50/3	4	VERY DENSE, 10YR 4/4, COARSE TO fine SILTY SAND, MOIST	SM	NA	β_γ - 20-40cpm Microrp - 0.0ppm α - 0cpm
57	114645 1000 05/20/93	8 8 15	12	0-8" SAA 8"-12" MEDIUM DENSE, 2.5Y 4/1, COARSE TO MEDIUM GRAINED SAND, WET - TOP of Aquifer WATER	SM / SP	NA	β_γ - 20-40cpm Microrp - 0.0ppm α - 0cpm
58 59	114646 1020 05/20/93	8 12 12	12	SAA	SP	NA	β_γ - 40-60cpm Microrp - 0.0ppm α - 0cpm
60	114647 1350 05/27/93	3 12 18	8	MEDIUM DENSE, 2.5Y 4/1, COARSE TO MEDIUM GRAINED SAND, some fine GRAVELS, WET	SP	NA	β_γ - 40-60cpm Microrp - 0.0ppm α - 0cpm

PRELIMINARY

NOTES

DRILLING CONTRACTOR Pennsylvania Drilling
DRILLING EQUIPMENT Bucyrus - Erie
DRILLER Bob Erickson
HELPER Richard Morris
LOGGING TECH Jennifer Mickert

ABRV.S: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

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

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03 05 (RCC11)	PROJECT NAME: CRU 2 / PHASE 2	
BORING NUMBER: 2939	COORDINATES:	DATE: 05/20/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/15/93
ENGINEER/GEOLOGIST: P. McCARREN	Depth Date/Time	DATE COMPLETED: 05/27/93
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
60				SEE PREVIOUS PAGE			
61 62	114648 1400 05/20/93	29 49 27	18	VERY DENSE, 2.5Y 4/1, COARSE TO MED GRAINED SAND, SOME FINE SAND, SOME FINE GRAVELS, WET * GRAVELS ARE CHEMICAL WEATHERING	SP	NA	B_g - 20-40 cpm MICROTIP - 0.0 ppm α - 0.0 cpm
63	114649 1415 05/20/93	16 30 39	18	SAA	SP	NA	B_g - 20-40 cpm MICROTIP - 0.0 ppm α - 0 cpm
64 65	~~114650~~ NA ~~1515~~ ~~05/20/93~~	for 05/20/93 NA	NA				B_g - NA MICROTIP - NA α - NA - NO SAMPLE TAKEN, NO SPLIT SPOON DRIVEN
for 05/20/93 66	~~114651~~ 1515 05/20/93	5 4 5	ϕ	NO RECOVERY			B_g - NA MICROTIP - NA α - NA
67 68	114652 1530 05/20/93	19 19 25		SAA			B_g - 20-40 cpm MICROTIP - 0.0 ppm α - 0.0 cpm
69				NO SAMPLE COLLECTED			
70 71				BOTTOM OF BORING 69.0' AN ADDITONAL 5.0' OF CASING DRIVEN TO HOLD SAND			COLLECTED STEEL ANALYSIS SAMPLE FROM 500 - 68.0' 114651 - 10" STEEL CASING USED FROM 0.0 ft TO 69.0 ft ~ 500 GALLONS WATER USED - WILL INSTALL 4" STAINLESS STEEL WELL

NOTES

DRILLING CONTRACTOR: Pennsylvania Drilling

DRILLING EQUIPMENT: Bucyrus Erie

DRILLER: [illegible]

HELPER: [illegible]

SAMPLE TEAM: [illegible]

ABRV.S: SAA - SAME AS ABOVE
NA - NOT APPLICABLE

- SAMPLES COLLECTED PER ASTM STANDARD DENSITRAT IV TEST
- COLORS IDENTIFIED USING MUNSELL COLOR CHART

PRELIMINARY

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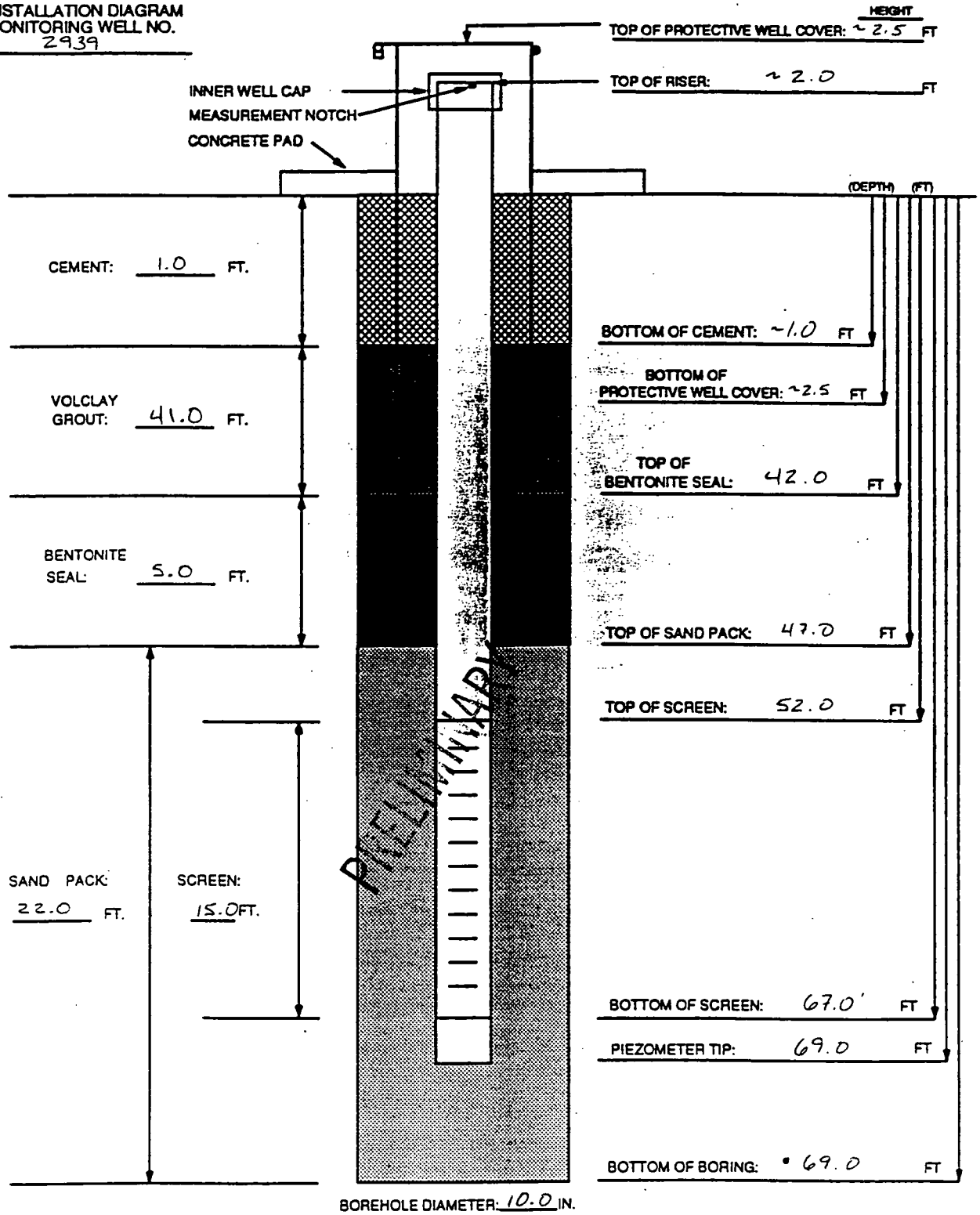
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 2939

INSTALLATION DATE: 05/27/93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 22 50lbs Bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5 Bkts
BAGS OF VOLCLAY GROUT: 10 50lbs Bags
AMOUNT OF CEMENT: 1 50 lb Bag
AMOUNT OF WATER USED: ~ 500 gallons
OTHER: 13 Drums Drill Cuttings 1 Drum Decon Water
TASK: 20.03.05 (RDC11)

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 54.1 FT/ 05/27/
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: Paul C. McCarren

ASI FORM 0157 REV: (0)

-4529

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Cru 2 / Phase 2 FIELD ENG./GEO. D. McCarren DATE 05/27/93
PROJECT NO. 20.03.05 (RDC11) CHECKED BY _____ DATE _____
BORING NO. 2939
PIEZOMETER NO. MW 2939 DATE OF INSTALLATION 05/27/93

BOREHOLE DRILLING

DRILLING METHOD Cable tool
DRILLING FLUID (S) USED: yes
FLUID water FROM 0.0 ft TO 69.0 ft
FLUID _____ FROM _____ TO _____

TYPE OF BIT Hammer percussion
CASING SIZE (S) USED:
SIZE 10.0 in FROM 0.0 ft TO 74.0 ft
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 in
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.010 in
TOTAL PERFORATED AREA 15.0 ft

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 in I.D. 4.0 in
LENGTH OF PIPE SECTIONS 5-10 ft 2 - 2 ft
JOINING METHOD screw type - flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. 10.0 in

OTHER PROTECTION Hinged locking cover with pad lock

PRELIMINARY

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		
Holday CEMENT GROUT / ~~SLURRY~~ 05/27/93	TOP 1.0	BOTTOM 42.0	TOP	BOTTOM
BENTONITE PELLETS	TOP 42.0	BOTTOM 47.0	TOP	BOTTOM
SAND 10/20	TOP 47.0	BOTTOM 69.0	TOP	BOTTOM
GRAVEL - NONE USED	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 52.0	BOTTOM 67.0	TOP	BOTTOM
PIEZOMETER TIP	69.0			
BOTTOM OF BOREHOLE	69.0			
GWL AFTER INSTALLATION	54.1			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS Cement placed from 0.0 ft to 1.0 ft to hold protective pipe in place
Water level 05/27/93 ~54.1 below ground surface

412 321

409-1

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03.05	PROJECT NAME. OU2-IFP		
BORING NUMBER 11051	COORDINATES.		DATE 5/26/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/26/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/27/93
DRILLING METHODS Hollow Stemaugr			PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0							Bγ = 60cpm - 5/26/93; 80-100 - 5/27/93
	NA	NA	NA	Augered 0-19 Ft Black Flyash	NA	NA	NA
19	116436 1440 5/26/93	100/4"	4"	Mixed terracotta pipe material and Flyash. Wet	NA	NA	Bγ = 800 cpm; Mt = 2.0 ppm
21	116438 116439 116440 0840	10 100/2"	6 2	Mixed waste materials, concrete, black flyash, soil is silty fine sand	NA	NA	Bγ = 1600 cpm; Mt = 0.5 ppm
JR 5/27/93	NA	NA	NA	NA	NA	NA	NA
22	116441 116442 116443 1010	100 200 100 10	6 6 6 6	Mixed waste, bolts, nails flyash. Soil is silty fine sand material	NA	NA	Bγ = 1000 cpm; Mt = 1.5 ppm
24	116444 1050	4 6 8 10	6 6 6 6	SAA; very stiff 2.5Y 4/1 silty clay, medium plasticity moist. Abrupt boundary to very stiff 10YR 4/3 silty clay, medium plasticity moist	Cl	2.5	Bγ = 3000 cpm waste, 100 cpm soil; Mt = 2.0 ppm waste, 1.2 ppm soil
26	NA	8 14 100/5"	6 6 5	SAA	Cl	2.5	Bγ = 400 cpm; Mt = 1.0 ppm
28							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment

Driller

SAA - Same as above
NA - Not Applicable
Mt - Microtip

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 20.03 05	PROJECT NAME. OU2-IFP		
BORING NUMBER 11051	COORDINATES.		DATE 5/27/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 5/26/93
ENGINEER/GEOLOGIST J. Reagan	Depth	Date/Time	DATE COMPLETED. 5/27/93
DRILLING METHODS Hollow stem auger			PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
28	116445 1500	5	4	Medium dense, 10YR 5/6,	SP	NA	βγ = 80cpm
	116446 1500	10	4	Poorly graded medium sand,			Mt = 0.5ppm
29 (92 5/27/93)	116447 1500	10	4	low plasticity, moist			
	116448 1500	10	4				
30 (92 5/27/93)				Bottom of boring 30'			
1							
2							
3							
4							
5							
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Acker soil sentry
Driller M. Watial
B. Deiley

SAA - Same as above
NA - Not Applicable
Mt - Microtop
Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

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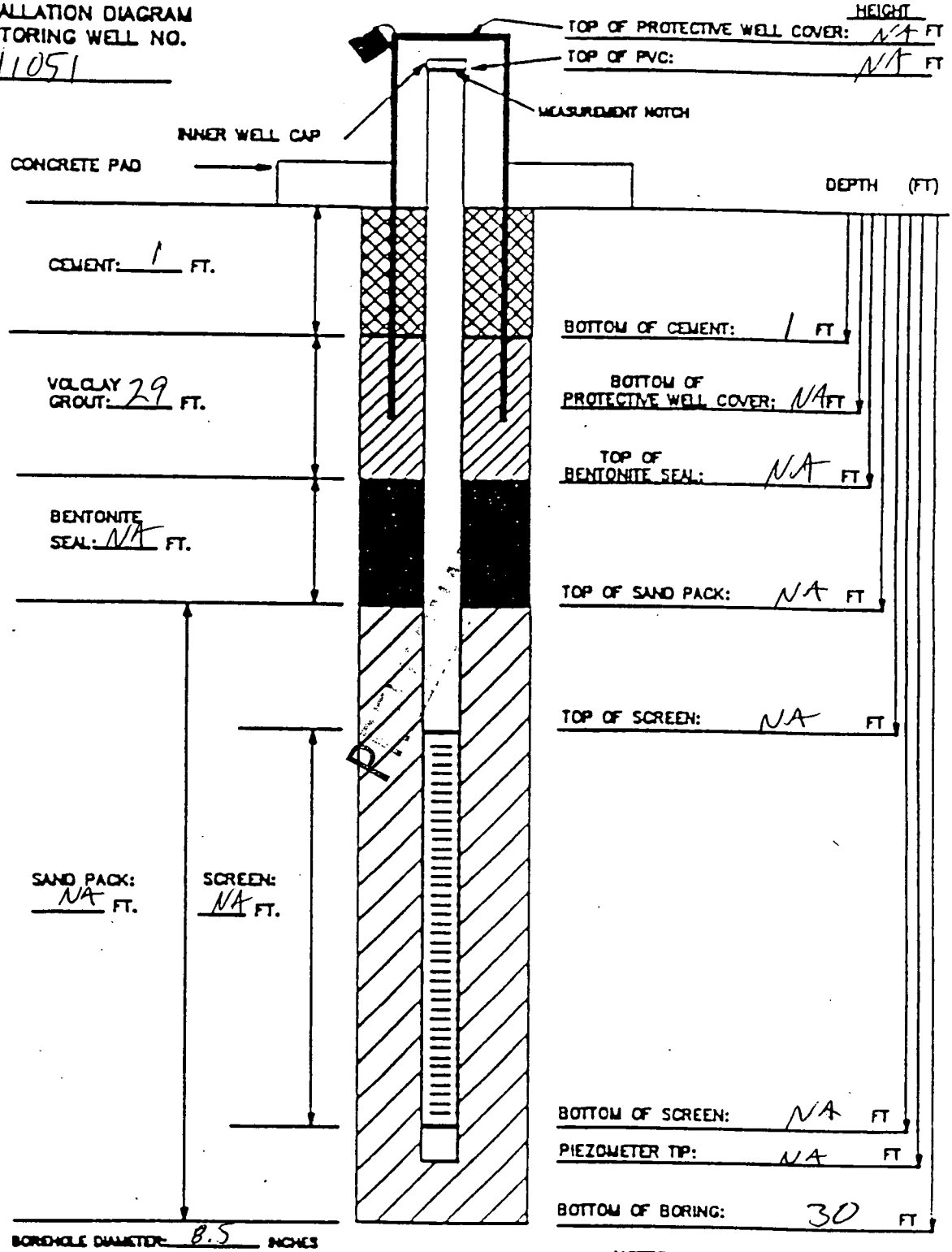
INSTALLATION DATE: 5/26-5/27 9R 5/27

FERNALD RI/FS

INSTALLATION DIAGRAM
MONITORING WELL NO.
11051



MATERIALS USED:

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 7
AMOUNT OF CEMENT: 1/2
AMOUNT OF WATER USED: 50 gal
OTHER: NA

NOTES:

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

TASK: 20.03.05

GEOLOGIST/ENGINEER: J. Reagan

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FERNALD RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU-I FP
PROJECT NO. 20.03.05
BORING NO. 11051
PIEZOMETER NO. NA

FIELD ENG./GEO. J. Reagan DATE 5/27/
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 5/26 - 5/27/9

BOREHOLE DRILLING

DRILLING METHOD Hollow stem auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT auger
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 (NA)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↓	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1	BOTTOM 30	TOP NA	BOTTOM
~~BENTONITE~~ CEMENT	TOP 0	BOTTOM 1	TOP ↓	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP ↓	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP ↓	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	30.0'			
GWL AFTER INSTALLATION	NA			

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

416

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RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
ING NUMBER: 11085	COORDINATES:	DATE: 05/27/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/27/93	
ENGINEER/GEOLOGIST: A. Como	Depth Date/Time	DATE COMPLETED: 05/28/93	
DRILLING METHODS: Hollow stem Auger w/ 2" Split Spoon		PAGE 1 OF 2	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY in	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0800 113243 113244	9 12 20	6 6 0	Hard (10YR 4/3) dark brown clayey silt ac 05/27/93, no plasticity, dry	ML ac 05/27/93	3.0	MT = 1.5 ppm BZ = 25-50 cpm
1.5	0805 113245	20 20 12	6 0 0	Hard (5Y 7/2) light gray silty clay, no plasticity, dry, some (10YR 4/3) dark brown silty clay	CL	2.0	MT = 1.5 ppm BZ = 25-50 cpm
3.0	0810 113246 113247	4 5 5	6 6 0	Hard (2.5Y 5/6) light olive brown and (5Y 7/2) light gray silty clay medium plasticity, dry	CL	2.5	MT = 0.4 ppm BZ = 25-50 cpm
4.5	0815 113248 113249 113250	7 7 10	6 6 6	SAA, some gravel	CL	2.5	MT = 0.4 ppm BZ = 25-50 cpm
6.0	0835 113251 113252 113253	6 7 8	6 6 2	Hard (2.5Y 5/4) light olive brown silty clay, some (5Y 7/2) light gray silty clay, medium plasticity, dry	CL	3.5	MT = 0.4 ppm BZ = 25-50 cpm
7.5	0840 113254 113255 113256	16 10 10	6 6 6	Hard (10YR 6/2) light brownish gray and (10YR 5/6) yellowish brown silty clay, dry ac 05/27/93 — 8.5' medium dense (10YR 6/2) light brownish gray and (10YR 5/6) yellowish brown clayey silt, dry	CL ML	3.5	MT = 0.4 ppm BZ = 25-50 cpm at 9.0' thin wet well graded sand lense
9.0							MT = 0.4 ppm BZ = 25-50 cpm

NOTES:

Drilling Co. Pennsylvania Drilling Co.

Driller Sam Smith

Assistant Don Arthur

SAA - Same As Above

Split spoons driven by ASTM standards

402-11-86

FERNALD
RI/FS

-4529

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 20.03.05	PROJECT NAME: OU2 Phase II		
BORING NUMBER: 11085	COORDINATES:	DATE: 05/27/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 05/27/93	
ENGINEER/GEOLOGIST: A. Lomo	Depth Date/Time	DATE COMPLETED: 05/28/93	
DRILLING METHODS: 4¼ Hollow Stem Auger w 2" split spoon		PAGE 2 OF 2	

DEPTH - ft -	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER - 6 in -	RECOVERY 05/27/93	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	0850	7	6	Hard (2.5Y 6/6) olive yellow silty clay, slight plasticity, some (5Y 6/1) gray silty clay, dry	CL	2.5	MT = 0.4 ppm Bσ = 25-50 cpm
	113257	10	6				
	113258						
	113259	12	6				From 10.0 to 10.5 limestone gravel
10.5	0855	16	6	Hard (2.5Y 5/4) light olive brown silty clay, medium plasticity, small gravel, moist	CL	3.5	MT = 0.4 ppm Bσ = 25-50 cpm
	113260	23	6				
	113261						At 11.5' a clayey silt wet zone
	113262	24	6				
12.0	0920	12	6	Dense (2.5Y 5/4) light olive brown silt, some small gravel, wet	ML	NA	MT = 0.4 ppm Bσ = 25-50 cpm
	113263	15	6				
	113264			12.5 Dense (2.5Y 5/4) light olive brown well graded sand, wet	SW		
	113265	15	6				
13.5	0925	12	6	Dense (2.5Y 5/4) light olive brown well graded sand, some silty clay, wet	SW	NA	MT = 0.4 ppm Bσ = 25-50 cpm
	113266	20	6				
	113267						
	113268	21	6				
15	0940	10	6	Firm (2.5Y 5/4) light olive brown silty clay, medium plasticity, moist 15.5'	CL	1.5	MT = 0.4 ppm Bσ = 25-50 cpm
	113269	15	6	Firm (5Y 5/1) gray silty clay, some (10YR 5/4) yellow brown silty clay, no plasticity, some well graded (5Y 5/1) gray fine sand, dry			
	113270					1.5	
	113271	13	6		CL		
16.5				End of Boring set MW-11085			

NOTES:

Drilling Co. Pennsylvania Drilling Co.
Driller Sam Smith
Assistant Don Arthur

MT = 0.4 ppm
Bσ = 25-50 cpm

NA - Not Applicable

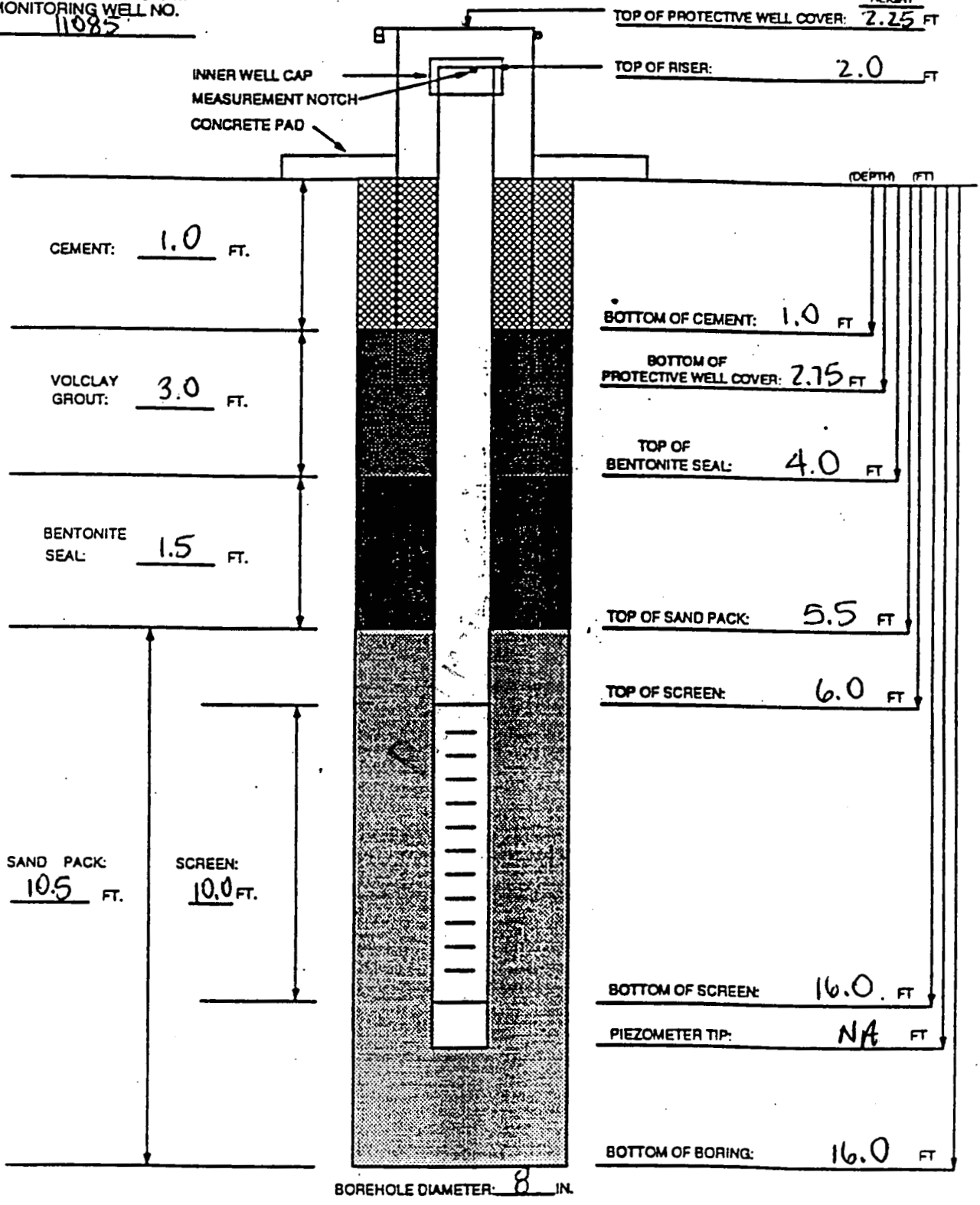
Split Spoons driven by ASTM standards

418 330

E-4509

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1108S

INSTALLATION DATE: 05/28/93



MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 7 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 1
F... OF VOLCLAY GROUT: 1
A... UNT OF CEMENT: 2 bags
AMOUNT OF WATER USED: 5 gallons
OTHER: 2" stainless steel
TASK: Monitoring Well

NOTES:

1) RISER PIPE IS 2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 2 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 NA FT/...
5) TOP OF CASING IS SECURED WITH ... STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH ... GROUND LEVEL.
7) WELL CASING HAS A PROTECT... COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: A. Como

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ASI FORM 0157 REV. (0)

FERNALD
RI/FS

-4529

PIEZOMETER INSTALLATION SHEET

PROJECT NAME OU2 Phase II
PROJECT NO. 20.03.05
BORING NO. 11085
PIEZOMETER NO. NA

FIELD ENG./GEO. A. Como DATE 05/28/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 05/28/93

BOREHOLE DRILLING

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

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

PIEZOMETER DESCRIPTION

TYPE 2" 10 slot stainless steel
DIAMETER OF PERFORATED SECTION 2"
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS 10 slot
TOTAL PERFORATED AREA 10 ft

RISER PIPE MATERIAL 2" stainless steel
RISER PIPE DIAMETERS:
O.D. 2" I.D. _____
LENGTH OF PIPE SECTIONS 8.0 ft
JOINING METHOD screw flush joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 ft
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.75 ft			
BOREHOLE FILL MATERIALS:	0.0	1.0		
Cement GROUT/SLURRY	TOP 1.0	BOTTOM 4.0	TOP	BOTTOM
BENTONITE	TOP 4.0	BOTTOM 5.5	TOP	BOTTOM
SAND	TOP 5.5	BOTTOM 16.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 6.0	BOTTOM 16.0	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	16.0			
GWL AFTER INSTALLATION	NA			

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

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